2021

Electrical Engineering Objective Type

ULTIMATE PROFESSIONAL CAREER SERIES

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Chapter # 1 Electric Current and Ohm's Law

1) Resistivity of wire depends on **Material**.
2) When n resistances each of value r are connected in parallel, then resultant resistance is x. When these n resistances are connected in series, total resistance is $\boldsymbol{n^2}$**x**.
3) Resistance of a wire is r ohms. The wire is stretched to double its length, then its resistance in ohms is **4r**.
4) Kirchhoff 2nd law is based on law of conversation of **Energy**.
5) The diameter of nucleus of an atom is of the order of $\mathbf{10^{-14}}$**m.**
6) The mass of proton is roughly **1840 times** the mass of an electron.
7) The charge on an electron is known to be 1.6 x10^{-19} coulomb. In a circuit the current flowing is 1 A. **0.625x** $\mathbf{10^{19}}$**electrons** will be flowing through the circuit in a second.
8) Two bulbs marked 200 watt-250 volts and 100 watt-250 volts are joined in series to 250 volts supply. the power consumed in the circuit is **67 watt.**
9) Ampere second could be the unit of **charge.**
10) **Ampere/volt** is not the same as watt.
11) One kilowatt hour of electrical energy is the same as **36x** $\mathbf{10^5}$ **joules.**
12) All electric current of 5A is same as **5 C/sec.**
13) An electron of mass m kg and having a charge of e coulombs travels from rest through a potential difference of V volts. Its kinetic energy will be **eV.**
14) The value of the following is given by 100(kilo ampere) x (micro ampere) = **0.1A**
    100 milli ampere x 10 ampere
15) A circuit contains two un-equal resistances in parallel, **potential differences across each is same.**
16) Conductance is expressed in terms of **mho.**
17) the value of resistivity of copper **1.7x**$\mathbf{10^{-8}}$ **ohm-cm.**
18) A copper wire of length *l* and diameter *d* has potential difference V applied at its two ends. The drift velocity is *vd.* If the diameter of wire is made *d/3,* then drift velocity becomes ***vd.***
19) Two resistances R1 and R2 give combined resistance of 4.5 ohms when in series and 1 ohm when in parallel. The resistances are **1.5ohm and 3ohm.**
20) We have three resistances of values 2 ohm , 3 ohm ,and 6 ohm. **2 ohm resistance in series with parallel combination of 3 ohm and 6 ohm resistance** give an effective resistance of 4 ohm.

21) Three equal resistors are connected in series across a source of emf together dissipate 10 watts of power. The power would be dissipate in the same resistors when they are connected in parallel across the same source of emf is **90 watt.**
22) Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be **1/16 times.**
23) Twelve wire of same length and same cross-section are connected in the form of a cube. If the resistance of each wire is R, then the effective resistance between P and Q will be **5/6 R.**
24) When P= Power, V= Voltage$I$ = Current, R = Resistance and G= Conductance, **G=P/I^2 is incorrect relation.** (V=$\sqrt{PR}$, P=V^2G, I=$\sqrt{P/R}$ are correct relations).
25) The unit of electrical conductivity is **mho/ metre.**
26) The ratio of the resistance of a 100 W,220V lamp to that of a 100W, 110 V lamp will be nearly **4.**
27) The resistance of 100W ,200V lamp is **400 ohm.**
28) Two 1 kilo ohm, ½ W resistors are connected in series. Their combined resistance value and wattage will be **2kΩ, 1W.**
29) **Wheat stone bridge method** can be used for absolute measurement of resistances.
30) Three 3 ohm resistors are connected to form a triangle. the resistance between any two of the corner is **2Ω.**
31) **4 combinations** may be obtained with three resistors. Each having the resistance R.
32) A wire of 0.14 mm diameter and specific resistance 9.6 μΩ - cm is 440 cm long. The resistance of the wire will be **27.4Ω.**
33) Ohm’s law is not applicable to **semiconductors.**
34) A metal resistor has a resistance of 10 ohms at 0°C and 11 ohms at 160°C, the temperature coefficient would be **0.000625/C.**
35) Specified resistance of a substance is measured in **ohm-cm.**
36) A wire of resistance R has it length and area of cross-section both doubled. Its resistance will become **R.**
37) Ohms law is applicable on **insulators.**
38) The element of an electric heater is made of **nichrome.**
39) 5×10^{16}electrons pass across the section of a conductor in 1 minutes and 20 seconds. The current is flowing **0.1mA.**

40) Three elements having conductance G1, G2, and G3 are connected in parallel. Their combined conductance will be **G1+G2+G3.**
41) A cube of material of side 1 cm has a resistance of 0.002 Ω between its opposite faces. If the same volume of the material has a length of 8 cm and a uniform cross - section, the resistance of this length will be **0.128 ohm.**
42) A 60W bulb is connected in series with a room heater and combination is connected across the mains. If the 60W is replaced by a 100W bulb, the heater output will **increase.**
43) Two aluminium conductors have equal length. The cross-sectional area of one conductor is four times that of the other. If the conductor having smaller cross-sectional area has a resistance of 100 ohms the resistance of other conductor will be **25 ohm.**
44) A nichrome wire used as a heater coil has a resistance of 1ohm/m. for a heater of 1kw at 200v, the length required is **40 m.**
45) Variable resistors are **wire wound resistors.**
46) Low resistance can be accurately measured by **Kelvin Bridge.**
47) A heating element of a hot plate on an electric cooking range draws 12 A from 240 v mains. **3.6 kwh** of energy will be consumed in one hour and 15 min.
48) Temperature coefficient of resistance is expressed in terms of ohms/ohm°C.
49) If R1 is the resistance of a coil of copper at t ºC and RT is the resistance at T ºC and also the resistance temperature coefficient of copper per degree centigrade at 0ºC is 1/234.45, then Rt/RT is **(234.45 + t) / (234.45 + T).**
50) Resistivity is usually expressed in terms of **ohms/cm-cube.**
51) **Copper** material is expected to have least resistivity.
52) The shunt winding of a motor has a resistance of 85 ohm at 22ºC. When the motor runs at full load, its resistance increases to 100 ohms. The resistance temperature coefficient of winding per 0ºC is 0.004. The rise in temperature of the winding will be nearly **70ºC**.
53) The resistance temperature coefficient is defined as **the ratio of increase in resistance per degree centigrade to the resistance at 0ºC.**
54) Two coils connected in series have resistance of 600 ohm and 300 ohm and temperature coefficients of 0.1% and 0.4% respectively. The resistance of the combination at 50ºC will be **990 ohms**.
55) A 100 W, 200 V filament lamp has operating temperature of 2000ºC. The filament material has resistance temperature coefficient of 0.005 at 0ºC per ºC. The current taken

by the lamp at the instant of switching with 200 V supply with filament temperature of 20ºC will be **5 A**.

56) A fuse is always installed in a circuit is **series**.
57) The rating of fuse wire is expressed in terms of **Amperes**.
58) **Carbon** material is not used as fuse material.
59) The current carrying capacity of the fuse material depends on cross-sectional area, length and material **all of the these.**
60) According to the fuse law, the current carrying capacity varies as **(diameter)**$^{3/2}$
61) A 100 W bulb is connected in series with a room heater of 750 W. What will happen if the bulb is replaced by a 60W bulb **Heater output will decrease.**
62) An immersion rod heats a bucket of water in 15 minutes. In order that the water should boil in 10 minutes **length of heating element of the rod should be reduced.**
63) A lamp of 100 W at 200 V is supplied current at 100 volts. It will be equivalent to the lamp of **25 W.**
64) Two electric bulbs of 100 W, 200 V are put in series and the combination is supplied 100 V. The power consumption of each bulb will be **100 / 16 W.**
65) Filaments of electric bulbs are usually made of **tungsten**.
66) The value of supply voltage for 500 W ,5-ohm load is **50V**.
67) **10-ohm, 50 W** resistor will be physically larger in size.
68) Four resistances R1, R2, R3 and R4 are connected in series against 220 V supply. The resistances are such that R1 > R2 > R3 > R4. The least power consumption will be in resistor **R_4** .
69) 100 resistors of 100 ohms each arc connected in parallel. Their equivalent resistances will be **1 ohm**.
70) For a fixed supply voltage, the current flowing through a conductor will decrease when **length of the conductor is increased.**
71) when current flows through heater coil it glows but supply wiring does not glow because **resistance of heater coil is more than that supply wires**.
72) The resistance of 1-meter length of 18-gauge copper wire is k ohm. The resistance of one meter length of 24-gauge copper wire will be **more than k ohm.**
73) If the length and diameter of a conductor is tripped, the resistance will increase approximately by **-66 $^2/_3$ %.**
74) If the resistance of an incandescent light bulb changes as the voltage across the bulb is changed, **the bulb is a type of non-linear resistance**.

75) **wheat stone bridge method** can be used for absolute measurement of resistance
76) Two 1 kilo ohm, 1/2 W resistors are connected in series. Their combined resistance value and wattage will be **2 k ohm, 1 W**.
77) The resistance of 100 W, 200 V tamp is **400 ohm**.
78) A cylindrical wire is compressed in length by 10%. The percentage decrease in the resistance will be **19%.**
79) The unit of conductance is **mho**.
80) The unit of conductivity is **mho / m**
81) Ohm's law is not applicable on Electrolysis, Arc lamps, Vacuum radio valves except **insulators.**
82) **10 V across two 10-ohm resistances in parallel circuit the voltage source** produces the most current.
83) A piece of sliver wire has a resistance of 1 ohm. A manganin wire has specific resistance 30 times that of silver. The resistance of a manganin wire of one fourth length and one third diameter will be **67.5 ohm.**
84) A cube of material of side 1 cm has a resistance of 0.002 ohm between its opposite faces. If the same volume of the material has a length of 8 cm and a uniform cross-section, the resistance of this length will be **0.128 ohm**.
85) According to Joule law heat produced by a current I while in flowing through a material of resistance R for a length of time T, is proportional to **(I^2RT**).
86) In the color code for resistances black color represents the number **0**.
87) In the color code white color represents the number **9**.
88) In the color code number 3 is represented by **orange**.
89) The condition for the validity under Ohm's law is **Resistance must be uniform**.
90) Production of heat due to current is related by **joule's law**.
91) A 1 k, 1 W resistor can safely pass a current of **30mA**.
92) The resistance to the flow of current through a copper wire increases as **the length of wire increases.**
93) For the same voltage, the ratio Resistance of 100 W lamp Resistance of 25 W lamp is **1 / 4.**
94) The voltage drop across a resistor of 100 ohm is 10 volts. The wattage of the resistor must be **1 W.**
95) A 100 volt bulb has a resistance of 500 ohms. The number of hours it can work for every kWh of energy consumed will be **50.**

96) A semi-conductor isa material whose conductivity is same as **between that of a conductor and an insulator.**
97) Two resistors R1 = 47 kohm, 1 W and R2 = 0 ohm, 1 W are connected in parallel. The combined value will be **0 kohm, 1W.**
98) A rheostat differs from potentiometer in the respect that **rheostat has higher wattage ratings.**
99) For the same electrical resistance, the weight of aluminium conductor as compared to copper conductor of identical cross-section is **50%.**
100) A drawn wire of resistance 25 ohm is further drawn so that its diameter becomes one fifth. Its resistance will now be **625**
101) Thermistor has **negative coefficient of resistance.**
102) The current at a given point in a certain circuit may be written as a function of time t, as i (t) = -3 + t. The total charge passing a point between t = 99 and t = 102 sec will be **292.5 coulombs.**
103) A certain passive circuit element has the characteristic that the instantaneous voltage across it is always exactly three times the cube of the instantaneous current through itThe power being dissipated when i = 0.1 A will be 3 x 10 -4 W.The power being dissipated when i = 10 A will be **30KW.**
104) A resistor has the value of 30 kohm and the current in it is measured to be 0.5 mA. The conductance is 3.33 x 10-5. the terminal voltage must be **15V.**
105) The charge of an electron is known to be 1.6 x 10-19C. **6.2 x 10^18** electron does not 1 make it C of charge.
106) Certain substances lose their electrical resistance completely at finite low temperatures. Such substances are called **super-conductors.**
107) We have three resistances each of 1 ohm. **four** different values of resistance can be obtained by different series-parallel combinations if all the three resistances are to remain in the circuit.
108) A resistor has the value of 3 kohm and the current through it is measured to be 0.3 mA. The conductance is **0.33 milli mho.**
109) When checked with an ohm meter an open resistor reads **infinite**.
110) A current of 1 mA flows through a 1 Mohm, 2 W carbon resistor. The power dissipated as heat in the resistor will be **1W.**
111) Brown, black, orange and no tolerance bandcarbon coded resistor has value of **10 kohm with 20% tolerance.**

112) A 10 ohm resistor with a 10 W power rating is expected to be **a wire wound resistor.**

113) Two 10 kohm, 5 W resistors in parallel have equivalent resistances of 5 kohm and power rating of **10W.**

114) **10-ohm, 50 W** is typical resistance and power dissipation value for a wire wound resistor.

115) A 100 kohm resistor with a 1 W power rating is likely to be **a carbon resistor.**

116) Two 5 kohm, 5 W resistors in series have equivalent resistance of **10 kohm with power rating of 10W.**

117) **1000,000-ohm, 1 W** are typical resistance and power-dissipation values for a carbon-composition resistor.

118) A resistor is to be connected across a 45 V battery to provide 1 mA of current. The required resistance with a suitable wattage rating **is 45 kohm, 1/4 W.**

119) For a carbon-composition resistor color-coded with yellow, violet, orange and silver stripes from left to right, the value of resistance and tolerance are **47ohm ± 10%.**

120) For a carbon-composition resistor color coded with green, black, gold and silver stripes from left to right, the resistance and tolerance **are 5 ohm ± 10%.**

121) A resistor with the color coded value of 1000 ohms and ± 10% tolerance can have an actual resistance between **900 ohm and 1100 ohm.**

122) For carbon resistors green is the color for **5.**

123) For carbon resistors, darker colour generally have values close to **1.**

124) In a carbon resistor in case fourth stripe is not present, it can be concluded that the tolerance limit is **± 20 %.**

125) The four stripes of a resistor are yellow-violet-orange-gold. The value of resistor should be **47 kilo ohm ± 5%.**

126) The tolerance for silver stripe is **± 10%.**

127) iron can have **positive or negative charge.**

128) In series as well as parallel circuits the equivalent (total) value of certain parameter is given by X = X1 + X2 + X3 + X4 + ... The parameter X could be **power..**

129) The resistance of a 150-scale voltmeter is 12000 ohms. The power consumed by the voltmeter when it is connected across a 125 volt circuit, will be nearly **1.3W.**

130) Materials having electrical conductivity much less than most of the metals but much greater than that of typical insulators, are known as **semiconductors.**

131) In a nickel-cadmium-alkali cell the electrolyte is **potassium hydroxide.**

132) Two batteries have an open-circuit voltage of 12.8 volts each and an internal resistance of 0.08 ohms. The short circuit current of two batteries connected in parallel will be **320A.**

133) All good conductors have **high conductance.**

134) A light dependent resistor is basically a **variable resistor.**

135) Voltage dependent resistors are usually made from **silicon carbide.**

136) The power rating of a 470 ohm resistor carrying a current of 40 mA should be **1W.**

137) Voltage dependent resistors are used to **suppress surges.**

138) Metals approach super-conductivity conditions near **absolute zero temperature.**

139) resistance decreases with rise in temperature in **NTC Thermistor.**

140) The equivalent resistance of 2N branches in parallel, each having resistance N/2 ohms will be **1/4 ohm.**

Chapter # 2 Source of EMF

1. The mass of an ion liberated at an electrode is directly proportional to the quantity of electricity which passes through the electrolytes called **Faraday law of electrolysis.**
2. For all substances, chemical equivalent is **96500 coulombs.**
3. The plates of lead acid battery are made of **cast animonial lead alloy.**
4. In a lead acid battery, separators are provided **to avoid internal short circuit.**
5. Filters in lead acid battery are provided **to facilitate flow of gases.**
6. In case of lead acid battery, during discharging both anode and cathode become **PbSO4.**
7. In lead acid battery during charging, **specific gravity of acid increases.**
8. The value of specific gravity of acid when lead acid battery is fully charged is **1.285**
9. The active material on positive and negative plate of fully charged lead acid battery is **lead peroxide and pure lead.**
10. A floating battery is one which supplies current **intermittently and also during off cycles gets charged.**
11. **Lead acid cell** has reversible chemical reaction.
12. Dry cell is basically a **leclanche cell.**
13. During charging, electrolyte of lead acid battery becomes **stronger.**
14. On ampere hours basis the efficiency of lead acid battery is in the range of **90 to 95%.**
15. In Edison cell, electrolyte is **potassium hydroxide.**
16. Life of lead acid battery is expected to be **2 to 5 years.**
17. The indication of state of charge is best given by **specific gravity of electrolyte**
18. Common impurity in battery electrolytes is **iron.**
19. Open circuit voltage of fully charged lead acid battery is **2.7 volt.**
20. The capacity of storage battery is expressed as **ampere hours** it can deliver.
21. On watt hours basis the efficiency of lead acid battery is in the range of **70 to 85 percent.**
22. The emf of storage battery depends upon **nature of electrodes.**
23. The internal resistance of dry cell is of the order of **0.2 to 0.4 ohm.**
24. Proper charging rate of lead acid battery is **1/8 of rated ampere hour capacity.**
25. For a group of cells, when internal resistance is equal to external resistance battery will give **maximum current.**
26. One ampere hour charge is equivalent to **3600 coulombs**.
27. When water is added to sulphuric acid, **lots of heat generated.**

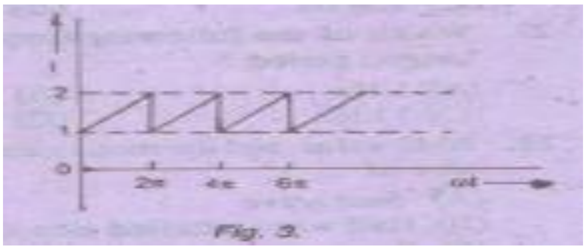
28. Electro chemical reactions are not reversible in case **of primary cells only.**
29. The energy in lead acid battery is stored in the form of **chemical energy.**
30. The electrolyte in leclanche cell is **aqueous solution of ammonium chloride.**
31. Electrode for a battery must be **good conductor of electricity.**
32. For discharged lead acid battery, the specific gravity is **1.12**
33. Even when not in use, self-discharge of battery occurs at the rate of **0.5 to 1%** of rated capacity per day.
34. Specific gravity of acid is checked with **hydrometer.**
35. The term trickle charge is associated with **lead acid battery.**
36. When the battery is being charged, terminal voltage **decreases with increase in temperature.**
37. When the battery is being discharged, terminal voltage **decreases with decrease in discharge rate.**
38. Ampere hour capacity of battery used in cars is about **30 to 60**
39. The ampere hours capacity of battery used in trucks is **100 to 150 Ah**
40. Cadmium test is used to check whether the **battery plates are defective or not.**
41. Common voltage of automobile batteries is **12V.**
42. Cells are connected in **parallel** to increase current capacity.
43. A constant voltage source has **low internal resistance.**
44. Current in chemical cell is movement **of positive and negative ions.**
45. Cells are connected in series **to increase voltage.**
46. Nickle cadmium cell is **dry storage cell.**
47. Two batteries having unequal emfs can be connected in **series only.**
48. Silicon is used in **solar cells.**
49. The efficiency of solar cells can be expected in range of **10 to 15 %.**
50. Output voltage of silver oxide cell is **1.5 V.**
51. In lithium cell, positive electrode is made of **carbon.**
52. Advantage of alkaline battery is that **they are robust.**
53. A fuel cell converts **chemical energy to electrical energy.**
54. In lead acid cell, hydrogen is liberated at **negative plate.**
55. In lead acid battery, pbso4 is formed during **discharging only.**
56. In Nickle iron cell electrolyte is **potassium hydroxide.**
57. In Edison cell concentration of electrolytes **remains unaltered.**
58. The efficiency of modern accumulators is **about 70%.**

59. A cell which is used as voltage reference source is **mercury cadmium cell.**
60. The current flowing between electrodes of inside a lead acid battery is **polarization current.**
61. When internal resistance is large as compared to external resistance then high current is obtained by **parallel grouping.**
62. Current flow through electrolyte is due to **movement of ions.**
63. Greater the internal resistance, **lesser is terminal voltage.**
64. The plates of lead acid battery are most likely to be short circuit if **sediments collect at the bottom of battery.**
65. To keep terminal of lead acid battery free from corrosion, **petroleum jelly is applied.**
66. When cells are connected is parallel, **current capacity increases.**
67. For cadmium plating, cathode current density is restricted to **1 to 3 amp/dm2**
68. **Silver plating** has lowest cathode current density.
69. **Zinc plating** has highest anode current density.
70. For Zinc plating, anode current density is **2 to 4 A/dm2**
71. In Zinc plating, rate of deposit **is 0.8 microns.**
72. Emf of cell depends upon **electrolyte.**
73. Voltage required for barrel plating is **6 to 16 volt.**
74. Faraday law find application in **electrolyte.**
75. During electrolyte, weight of substance deposited depends on **quantity of electricity**.
76. Electrochemical equilant is usually expressed in **milligram per coulombs.**
77. Current efficiency in electroplating is usually **90 to 98%.**
78. Energy efficiency during electroplating is **50 to 80%.**
79. Zinc cadmium and lead coating is generally provided for **corrosion.**
80. Recommended coating for food containers is **tin.**
81. Coating for Electrical contacts is **silver.**
82. Coating used for reflectors is **rhodium.**
83. Galvanizing is coating of **zinc.**
84. Coating recommended for hard surfacing is **chromium plating**
85. The best instrument for measuring emf of cell is **potentiometer.**
86. Temperature recommended for bronze plating is **70 to 80.**
87. For chromium plating, current density is **1500 to 2500.**
88. Lead coating is used for **bearing surface.**
89. Iron is deposited for **electro forming.**

90. Uniform thickness of plating on irregular surface is assist by **keeping anode and cathode apart.**
91. Aluminum surfaces in contact with air always cover with **thin layer of oxide.**
92. Aluminum is prepared from bauxite by **electrolytic process.**
93. Highest purity copper is obtained by **electroplating.**

Chapter # 3 AC Fundamentals

1. The form factor in reference to alternating current wave form represents the ratio of **the R.M.S. value to the average value.**
2. If the current and voltage are out of phase by 90°, thee power is **Zero.**
3. The form factor of a 220 V, 50 Hz A.C. waveform is **1.11.**
4. If E1 = A sin ωt and E2= A sin $(\omega t - \theta)$ **then E1 leads E2 by** $\boldsymbol{\theta}$**.**
5. For the waveform shown in figure, average value is **1.5 A.**



6. For the above wave the rms value will be **1.528 A.**
7. Two sinusoidal quantities are said to be phase quadrature, when their phase difference is $\mathbf{90}$°**.**
8. The equation for 25 cycles current sine wave having rms value of 30 amperes, will be $\mathbf{42.4\ \sin 50\ \pi t}$**.**
9. R.M.S value of a current given by $i = 10 + 5\cos(628t + 90°)$ is **10.6A**
10. What is the rms value of rectangular voltage wave with an amplitude of 10 V? **10V.**
11. The mean value of a.c related to peak value of a.c by the equation is $\boldsymbol{Im = \frac{2Io}{\pi}}$**.**
12. In above case , the value of direct current which produces in the same conductor the same amount of heat in the same time will be **141 V.**
13. The current in a circuit follows the law $i = 100 \sin \omega t$, If the frequency is 25 Hz how long will it take for the current to rise to 50 amperes? $\mathbf{\frac{1}{1000}}$ **sec.**
14. The voltage $v = 90\cos(\omega t - 161.5°)$ may be represented as sine function by $\boldsymbol{90 \sin(\omega t - 71.5°)}$**.**
15. The equation of emf is given by $= \boldsymbol{Im\sqrt{(R^2 + 4\omega^2 L^2)}}$.
16. In above problem the frequency in hertz is $\boldsymbol{\frac{\omega}{\pi}}$**.**
17. The negative maximum of a cosine waveform occurs at **180°.**
18. The RMS value of sinusoidal 200 V peak to peak wave is $\mathbf{\frac{200}{\sqrt{2}}}$ **V. ???**

19. The positive maximum of a sine wave occurs at $\mathbf{90°}$
20. In figure 4 the combined impedance of the parallel circuits equals **120 V**.

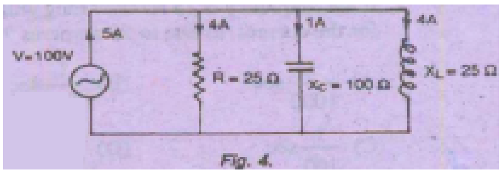


Fig. 4.

21. For the same peak value of voltage, which waveform will have the least rms value? **Triangular wave.**
22. For the same peak value of voltage, which waveform will have the highest rms value? **Square wave.**
23. Which wave has the highest value of form factor? **Half wave rectified sine wave**.
24. Which wave has the least value of form factor? **Square wave.**
25. Which of the following waves has form factor of 1.0? **Square wave.**
26. If one cycle of ac waveform occurs every milli-second, the frequency will be **1000Hz**.
27. Which of the following frequencies has the longest period? **10kHz.**
28. RMS value and the mean value is the same in case of **Square wave.**
29. If emf in a circuit is given by $e = 100 \sin 628t$ then maximum value of voltage and frequency are **100V 100Hz.**
30. For a wave form more peaky than a sine wave, the form factor **will be more than 1.11.**
31. For a triangular wave, the form factor is **1.15.**
32. For a square wave, the form factor is **1.0.**
33. The equation of alternating current is $i = 42.42 \sin 628t$. the average value of current is **27A**.
34. For the voltage waveform shown in figure 5 the rms value of voltage will be $\frac{\sqrt{5}}{3}\ \boldsymbol{y\,max}$**.**

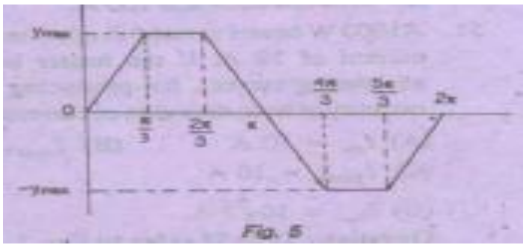


Fig. 5

35. The average value of the above voltage is $\frac{2}{3}\ \boldsymbol{y\,max}$**.**
36. The peak factor for the above voltage is $\frac{3}{\sqrt{5}}$**.**

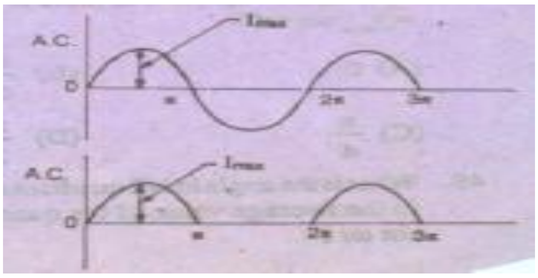
37. The form factor for the above voltage is $\frac{\sqrt{5}}{2}$.

Questions 38 to 40 refer to the following data:

A current has following steady values in amperes for equal intervals of time changing simultaneously from one to the next 0, 10, 20, 30, 20, 10, 0, -10, -20, -30, -20, -10, -0.

38. The rms value of the current will be **17.8 A**.
39. The form factor will be **1.187**.
40. The peak value of a wave is $\frac{\text{Maximum value}}{\text{r.m.s value}}$.
41. Two waves, a sine wave and a half wave rectified ac, are shown in figure 6.

The value of which of the following parameters for half wave rectified ac will be more? **Form factor.**



42. In the above case the value of which parameter for full sine wave will be more? **Average value.**
43. An alternating voltage $e = 200\ sin\ 314t$ is applied to a device which offers an ohmic resistance of 200Ω to the flow of current in one direction while entirely preventing the flow in the opposite direction. The value of current will be **5 A**. ??
44. In the above case, the average value of the current will be **3.18 A**.
45. When the sole purpose of the alternating current is to produce heat, the selection of conductor is based on **rms value of current**.
46. The r.m.s value of a.c. is related to peak value of a.c. by the equation $\boldsymbol{Io = \sqrt{2}}$ **I r.m.s**.
47. The form factor of dc supply voltage is always **Unity**.
48. What is the angle in the NE quadrant corresponding to a rms value of the quantity, $y = y_{max} sin\omega t$? $\boldsymbol{\frac{\pi}{4}}$.
49. What is the angle in NE quadrant corresponding to the average value of the quantity, $y = y_{max} sin\omega t$? **0.69 rad**.
50. Two currents represented by $i_1 = 50 \sin \omega t$, $i_{12} = 100 \sin(\omega t + 45\,°)$ are fed into a common conductor. The rms value of the current will be **between 50 A and 100 A.**

Questions 51 to 54 refer to the fig7.

51. A 1000 W heater is rated to operate at a direct current of 10A. If the heater is supplied alternating current, for producing the same quantity of heat, the value of current should be $\boldsymbol{I_{rms} = 10A}$.

52. The rms value of the voltage shown in Fig. 7 is $\boldsymbol{\frac{y_{max}}{\sqrt{3}}}$.

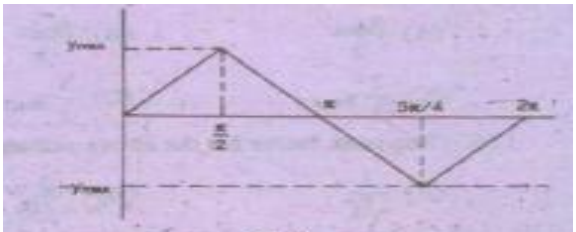


Fig. 7.

53. The peak factor for the above voltage is **1.41. ??**

54. The average value for above voltage is $\boldsymbol{\frac{y_{max}}{2}}$.

55. The form factor for the above voltage is $\boldsymbol{\frac{2}{\sqrt{3}}}$.

56. With reference to Fig.8 which statement is correct? **Current $\boldsymbol{i_2}$ is leading current $\boldsymbol{i_1}$**.

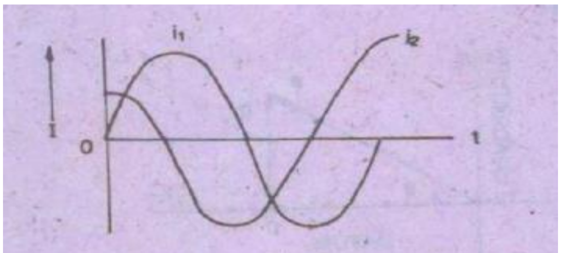


Fig. 8.

Questions 57 to 60 refer to the following data:

An alternating quantity increases uniformly from 0 to 0° at F_m at α; remains constant from α to $(\pi - \alpha)$ and decreases uniformly from F_m at $(\pi - \alpha)$ to 0 at π.

57. The rms value of the wave for one half cycle wil be $\boldsymbol{\frac{F_m(\pi-\alpha)}{\pi}}$.

58. The average value of the wave for one half cycle will be $\boldsymbol{\frac{2F_m}{\pi}}$.

59. In above case when $\alpha = \frac{\pi}{9}$, the rms value will be $\boldsymbol{\frac{3F_m}{5}}$.

60. In the above case when $\alpha = \frac{\pi}{2}$, the rms will be $\boldsymbol{\frac{F_m}{2}}$.

Questions 61 to 63 refer to the fig9.

61. For the the waveform shown in figure, the equation for voltage may be written as $\boldsymbol{v = V_m \sin \omega t}$.

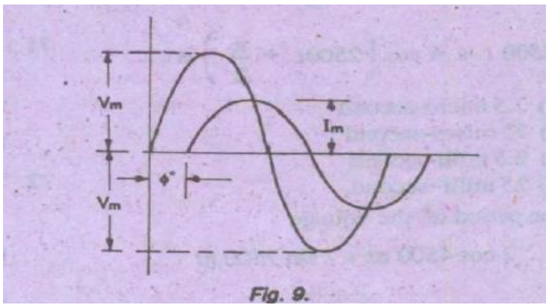


Fig. 9.

62. In the figure shown the equation for the current may be written as $\boldsymbol{i = I_m \sin(\omega t - \emptyset)}$.
63. For the waveform the vectorical reperesentation is correctly shown in which of the following Fig.10: **Figure D**

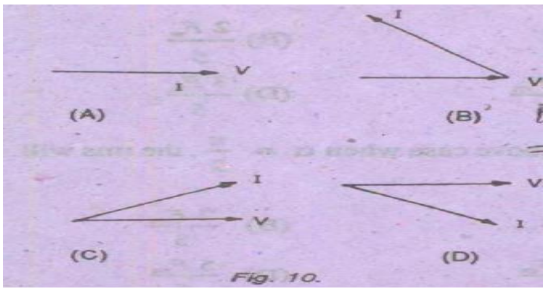


Fig. 10.

64. The period of voltage $12\sin(800\pi t + 0.125\pi)$V is **1.33 milli-second**.
65. The period of voltage $3\cos 2500t + 4\cos(2500t + \frac{\pi}{2})$ is **2.5 milli-second**.
66. The period of voltage $2\cos 4500\pi t + 7\sin 7500\ \pi t$ is **2.51 milli-second**.
67. The average value of the square of the wave from $3\cos 2t + 4\cos(2t + \frac{\pi}{4})$ is nearly **20.5**.
68. The average value of the square of the waveform $(4\cos 2t + 5\cos 3t)$ is nearly **21**.
69. A load draws 10W power from a 10V source drawing 10A current. The power factor is **0.1**.
70. The vector can be represented in rectangular form as $\boldsymbol{p + jq}$.

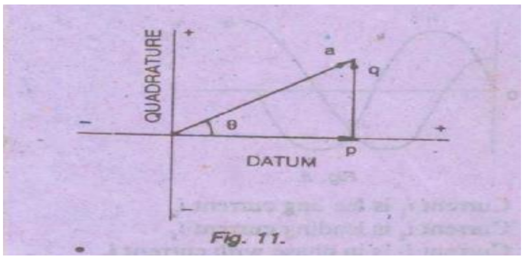


Fig. 11.

71. The vector α can be represented in polar as $\boldsymbol{\sqrt{p^2 + q^2 < \theta}}$.

72. The vector α can be represented in exponential form as $\sqrt{\boldsymbol{p^2 + q^2 e^e}}$ **.**
73. The vector α can be represented in trigonometrical form as $\sqrt{\boldsymbol{p^2 + q^2}}(\boldsymbol{cos\theta} + \boldsymbol{j\ sin\theta})$.
74. The rms value of the waveform shown in Fig.12 is **66.7.**

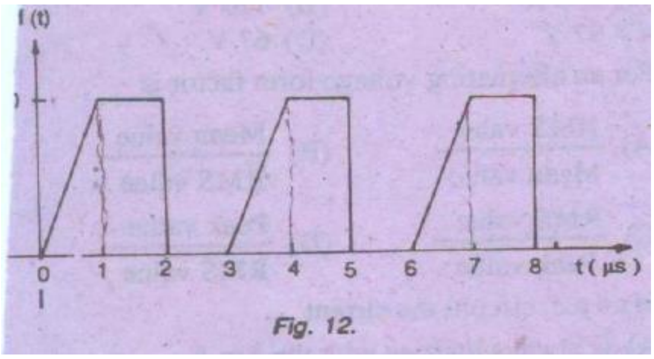


Fig. 12.

75. The multiplication of the vector $(p + jq)$ and $(r + js)$ will be $(\boldsymbol{pr - qs}) + \boldsymbol{j}(\boldsymbol{qr + ps})$.
76. $a < \emptyset . b < \theta\ =\ \boldsymbol{ab/\varphi + \ \theta}$.
77. Two sinusoidal quantities are said to be in phase quadrature, when their phase difference is $\boldsymbol{90}°$.
78. Which of the following relation is incorrect ? $\frac{\boldsymbol{Conductance}}{\boldsymbol{Susceptance}}$.
79. The capacitor for power factor correction are rated in terms of **KVAR**.
80. Poor power factor results in all of the following EXCEPT: **reduction in power loss.**
81. Power factor of an inductive circuit can be improved by connecting a capacitor to it in **parallel**.
82. For the same load, if the power factor of load is reduced, it will **draw more current**.
83. For the saw tooth current waveform, the rms value is **5.77A**.

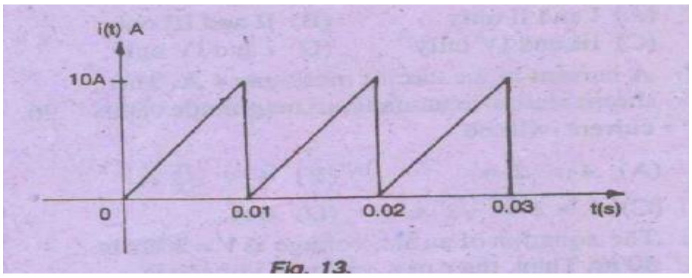


Fig. 13.

84. The effects due to electric current are I. Magnetic effect, II. Heating effect, III. Luminous effect. Appliance working on which effect can be used on ac as well as dc supply? **II. and III. Only**.
85. The rms value of the waveform shown in Fig.14 will be **57.7**.

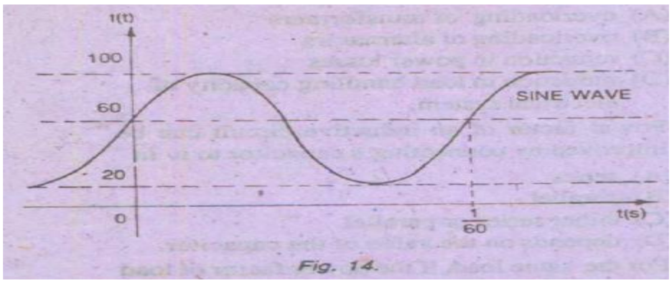


Fig. 14.

86. The effects due to electric current are I. Thermal effect, II. Luminous effect, III. Chemical effect, IIII. Magnetic effect. Which two effects are significant when current flows through transmission lines **I and IV only**.
87. A current in ac circuit measures 4 A. Then , the maximum instantaneous magnitude of this current will be $\mathbf{4 \times \sqrt{2}}$ **A**.
88. The equation of an a.c voltage is $V = 200 \sin 50\pi t$. Then, the r.m.s value of voltage is $\mathbf{100\sqrt{2}}$ **V**. ??
89. When a.c. current flows through a resistance, then **current and e.m.f. are in phase**.
90. The power factor of incandescent bulb is **unity**.
91. A incandescent bulb can work on **both ac as well as dc**.
92. It is know that a given capacitor will fail if the terminal voltage exceeds 180 V. If the circuit is operating on sinusoidal steady voltage, the maximum rms voltage that may applied to the capacitor will be **127 V**.
93. For an alternating voltage form factor is $\frac{\textbf{RMS Value}}{\textbf{Mean value}}$.
94. In and a.c. circuit, the current **any of the above, depending upon the elements (L,C or R) of the circuit**.
95. Power factor of the magnetizing component of a transformer is **zero**.
96. Which of the following statement is not necessarily valid for ac currents: Alternating currents **is suitable of charging batteries**.

    Questions 97 and 98 refer to the data given below:

    A current is given by $i = 45.24 \sin 377t$.
97. The maximum value of the current is **45.24 A**.
98. The frequency is $\mathbf{\frac{377}{2\pi}}$ **Hz**.
99. A circuit has impedance of $(3 + j4)$. If a voltage $(100 + j50)$ is applied, the power in the circuit will be **500 W**.
100. Which will draw least current **40W lamp**.

    Questions 101 and 102 refer to the given data below:

Since wave A has a frequency of 100 Hz and an rms applied of 100 mA. Since wave B has the same frequency, has an rms amplitude of 200 mAand lags sine wave A by 60°.

101. The instantaneous value of current i_A at $t = 0.35\ rms$ will be **20.5 mA**.
102. The instantaneous value of current i_B at $t = 0.35\ rms$ will be **-20.6 mA**.
103. What value of dc voltage will produce the same average power as 150V peak sine wave? **106 V**.
104. What current will an ammeter show when connected in series with a 32 ohm load that is dissipating a peak power of 288 W? **2.12 A**.
105. A 160 W soldering iron is operated from the 60 Hz power line. The resistance of the soldering iron is **75.6 ohms**.
106. A certain 1-Khz sine wave reaches -70 V at $t = 0.6\ ms$, The peak value of this sine wave will be **118 V**.
107. A certain sine wave is expressed as $e = \sin(4000t)$. The frequency of this sine wave will be **637 Hz**.
108. A sine wave of voltage produces a peak current of 12 mA in a 3 KΩ resistor. The average power dissipated in the resistor will be **216 W**.
109. In a.c. circuits, the a.c. meters measures **r.m.s values**.
110. Radio frequency choke is air cored to **keep inductive reactance low**.
111. Hot wire ammeters are used for measuring **only a.c.**
112. When $v_1 = 50\sin\theta, v_2 = 30\sin(\theta + 25°)$ and $\mathrm{v}_2 = 25\sin(\theta - 90°)$, the resultant of $(v_1 + v_2 - v_3)$ is given by $\mathbf{86\sin(\theta + 26°)}$.
113. $12 < 30°$ in rectangular coordinates can be represented as $\mathbf{10.4 + j6}$.
114. 270/1.7 π can be represented in rectangular coordinates as $\mathbf{159 - j\,218}$.
115. A choke coil is used for controlling current in an **a.c.circuit only**.
116. Ohm's law $(E = IR)$ **can be applied to a.c. but after replacing R by Z (impedance)**.
117. What frequency is one octave above 110 Hz? **220 Hz**.
118. What frequency is the fourth harmonic of 4 Mhz? **16 Mhz**.

Questions 119 to 122 refer to data given below:

A 60 Hz power-line voltage of 120 V is applied across a resistance of 10 ohms.

119. The rms current in the circuit is **12 A**.
120. The frequency of the current will be **60 Hz**.
121. The phase angle between the current and the voltage will be **0**°.

122. The dc applied voltage necessary for the same heating affect in the resistance will be **120 V**.

Questions 123 to 124 refer to data given below:

An a.c wave form with a frequency of 1.5 kHz has a peak value of 3.3 V.

123. The instantaneous value of voltage at 0.65 micro-second will be **20.2 mV**.
124. The instantaneous value at 1.2 milli-seconds will be **-3.1 V**.

Questions 125 to 128 refer to data given below:

The circuit shown in figure below has a 60 Hz supply voltage with a maximum value of 160 V.

125. The instantaneous current at $\pi/4$ radians will be **11.3 A**.

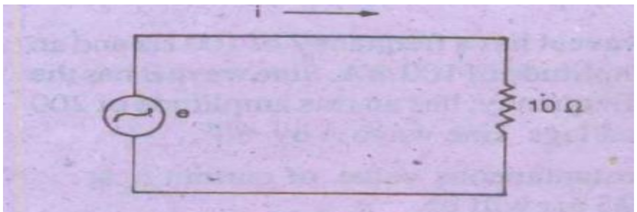


Fig. 15.

126. The instantaneous power at $\pi/4$ radians will be **2.56 kW**.
127. The instantaneous value of current at $\frac{5\pi}{4}$ radians will be **-5.5 A**.
128. The instantaneous power at $\frac{3\pi}{4}$ radians will be **2.56 kW**.

Questions 129 to 132 refer to data given below:

A 300 V sinusoidal ac supply is applied to a 50-ohm resistor.

129. The peak value of current through the resistor will be **8.28 A**.
130. The rms value of current through the resistor will be **6 A**.
131. The average value of current for the half cycle will be **5.4 A.**
132. The power dissipated in the resistor will be **1.8 kW**.

Questions 133 to 135 refer to data given below:

A conducting loop rotated in the magnetic field has an axial length of $l = 30cm$ and a distance between sides of $D = 8cm$. The flux density of the magnetic field is $B = 0.25$ Tesla and the loop is rotated at 140 revolutions per minute.

133. The output voltage will be **28 mV**.
134. If the loops has10 turns instead of one the maximum output voltage will be **880 mV**.
135. For the generator with 10 turns the instantaneous level of voltage at $\frac{5\pi}{4}$ radians from $e = 0$ will be **-0.62 V**.
136. In the above case the value of output voltage at 25 ms from $e = 0$ will be **315.4 mV**.

Questions 137 to 139 refer to data given below:

A sisusoidal waveform with an rms value of 6 V and a frequency of 30 Hz is applied across a 120Ω resistor.

137. The instantaneous power dissipated in the resistor at 5.5 milli-seconds from the time that the waveform commences to grow positively from zero, will be **0.44 W**.
138. The peak instantaneous power dissipated in the resistor will be **6 W**.
139. The average power dissipated in the resistor will be **0.3 W**.
140. $90 < 33.7° \times 25.5 < 11.3° = \mathbf{2295} < -22.4°$.
141. $90 < 33.7° + 25.5 < 11.3° = \mathbf{3.5} < -45°$.
142. When $v_1 = 47 \sin\theta$ and $v_2 = 33(\sin\emptyset + 20°)$ then $(v_1 - v_2)$is given by $\mathbf{19.59\,sin}(\emptyset - \mathbf{35}°)$.
143. The average power of an circuit is $\boldsymbol{E_v I_v}\,\mathbf{cos}\,\emptyset$.

Question 144 and 145 refer to data given below:

144. If $v_1 = 47 \sin\theta$ and $v_2 = 33(\sin\emptyset + 20°)$ then $(v_1 + v_2)$will be equal to $\mathbf{77.8\,sin}(\emptyset + \mathbf{8.3}°)$.
145. $(v_1 - v_2)$will be equal to $\mathbf{19.59\,sin}(\emptyset - \mathbf{35}°)$.
146. A certain 50 Hz current sine wave reaches 200 mA at $t = 2.5\ ms$. The peak value of this current sine wave is **382.8 mA**.

Question 147 and 149 refer to data given below:

Sine wave A has a peak and amplitude of 50 V and a frequency of 60 Hz. Sine wave B has a peak amplitude of 30 V at the same frequency and leads sine wave A by 45°,

147. The expression for wave B is $\mathbf{30\,sin}\left(\mathbf{377}\,\boldsymbol{t} + \frac{\boldsymbol{\pi}}{\mathbf{4}}\right)$.
148. At $t = 1$ ms the instantaneous value of A will be **18.5 V**.
149. At $t = 1$ ms the instantaneous value of B will be **27.5 V**.
150. When $v_1 = 115 < 0°$, v_2 =115<-120° and $i_1 = 22 < 73°$, the $Z = \frac{v_1+v_2}{i_1}$ will be equal to $\mathbf{5.23} < -133°$.
151. For the voltage waveform shown in figure, the frequency is **16 kHz**.

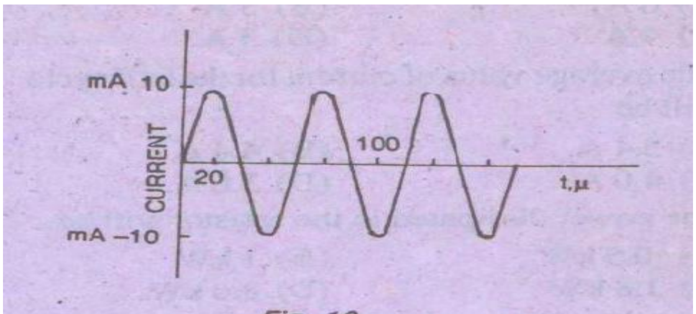


Fig. 16.

152. When $v_1 = 10\sin\theta, v_2 = 15\sin(\theta - 15°), v_3 = 20\sin(\theta + 10°)$ and $v_4 = 18\sin(\theta + 25°)$ then the resultant of $v_1 + v_2 + v_3 - v_4$ will be $\mathbf{30\sin(\emptyset - 15.3}°)$.

Question 153 and 154 refer to data given below:

$v_1 = 45 < 30°, v_2 = 27 < 21°, v_3 = 30 < 42°$

153. $(v_1 + v_2 - v_3)$ will be equal to $\mathbf{43.6} < 16.1°$.

154. $(v_1 - v_2 - v_3)$ will be equal to $\mathbf{11.2} < 220.7°$.

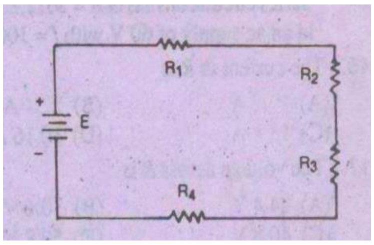
155. Match the following:

Wave	**Form factor**
(a) Sine	(i) 1.0
(b) Half wave rectified sin wave	(ii) 1.11
(c) Rectangular	(iii) 1.16
(d) Triangular	(iv) 1.57

$\boldsymbol{a - (ii),\ b - (iv),\ c - (i),\ d -}$**(iii).**

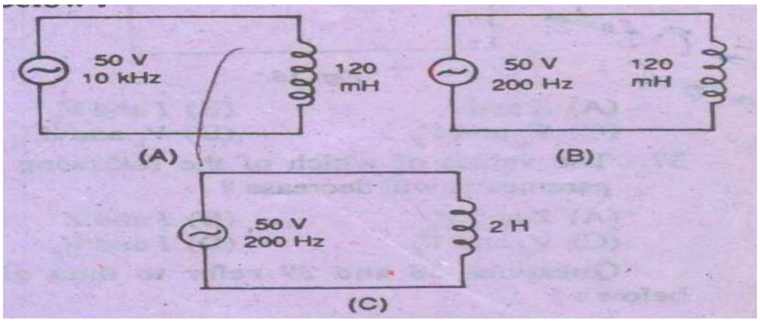
Chapter # 4 RLC Circuits

1. Acapacitor offers easy path to a.c. but blocks d.c.
2. The unit of inductive susceptance is Siemens.
3. An inductor supplied with 50 V ac with a frequency of 10 kHz passes a current of 7.96 mA. The value of inductor is 100 **mH**
4. When a 100-mA alternating current with a frequency of 1 kHz flows in the primary of two coupled coils, the secondary voltage is 1 V. The mutual inductance between the coils is I.59 mH.
5. In a.c. circuit, the power is consumed only in r e s i s t a n c e .
6. In which of the following cases will the capacitor complete its discharge most rapidly A 50 pF capacitor with a 20-mV charge discharging through a 200 milli-ohm resistance.
7. An electric bulb rated 220 V is connected 220 V, 5 Hz source. Then, the bulb glows intermittently.
8. Which of the following refers to a parallel circuit? **The current through any one element is less than the source current.**
9. Under which of the following case the power dissipated in R3 in the circuit shown will be increased. R4 is shorted circuited.

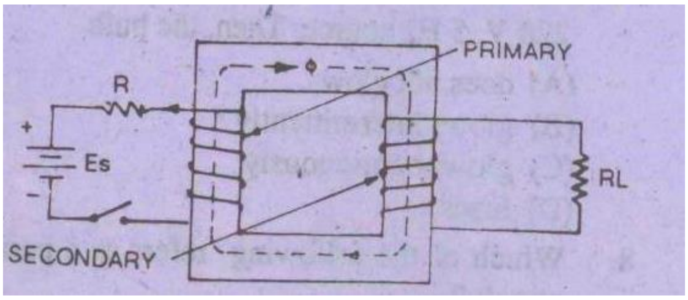


10. Capacitive susceptance is a measure of a purely capacitive circuit's ability to pass current.
11. . Capacitive susceptance is expressed in terms Siemens.
12. A 50 micro farad capacitor supplied from a 1.5-volt source with a frequency of 60 Hz: The Capacitive reactance is 53 ohms.
13. The current that flows in the circuit is 2.2A.
14. **A capacitor passes a current of 12.6 mA when supplied with 20 V ac with a frequency of 1 kHz. The capacitance of the capacitor is 0.1 micro F.**
15. Admittance is a reciprocal of impedance.

16. Questions 16 to 19 refer to data given A series circuit consists of R =*20 0ohms,L*= 20 mH hand an ac supply of 60 V with *f* = 100 Hz. The current in *R* is 2.54 A.
17. The voltage across *R* is50.8 V.
18. The voltage across *L* is 31.9 V
19. The phase angle of current with respect to supply voltage is 32.1°.
20. Which of the following case represent largest mmf? A100 turn coil wound around 30cm cardboard core and passing a current of 0.75 A.
21. Questions 21 and 22 refer to data given below: A certain cast-iron core has a length of 10 cm and a cross-sectional area of 6 cm'. A coil of 150 turns is wound around the core and is passing a current of 4 A. The mmf is 600 A-t.
22. The flux in the core is 5.7×10^{-4} Wb.
23. Questions 23 and 24 refer to figures given below: In which of the circuit the lamp will be brightest: circuit C.
24. In which of the circuit the lamp will be dimmest: circuit A.

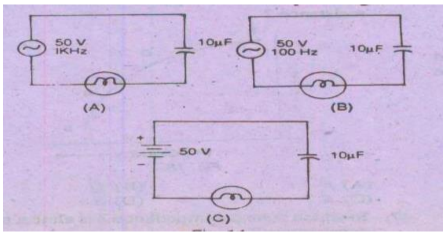


25. Questions 25 to 29 refer to Fig given below. What will be the effect of increased *R* ?Emf induced in the secondary will be less.

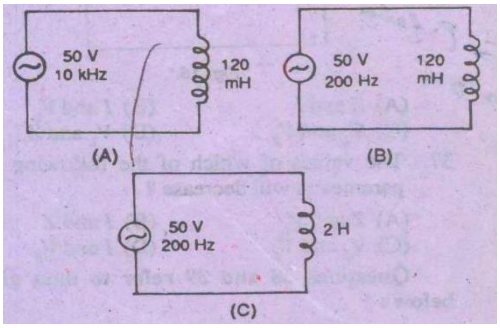


26. Increase in the number of primary turns will result in larger emf in secondary.
27. Increase in the number of secondary turns will result in larger secondary emf.
28. The average power dissipated in a pure inductor is zero.
29. By reversing the battery terminal polarity of induced emf will reversed.
30. **Question 30 and 31 refer to the figure below:**In which circuit will the lamp be brightest: Circuit A.

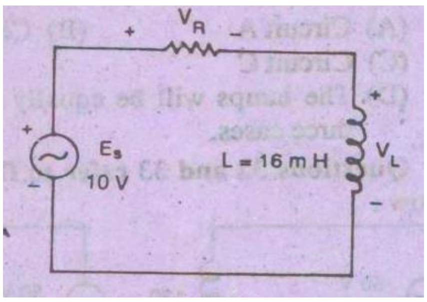
31. In which circuit will the lamp be dimmest: Circuit C



32. **Question 32 and 33refer to the figure below**: which circuit have least rms current.circuit B
33. which circuit have highest rms:circuit C



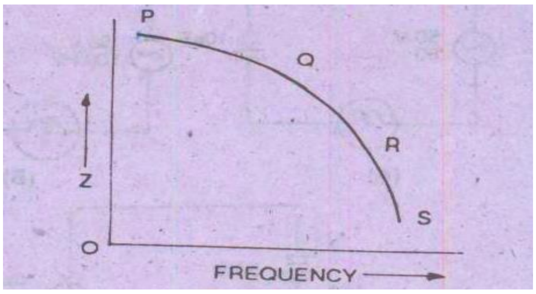
34. Wattles current is possible only in non-resistive circuits.
35. A series *RL* circuit is to operate at frequencies in the range of 100 Hz, 600 Hz. It is required that the current lags the source voltage by at least30° over this range. IfR = 1000 ohms, the appropriate value of *L will* be 0.92 H.
36. Questions 36 and 37 refer to figures below : 36. For the circuit shown, as the .frequency of source voltage increases, the value of which of the following two parameters will increases? V_L and Z.
37. the value of which of the following two parameters will decreases **Z and V_r.**



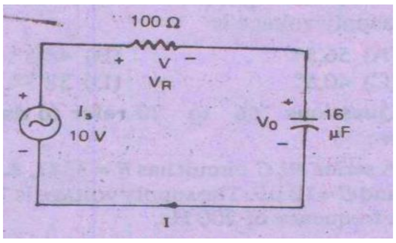
38. Questions 38 and 39 refer to data given below: A series RL circuit draws 15 mA of current from a 120-V, 60 Hz source. The current lags the voltage by 60°. The value of R must be 4kohms.

39. The value of inductance must be <u>18.3Mh.</u>
40. Questions 40 to 43 refer to figure below: A series *R-L* circuit contains *R* = 2 Icrl and *X* = 1 ka. The rms value of current in the circuit is5mA.The source voltage must be<u>11.2 V.</u>
41. The phase angle between *E*, and/ is <u>26.5°.</u>
42. The phase angle between *E*,and voltage across inductor is <u>63.5°.</u>
43. The phase angle between *E*, and voltage across resister is<u>26.5°.</u>

44. A 1 mH inductance and 10 4F capacitance when connected in series to an a.c. source, possess equal reactance. The angular frequency of the a.c. source is<u>10^4 ·</u>
45. For a series *RC* circuit V, is measured to be 4 V and V_c is measured as 3 V. The ac source voltage must be<u>5 V.</u>
46. Questions 46 and 47 refer to figure below: The variation of impedance with frequency is shown in figure. Four zones *P*, *Q*, *R* and *S* have been marked on the curve. In which zone the impedance Z is almost pure resistance ?<u>P.</u>
47. In which zone the impedance Z is almost pure inductance? **S**

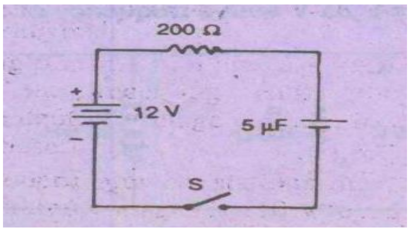


48. Questions 48 and 50 refer to figure below.As the frequency increases, the value of which of the following parameter increases? <u>I.</u>

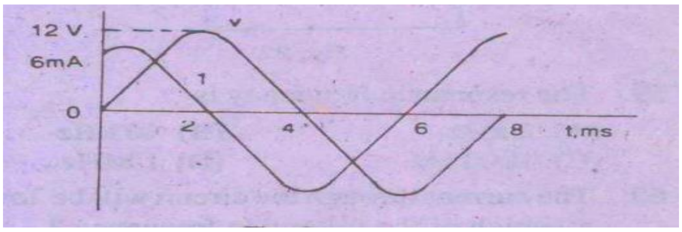


49. **As the frequency increases, the values of which of the following decreases ?<u>V_c.</u>**
50. **In a series *RC* circuit as frequency increases<u>Current increases.</u>**
51. The minimum and maximum values of power factor in a ac circuit are 0<u> and 1.</u>

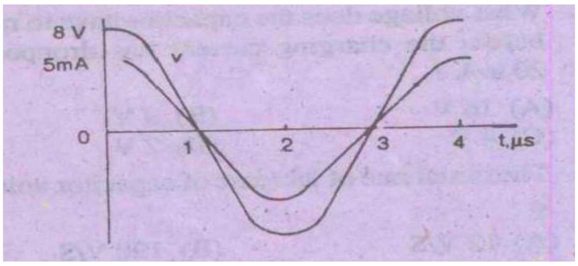
52. Questions 52 to 56 refer to figure below :When the switch is closed at t=0 the value of charging current will be <u>60 mA.</u>



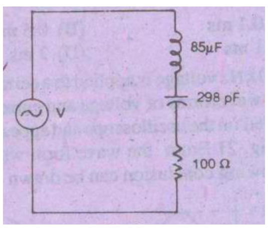
53. What voltage does the capacitor have to reach before the charging current has dropped to 20 mA. 8V.
54. The initial rate of increase of capacitor voltage is 12 kV/S.
55. At what rate is the capacitor voltage increasing 16 when the capacitor voltage is 8 V ? 4 kV/S.
56. The time constant for the circuit is1ms.
57. A 10 kHz voltage is applied to a certain device. The waveforms of voltage and current are displayed on the oscilloscope and appear as shown in Fig. 21 From the wave form which of the following conclusion can be drawn ? The device is a 0.639 p.F capacitor.



58. The waveforms of voltage and current are displayed on the oscilloscope and appear as shown in figure. From the waveform which of the following conclusion can be drawn ?The device is 1.6 kohmresistors.

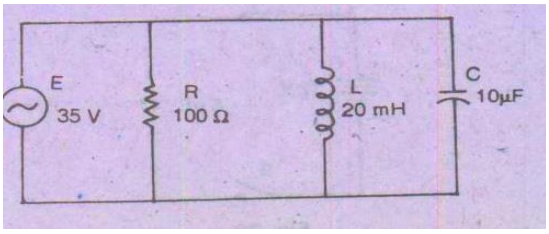


59. Questions 59 and 61 refer to data given below:In the seriesLCR circuit shown in figure supply voltage is 10 volts.1 MHz.



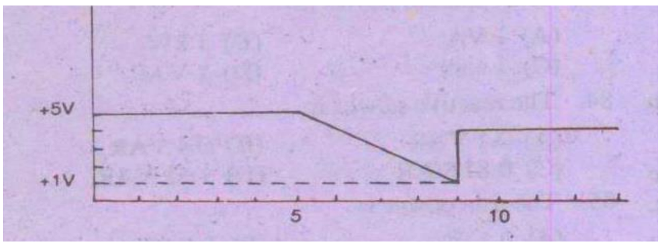
60. The current through the circuit will be lowest at which of the following frequency? 250 kHz.

61. The current drawn by the circuit at resonance frequency will be 0.1A.
62. Questions 62 to 65 refer to data given below:A series circuit consists ofR .47 C= 10 p.F, and an ac supply of 100 V with f = 300 Hz. The current through R is1.41A.
63. The voltage across R is66.3V.
64. The voltage across C is 74.9V.
65. 65. The phase angle of the current with respect to Al supply voltage is (A) 56.5' (B) 48.5° (C) 40.5°
66. Questions 66 to 70 refer to data given : below : A series RLC circuit has R = 33 SI, L= 50 mH and C= 10 p.F. The supply voltage is 73 V with a frequency of 200 Hz.The circuit impedance is 33 -j 16.8. 67.
67. The current through the circuit is 2.03 A.
68. The maximum voltage will appear acrossCapacitance.
69. The minimum voltage will appear across Resistance.
70. The voltage across inductance will be **127V.**
71. Questions 71 to 73 refer to data given below:A parallel RLC circuit shown in figure has R=1000,L=20mHandC =10A. The supply voltage is 35 volts with the frequency of 500 Hz.The supply current is 646 mA.

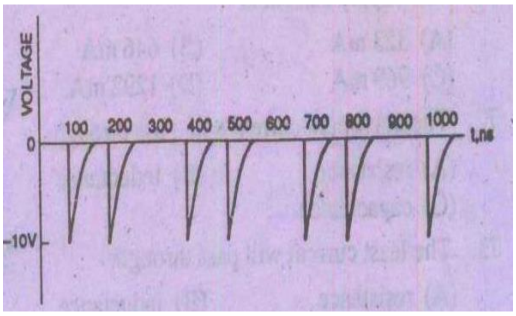


72. The maximum current will pass through capacitance.
73. The least current will pass through resistance.
74. Questions 74 and 75 refer to data given: A low-pass filter has L= 20 mH and C = 0.12 micro F. The input signal amplitude is 2V peak-to-peak and its frequency is 5 kHz. An unwanted noise input is also present with an amplitude of 0.2 V peak-to-peak and a frequency of 50 Hz. The signal-to-noise ratio at the input is 10.
75. The signal-to-noise ratio at the output is 1700.

76. Questions 76 and 77 refer to data given: A high-pass filter has a resistance R = 2k ohm. The lowest input frequency to be passed is7.5 kHz. The value of suitable coupling capacitor must be 0.1micro F.
77. The attenuation of the filter for 60-Hz frequencies will be 0.075.
78. Questions 78 to 80 refer to data given below : A 100 W electric lamp is 115 V, 60 Hz source. The current flowing is 870 mA.
79. The resistance of the filament is 132 ohms.
80. The peak instantaneous power dissipated in a lamp filament is 200W.
81. The power supplied to a 50 mH inductor from a 120 V, 60 Hz source will be 766VAR.
82. The power supplied to a 33 micro F capacitor from a 120 V, 60 Hz source will be Zero.
83. Questions 83 to 85 refer to data given below :A series circuit consisting of R =.1.2 k ohms and = 0.1 micro F is supplied with 45 Vat a frequency of 1 kHz. The apparent power is1 VA.
84. The reactive power is 0.81 VAR.
85. The true power is 0.6 W.
86. When a.c. flows through an inductance (no resistance), then the **current lags e.m.f. by pi/2.**
87. Three identical lyshaped segments of different materials have a voltage of 120 mV applied between their ends. Asa result of the voltage, segment A has a current of 2500 micro A, segment B has a current of 100000 mAand segment C has a current of 0.000002 A. The materials are conductor, semi-conductor and insulators as B Aand C .
88. 35 pico-coulombs of charge move pasta point in a wire every 1 ms. The current in the wire will be 35nA.
89. A certain wire has a current of 35 mA. The ch.irge passing through a given point in the \.; wire in 5 ms will be 175pC.
90. Two charges q1 and q2 are separated by a distance of 0.05 millimeters. Each charge is positive and has a magnitude of 2 pC. The force between the charges will be 1.44 x 10-5N.
91. A sweep pulse is shown in Fig. below. The sweep time of the pulse is 4second.

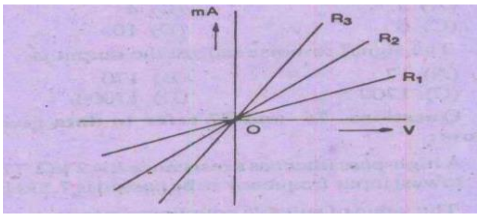


92. The slope of the ramp in Fig. 26 is -1 V/s.
93. When a.c. flows through a capacitor, then the current leads e.m.f. by Pi/2.
94. The frequency of the waveform shown in Fig below 3.3MHz.

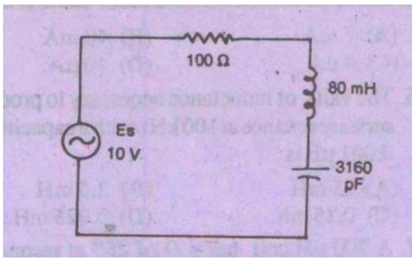


95. In a sine wave slope is constant nowhere.

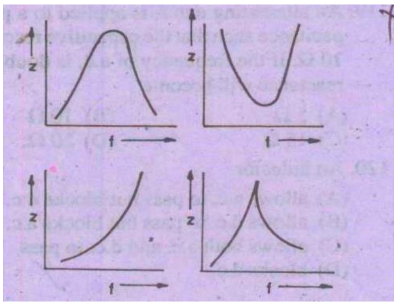
96. Questions 96 to 97 refer to figure below: the resistor with least resistance is R3.



97. the resistor with highest resistance is R1.
98. Questions 98 to 100 refer to figure below: The resonance frequency for the circuit is 10 kHz.



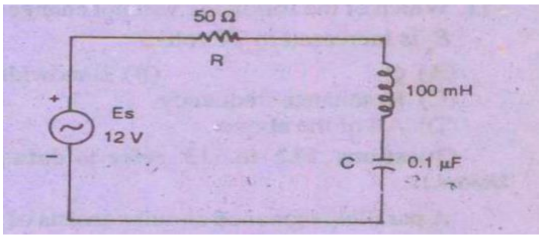
99. At which a the following frequencies, the value of Xc will be least ?12 KHz.
100. 100. At which of the following frequencies, the phase angle of I relative to Es, will be zero:10 kHz.
101. The shape of impedance versus frequency curve for a parallel resonance circuit is of the shape as shown in figure A.



102. The capacitive reactance of a capacitor 1/2Pi F at 10000 H is1/2pi*10000 ohms.

103. The inductive reactance of an inductance of 1/Pi H at50 H is 100 ohms.

104. Questions 104 to 110 refer to figure below : For the circuit shown in figure, Q is nearly 20.



105. The bandwidth is 80 Hz.

106. The bandwidth of the circuit can be doubled, while maintaining resonance frequency unaltered, by increasing R to 100.

107. In the circuit what will happen when L is increased? Resonance frequency will decrease.

108. In the circuit what will happen when C is de creased? Q will increase.

109. Which of the following will not change when input frequency is changed? Bandwidth ,Resonance frequency and Q.

110. Any reduction in the value ofR will not change Resonance frequency.

111. Which of the following will not change when *E* is increased to 24 volts ?Q, Bandwidth and Resonance frequency.

112. A parallel resonance circuit consists of a coil with *L*= 200 mH and *R*= 60 ohms and a 130 pF capacitor. The circuit is connected to a 50 mV source. A) The resonance frequency will be 1 MHz.

113. Q will be 21.

114. The current from the source, I_T will be1.9μA.

115. The current through conductor will be 40μA.

116. The value of inductance necessary to produce series resonance at 100 kHz with a capacitor of 0.001µF is2.5 mH.

117. A 200 1±H coil has a *Q* of 250 at resonance frequency of 800 kHz. The effective resistance of coil is4 ohms.

118. An alternating e.m.f. is applied to a pure inductance such that inductive reactance is 10f2. If the frequency of a.c. is doubled, the reactance will become20 ohms

119. An alternating e.m.f. is applied to a pure capacitance such that the capacitive reactance is 10 Q. If the frequency of a.c. is doubled, the reactance will become5 ohms.

120. An inductor allows both ac and dc to pass.

Chapter # 5 Network Theory

1. A nonlinear network does not satisfy **both homogeneity and super position condition.**
2. An ideal current source has **zero internal conductance.**
3. A terminal where three or more branches meet is known **as node.**
4. A closed path made up by several branches of the network is known as **loop.**
5. Vacuum tube, transistor and filament bulb shows **nonlinear V-I characteristics.**
6. Kirchhoff law can be applied to both **AC and Dc circuits.**
7. Generally, **abscissa refer to the horizontal axis and ordinate refers to vertical axis.**
8. If abscissa refer to current and ordinate refers to voltage, **characteristic of ideal current is vertical line**
9. An ideal voltage source has **zero internal resistance.**
10. Capacitor is **passive and bilateral.**
11. Constant voltage source **is active and unilateral.**
12. A network which contain one or more than one source of emf is known as **active network.**
13. Inductance of the coil can be increase by using **core material of high relative permeability , or by increasing no of turns or by decreasing length of the coil .**
14. Air gap provided in the iron core of an inductor **prevents core saturation.**
15. Inductor stores energy in **magnetic field.**
16. Current through the inductance follows **exponential growth.**
17. Reciprocal network is one in which transmission of signal between any two ports **does not depend on the direction of propagation. Input and output can be interchangeable.**
18. The condition **AD-BC=0** for two port network applies that network is **reciprocal.**
19. At t=0+ **inductor act as open circuit and capacitor act as short circuit** (with no initial conditions)
20. At t=infinity **inductor act as short circuit and capacitor act as open circuit.**
21. Power factor of pure inductor is **zero.**
22. With some initial charge at t=0+ a capacitor will act as **voltage source.**
23. Between the branch voltages of the loop the Kirchhoff law impose **linear constraints.**
24. The characteristics of the open circuit on current – voltage plot is **vertical line through origin.**
25. A linear resistor 0<R<infinity is a both **voltage and current controlled**

26. Diode is neither **current controlled nor voltage-controlled device.**
27. Superposition theorem is applicable to **only linear responses.**
28. Superposition theorem is applicable to **current and voltage but not on power.**
29. A star circuit has each element of resistance R/2, the equivalent delta element will **be (3/2) R.**
30. Power in **delta P(delta)= 3P(star) power in star**.
31. If one of the resistor in delta connection is removed, then total power will be reduced by **1/3**
32. For three phase star connected circuit, **line current = phase current.**
33. For three phase delta connected circuit, **line voltage = phase voltage.**
34. In three phase star connected circuit, **line voltage = under root(3) phase voltage.**
35. In three phase delta connected circuit, **line current = under root (3) phase current.**
36. In order to find Z in Thevenin's theorem **all independent voltage source are short circuited and all independent current sources are open circuited.**
37. Application of Norton theorem to a circuit yields **equivalent current source and impedance in parallel.**
38. Millman's theorem yields **equivalent voltage and current source.**
39. Power consumed in a 3 phase delta connection is **underroot(3) VL IL costheta**
40. In two phase system , the phase will differ by an angle of **90 degree.**
41. The super position theorem requires as many circuits to be solved as there are **sources.**
42. The number of independent equations to solve a network is equal to the number of **chords.**
43. The laplace transform of ramp function is = **1/s2**
44. A unit ramp function when integrated yields **unit parabolic functions.**
45. **S** is the laplace transform of **unit doublet .**
46. A **unit impulse function** is obtained on the **differentiation of unit step function.**
47. For even symmetry the Fourier series consist of **only cosine terms.**
48. For odd symmetry the Fourier series consist of **only sine terms.**
49. For half wave symmetry the Fourier series consist of **only odd harmonics.**
50. Current sources in parallel are added **algebraically** and if it is in series **then current is the same as any one source.**
51. For **nodal analysis we use KCL** and for **mesh analysis we use KVL.**
52. Any periodic waveform can be represented by **infinite sum of sine and cosine functions.**

53. Ratio of effective value to average value is the **form factor of a waveform.**
54. In parallel resonance ckt, **admittance is minimum at resonance** and **resistance is maximum at resonance.**
55. Laplace transform of t2 has **3 poles at s=0.**
56. Initial condition, is to be **subtracted in case of differentiation** and **added in case of integration.**
57. Thevenin equivalent circuit is preferred when circuit is analyzed in term of **voltage and impedance.**
58. Norton equivalent circuit is preferred when circuit is analyzed **in term of current and impedance.**
59. Max possible power can be delivered to load when **load resistance equal to internal resistance of dc generator.**
60. The condition for network to be **lossless** in term of ABCD parameter is **A and D real** and **B and C imaginary.**

Chapter # 6 Control Systems

1. If torsional spring stiffness and reciprocal of capacitance are considered as analogous quantities the system being considered is **torque-voltage**
2. Which of the following quantities under mechanical rotational system and electrical system are not analogous? **Moment of inertia-conductance.**
3. The inverse Laplace transform of $\frac{1}{s+3}$ **is** e^{-3t}
4. When analogy is drawn between electrical systems and thermal systems, current is considered analogous to **heat flow rate.**
5. For system shown in Fig. 18 (a) the analogous system is represented in Fig 18 (b) by **figure A**.

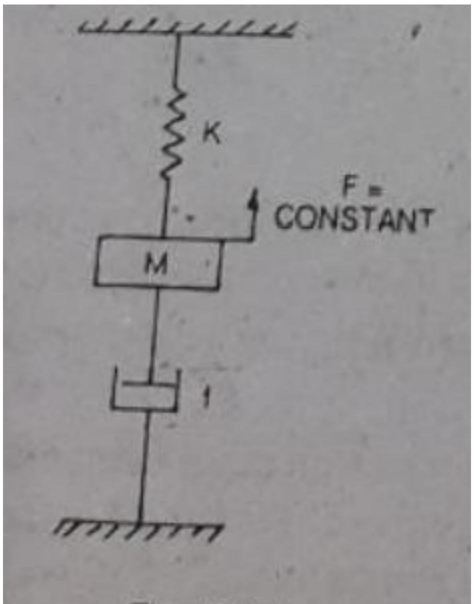
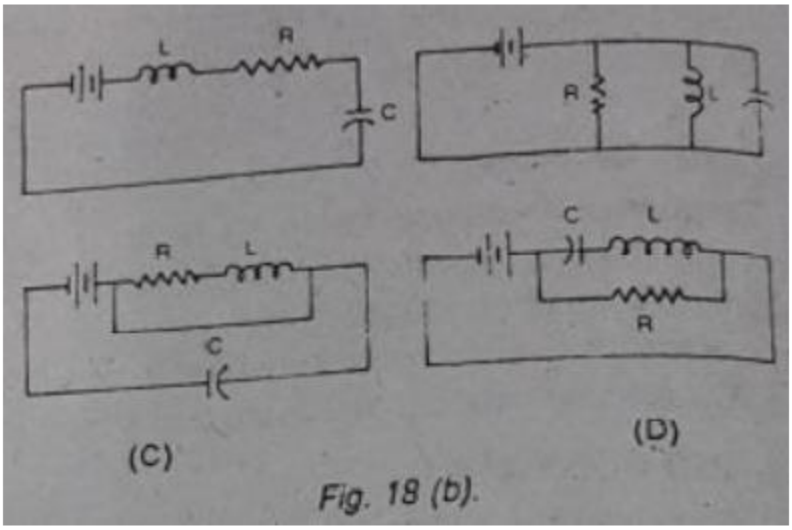
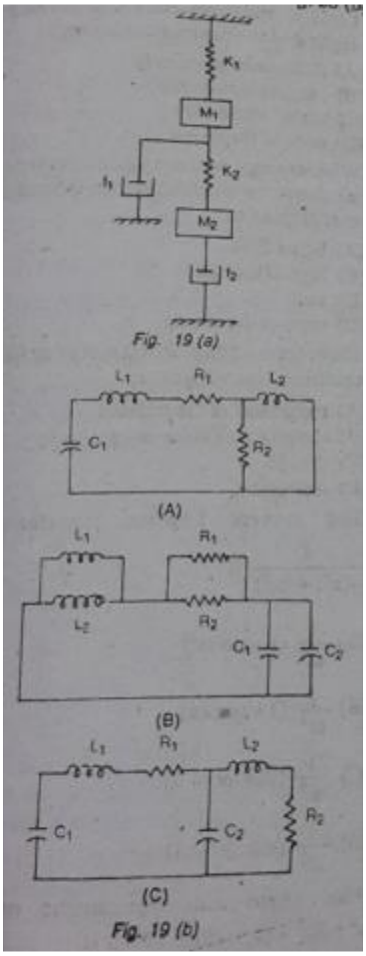


Fig. 18 (a).



6. The Laplace transform of damped sine wave e^{-at} sinωt is $\frac{\omega}{(s+a)^2+\omega^2}$.
7. Under thermal and electrical system analogy, temperature is considered analogous to **voltage.**
8. Mass in mechanical translational system is analogous to **moment of inertia** under mechanical rotational system.
9. The Laplace transform of e-at is $\frac{1}{s+a}$
10. Under electrical system and pneumatic system analogy, current is considered analogous to **air flow rate**.
11. For the system shown in Fig. 26 (a) electric analog circuit is represented in Fig. 26 (b) by**Figure C**.



12. The Laplace transform of cosine wave is $\frac{s}{s^2+\omega^2}$
13. **Charge air flow** represents an analogous pair between electrical systems and pneumatic systems.
14. Under force-current analogy, displacement is analogous to **magnetic flux linkage**.
15. The inverse Laplace transform of $\frac{1}{s(s+2)}$ *is* $\frac{1}{2}$ **[1-e^{-2t}]**
16. It is generally preferred to draw analogies of non-electrical systems to electrical systems because **electrical systems are more easily amenable to experimental study**.
17. Under force-voltage analogy, reciprocal of capacitance is analogous to **spring stiffness**.
18. The initial value of the function f(t) whose Laplace transform is F(S)=$\frac{4s}{s^3+s^2+9s+6}$will be **zero**.
19. Under analogy of electrical and thermal systems, the resistance under thermal quantities is expressed in terms of $\frac{C}{Joule/min}$

20. Laplace transform of 1 is $\frac{1}{s}$.
21. The Laplace transform of a unity function is $\frac{1}{s}$.
22. Under thermal and electrical system analogy charge is considered analogous to **temperature.**
23. **Viscous current coefficient-Reciprocal of resistance** is the analogous pair under current force analogy.
24. The Laplace transform of sinωt is $\frac{\omega}{s^2+\omega^2}$.
25. Laplace transform of $\frac{t^{n-1}}{<(n-1)}$ (n is positive integer) is $\frac{1}{s^n}$
26. The Laplace transform of e^{-2t} is $\frac{1}{s\ \ +2}$
27. Laplace transform (used to switch a function from the time domain to the s-domain) method of solution is applicable to equations containing **none of the above.**
28. When analogy between liquid level and electrical systems is drawn, voltage is considered as analogous to **head.**
29. Under force-voltage analogy, viscous friction coefficient is analogous to **resistance.**
30. The inverse Laplace transform of $\frac{\omega}{s(s^2+\omega^2)}$ **is** $\frac{1}{\omega^2}$ **[cosωt-1]**
31. The system with characteristic equation $s^4+3s^3+6s^2+9s+12=0$ is **unstable.**
32. **The characteristic equation** $s^2+ 4s^2+8s+12$ represents a **stable system**.
33. The impulse responses of systems are given below.**sinωt** represents an unstable system.
34. A system with characteristic equation $s^3+14s^2+56s+k=0$ will be stable if **0<k<784**

    Given C.E., s3 + 14s2 + 56s + K = 0

    Using R.H array

    s3 1 56

    s2 14 K

    s1 784 – K /14

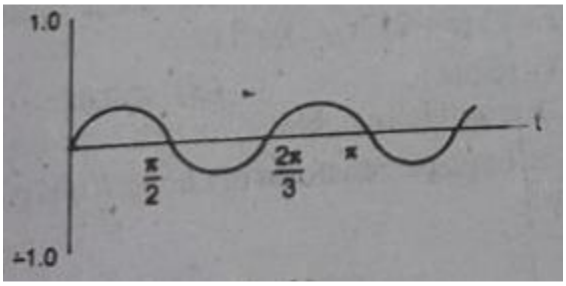
    s0 K

    Therefore, for the system to be stable

    K > 0 and 784 – K 14 > 0 or 784 – K > 0 or K < 784

    Therefore 0 < K < 784 is the required condition for the system to be stable.
35. The characteristic equation of a system is $s^4+3s^3+6s^2+9s+12=0$. in order to ensure that the system be stable, K must be greater than **zero a and less than 10**.

36. Fig. 20 represents the impulse response given by $\mathbf{e^{-t}sin3t}$.



37. If a zero appears in the first column of the Routh table, the system is **necessarily unstable.**
38. The roots of the characteristic equations of several systems are given below.**2,-1,-3** roots represents unstable system.
39. Which of the following characteristic equation represents a stable system $\mathbf{s^2+7s^2+7s+46}$.
40. For the characteristic equation $2s^3+4s^2+4s+12=0$ the number of roots with positive real parts is **two**.
41. The roots of the characteristic equations of several systems are given below. All of these represents unstable systems EXCEPT**-1, +1.**
42. For what values of K does the polynomial $s^3+(4+4k)s^2+6s+12$ have roots with negative real parts **k>-2.**
43. The characteristic equation $s^3+8s^2+14s+24=0$ represents a **stable system**.

Question 44 to 47 refer to data given below:

Let us consider the second order system

$2\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 8x.$

44. The damping ratio is **0.5.**
45. The undamped natural frequency is **0.1.**
46. The damping coefficient is **1**.
47. The time constant is **1**.
48. For what range of values of K the system having characteristic equation $s^2+Ks+2K-1=0$ will be stable? **K>**$\mathbf{\frac{1}{2}}$
49. For the given signal flow graph, $\frac{C}{R}$ is **unity**.

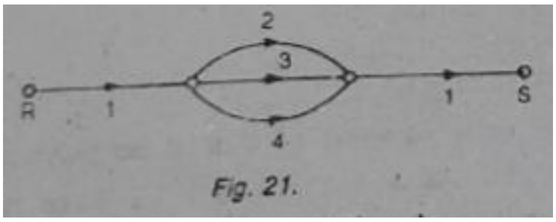


Fig. 21.

50. When all the coefficients of the characteristic equation do not have the same sign, the system is **unstable.**
51. The roots of the characteristic equations of several systems are given below. Which of these sets presents marginally stable systems? **-2+j, -2-j, 2j, -2j.**
52. The transfer function of a system is given by

    $\Theta = \frac{1}{s(s+2+4j)(s+2-4j)}$

    The number of poles is **three.**
53. If any coefficient of the characteristic equation of a system are zero, the system is **unstable.**
54. A system has poles at -1, -5 and zeros at 1 and -2. The systems is **stable.**
55. The open loop transfer functions of systems are given below. Identify the system that is not stable for all values of gain constant K.

    $\boldsymbol{\Theta = \frac{K(s+1)}{s(s+2j)(-s+4)}}$
56. The number of roots with positive real parts for the polynomial s^3+s^2-s+1 is **two**.
57. A system having characteristic equation (s+1) (s+2) (s-3) is **unstable**.
58. The Laplace transform of circuit I(t) is given by

    $\boldsymbol{i(s) = \frac{V(s)}{RL+1}}$

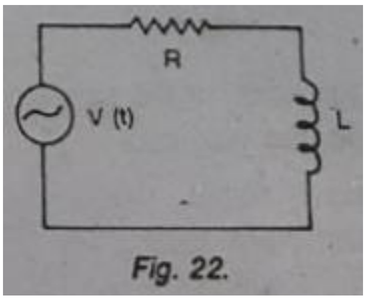


Fig. 22.

59. The number of roots with positive real parts for the polynomial $s^4+2s^3+2s^2+2s+1$ is **none**.
60. The differential equation of an integer is $\frac{dy}{dt}=x$. The integer is **marginally stable.**
61. Routh Hurwitz criterion gives **roots in right half of s-plane.**

62. The number of roots with positive real part for the polynomial s^3+s^2-2 is **one.**

Question 63 to 64 refer to data given below:

Considered the polynomial $s^4+8s^3+24s^2+32s+K$

63. The positive value of K for which the above polynomial has roots with zero real parts is **80.**
64. These roots are **s=±j2.**
65. A system in which the control action is dependent upon the output is known as **closed loop system.**

Question 66 to 68 refer to Fig. 23.

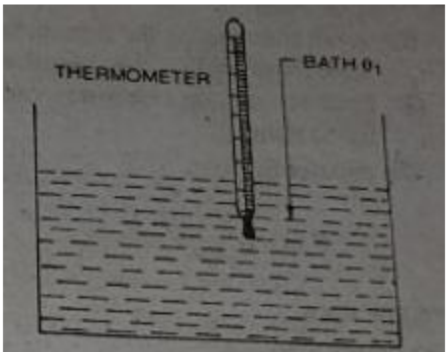


Fig. 23.

66. The thermometer can be considered to have thermal **capacitance which stores heat & thermal resistance R which limits the heat flow (both A&B).**
67. The transfer function $\frac{\Theta(s)}{\Theta i(s)}$ of the thermometer is given by $\frac{\mathbf{1}}{\boldsymbol{RCs+1}}$
68. Which of the following represents the variation of temperature inclination of the thermometer with time, after the thermometer is suddenly plugged air?

$\boldsymbol{\Theta(t) = \Theta i\ [1-e^{-t/RC}]}$

69. The transfer function of a system is used to calculate **output for a given input**.
70. Which of the following statements is not necessarily correct for open loop control system? **Presence of non-linearities causes malfunctioning.**
71. The transfer function

P(s)=$\frac{\mathbf{2s+1}}{\mathbf{s2+s+1}}$

represents a **stable system**.

72. Human eye can be considered as a **closed loop system with multivariable feed-back.**
73. **Closed loop system** has tendency to oscillate**.**
74. The limit of the gain k for which the forward path

    $\frac{\Theta o(D)}{E(D)} = \frac{k(1+0.01D)}{D(1+D)(0.1+0.2D))}$

    Will results in stable system is **6.4.**
75. In an open loop system, the control action **is independent of the output**.
76. **Open loop system** is most sensitive to the presence of non-linearities.

    Questions 77 and 78 refer to the data given below:

    A feedback control system is represented by the following differential equation:

    $\frac{d^2c}{dt^2} + 6.4\frac{dc}{dt} = 160$ e

    Where e=r-0.4c, where e is output variable.
77. The value of damping ratio is **0.4.**
78. Which of the following information can be concluded about the transient behavior of the system? **25% maximum overshoot to step command**.
79. The transient response of a system is mainly due to **stored energy**.
80. The main application of transfer function is in the study of **steady as well as transient behaviors of systems**.
81. The value of K for the stability in the following should be $\mathbf{\frac{1}{2} < K < 1}$

    $Ks^4+Ks^3+s^2+s+1=0$
82. **Actuating signal** will become zero when feedback signal and reference signals are equal.
83. The transfer function of a system is the ratio of **Laplace transform of the output variable to that of input variable.**
84. **The dc gain of the system represented by s transfer function**

    P(s) = $\frac{1}{s+1}$ is 1
85. The equation for a servo-mechanism damped solely by pure viscous friction, is given by

    $(10D^2+20D+1000)\Theta o = 1000\Theta i$

    Where Θo = load shaft displacement, radians.

    Θi = input shaft displacement, radians

    The value of damping ratio will be **0.1**

86. Transfer function can be obtained from **signal flow graph.**
87. **The transfer function of a system is given by**

    P(s) = $\frac{2}{s+2}$

    For ω=10, the gain will be **0.196**
88. In the above case the phase shift will be **$-\tan^{-1}$ 5.**
89. Reference input minus the primary feedback **is actuating signal.**
90. The transfer function is applicable to **linear and time invariant systems.**
91. The dc gain of the system represented by the transfer function

    P(s) =$\frac{(s+8)}{(s+2)(s+4)}$ is **1.**
92. The input which is established or varied by some means external to and independent of the feedback control system is known as **command.**
93. The impulse response of a certain system is the sinusoidal signal sint. The transfer function is $\frac{1}{s^2+1}$
94. For a system has transfer function

    P(s) =$\frac{2}{(s+2)}$

    The gain for ω=2 will be **0.707**
95. In the above case, the phase shift will be **-45º**.

    Questions 96 to 99 refer to Fig. 24

    A control system is composed of components whose transfer functions are as specified in the block diagram.

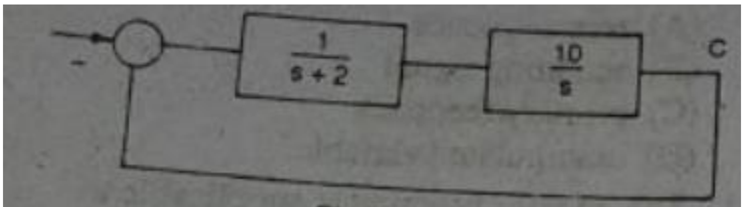


Fig. 24.

96. Which of the following is the expression for the closed loop transfer functions?

    $\frac{1}{s^2+2s+10}$.
97. At what frequency does the output variable oscillate in responding to a step command before reaching a steady gate? **3 rad/sec**.
98. In the above case the maximum percent overshoot is **35%.**
99. Time required for to output to reach within percent of steady state in equation is **5 seconds.**

Question 100 to 103 refer to data given below:

The measurements made on a servo mechanism show the output response to be

$\frac{C(t)}{ro}$= 1 – 1.66e^{-8t} sin (6t+37) where the input is a step displacement of magnitude r_o

100. The natural frequency of the system in radians per second is **10 radians per second.**
101. The damped frequency of oscillation is **6 radians per second.**
102. The damping ratio is **0.8.**
103. If the damping ratio is not to be less than 0.4, the loop gain can be increased **10 times.**
104. **The gain for transfer function**

P(s) $=\frac{2}{(s+2)}$

For ω=1 will be **0.894**

105. In the above case phase shift will be**tan**$^{-1}\frac{1}{2}$**.**
106. A zero-order hold is used with sampled data systems **to reconstruct the sampled signal.**
107. A servo-mechanism with unit step input can be categorized as **type 1 system**.
108. **Ratio of the Laplace transform of the system response to the Laplace transform of the system input function** defines a transfer function.
109. What fraction of derivative of error will be needed in order to produce a damping ratio 0.5? **0.08.**
110. A type 1 system under steady state will have position error when there is **ramp input.**
111. Analysis of control systems by Laplace transform technique is not possible for **Discrete time systems**.
112. A control system in which the control action is somehow dependent on the output is known as **closed loop system**.
113. The octave frequency range is specified by $\frac{w2}{w1}$**=2**
114. The damping factor of a system is unity. The system is **critical damped.**
115. The presence of feedback in control system **reduces distortion and increases bandwidth.**
116. For type 1 system, the steady state acceleration error is **infinite.**

117. A stepper motor is a **kind of rotating amplifier.**

118. The transfer function for the circuit shown in Fig.25, when there is no external load, will be

$$\frac{\theta_o}{\theta_i} = a\,\frac{1+R_1CD}{1+aR_1CD}$$

$[a=\frac{R_2}{R_1+R_2}]$

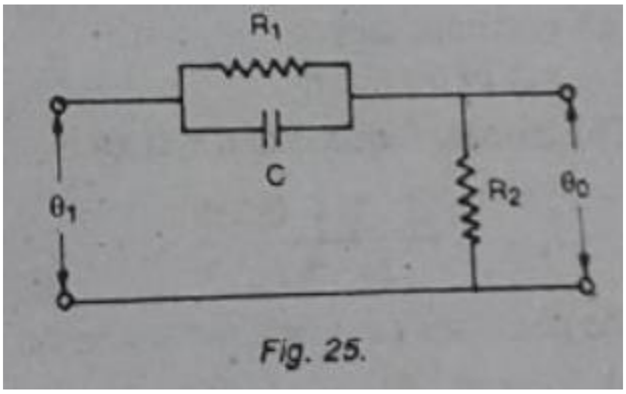


Fig. 25.

119. A type 0 system under step input has **step output with constant actuating signal**.

120. 1n control system we have

I. Nyquist criterion
II. Bode Plot
III. Root Locus Plot
IV. Routh Hermitz’s criterion

Which of the above are in time domain? **II and IV only.**

121. Which one of the following must have negative real parts for a stable system? **The system eigen values.**

122. A type 1 system under parabolic input will have **actuating signal which will increase with time.**

123. The transfer function of a system is

$$\frac{10(1+0.2s)}{1+0.5s}$$

The phase shift at w=0 and w=∞ be**(none of the above)**

124. The Bode plot of a transfer function G(s)=s is **20 dB/decade and phase shift of $\pi/2$.**

125. The decade frequency range is specified by $\frac{w2}{w1}$**=10**

126. It is found that the complete response of a system is given by the following equation

$$Y(t)= 5 + 3 \sin (\omega t + \delta_1) + e^{-3t} \sin (\omega t + \delta_2 0 + e^{5t})$$

The steady state part of the above expression is given by **5 + 3 sin (ωt + δ_1)**

127. The servo systems with step acceleration input is a **type 2 system.**

128. Which of the following is the source of non-linearity? **Backlash in gears, Threshold in seasons & Saturation in effects in amplifiers (All of the above).**

129. A differentiator is usually not a part of a control system because **it increases input noise.**

130. Frequency domain analysis is preferred when dealing with systems having input as **sinusoidal with variable frequency and amplitude.**

131. A system is critically damped. Now if the gain of the system is increased the system will behave as **under damped**.

132. The transfer function for the circuit shown in Fig. 26 when there is no external load, will be

$$\frac{\Theta o}{\Theta i} = \frac{1}{T1T2s2 + T1s + 1}$$

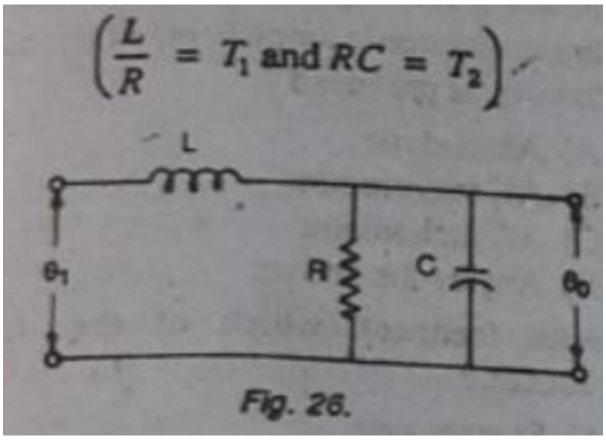


Fig. 26.

133. The response of a control system having damping factor as unity will be **critically damped.**

Questions 134 to 136 refer to Fig. 27

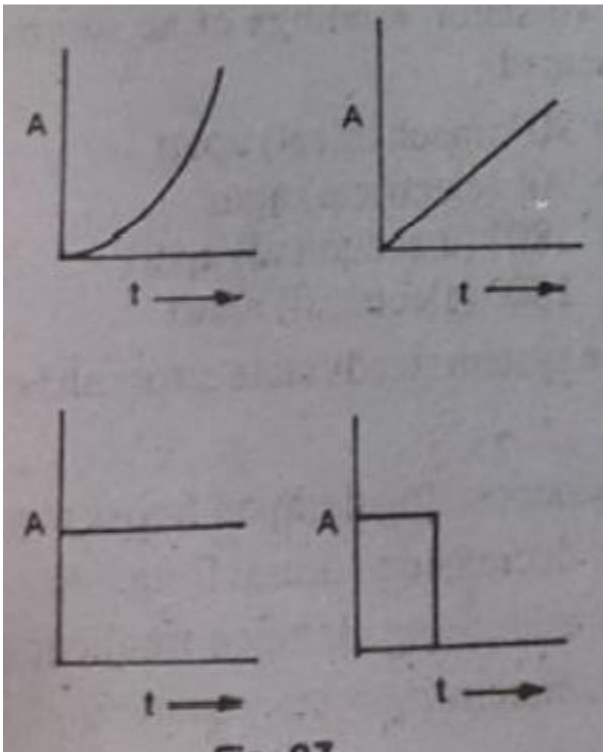


Fig. 27.

134. The unit impulse test signal is represented by **figure C.**

135. The ramp test signal is represented by **Figure B.**

136. Damping is proportional to $\frac{1}{\sqrt{gain}}$.

137. Integral error compensation in a control system **minimize steady state error.**

138. For the mechanical system shown in Fig. 28 (a) as the force voltage analogous circuit is represented by (in Fig. 28 (b)) Figure **C.**

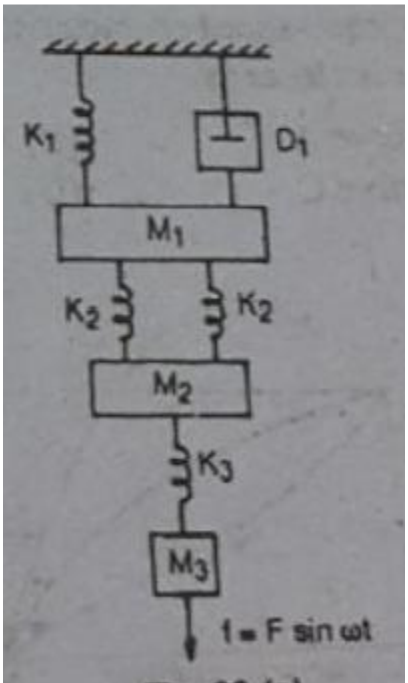


Fig. 28 (a)

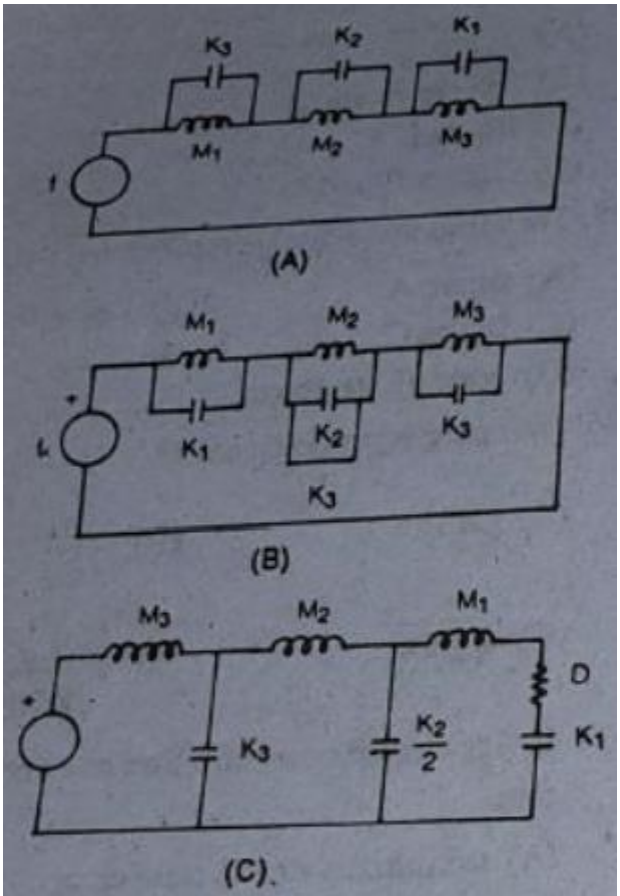
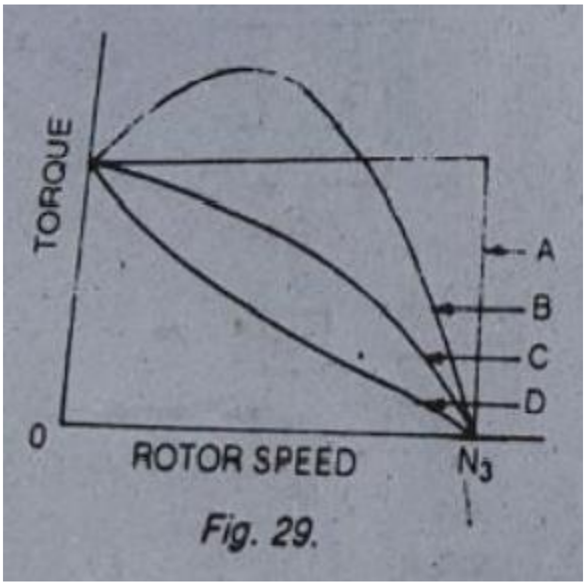


Fig. 28 (b).

139. Which of the following is not in frequency domain? **Root Locus Plot.**

140. The torque speed characteristics of ac servo motor is closer to **Curve C.**



141. The acceleration error coefficient is defined as $\lim_{s\to 0} s^2\,G(s)$.

142. When a control is required to have a power level higher than the capability of linear electronic amplifiers, which of the following is preferred? **Amplidyne.**

143. With feedback which of the following reduces? **System gain.**

144. The normal range of damping ratio is **0.4 to 1.0.**

145. The resolution of potentiometer depends upon **size of wire.**

146. With feedback which of the following increases? **System stability.**

147. Two stator windings of ac servomotors are **oriented 90^0 (electrical) apart.**

148. The system steady state error can be minimized by **increasing system gain constant A.**

149. For minimizing the loading in potentiometers **non-linearity may be introduced.**

150. With feedback system **the transient response decays more quickly.**

151. The number of root loci branches which do not terminate at zero is given by **the number of zeros- the number of poles.**

152. For converting the angular position of a shaft into an electrical signal, which of the following electromagnetic transducer can be used. **Synchronous.**

153. An amplidyne can give the characteristics as constant voltage, **constant current and constant power.**

154. AC servomotor is basically **a two-phase induction motor.**

155. Which of the following directly converts temperature into voltage? **Thermocouple.**

156. Under which of the following conditions, the transfer function technique is considered as inadequate? **Systems having stability problems, Systems having multiple input disturbances & systems having complexities and non-linearities (All of the above.)**
157. In case the magnitude of the polar plot at phase cross over is A then the gain margin is $\frac{1}{A}$ **.**
158. A two-phase induction motor consists of **two stator windings.**
159. LVDT can be used to measure **acceleration, velocity & displacement (All of the above).**
160. The output of a thermocouple is **dc voltage**.
161. If the phase angle at the gain cross over point is θ then phase margin is **180+θ.**
162. Which of the following potentiometer has infinite resolution? **Deposited field potentiometer.**
163. Identify the electromechanical device **LVDT.**
164. For a linear transfer function of the variable, the transfer function of the system **does not change.**
165. $\frac{(s+2)(s+1)}{s^2(s+3)(s+4)}$ is a **type 2 system.**
166. An ideal potentiometer should have **an infinite resolution.**
167. As compared to a potentiometer, which of the following is high for a LDT? **None of the above.**
168. The effect of adding poles and zeros can be determined quickly by **Bode Plot.**
169. In steady state the velocity error of a type 1 system will **inversely proportional to gain constant of the system.**
170. A term not associated with potentiometer is **backlash.**
171. Which of the following is incorrect? **Nyquist criterion is in time domain**.
172. In case the initial conditions of a system are specified to be zero, it implies that **the system is at rest without any stored energy.**

Question 173 to 176 refer to data given below:

The open loop transfer function of a system is

$$H(s)G(s) = \frac{10}{s(s+2)(s+5)}$$

173. The system is of type **N=1.**
174. The value of ramp constant is **1.5.**

175. The value of steady state error when the input signal is a step of magnitude 2, will be **2.**

176. According to Routh criterion, the system is **stable.**

Question 177 to 181 refer to data given below:

Suppose an RLC electrical network with supply voltage u(t) and output voltage y(t) is described by

$$\frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 25\,y(t) = 50\,u(t)$$

177. The transient behavior of this network would best be described as a **damped oscillation.**

178. If a step voltage of 10 volts is the input what is the output steady state voltage? **20.**

179. The impulse response of this network would tend to **0 value** as t approaches ∞.

180. The damping coefficient ζ for the impulse response belongs to which category? $0<\zeta<1$.

181. If a sinusoidal input voltage with peak amplitude 150 volts and frequency 60 Hz is applied to this network, what is the frequency of the sinusoidal steady state output? **The input frequency 60 Hz.**

182. The root locus of a unity feedback system is shown in Fig. 30. The open loop transfer function is given by

$$\frac{k}{s(s+1)(s+2)}$$

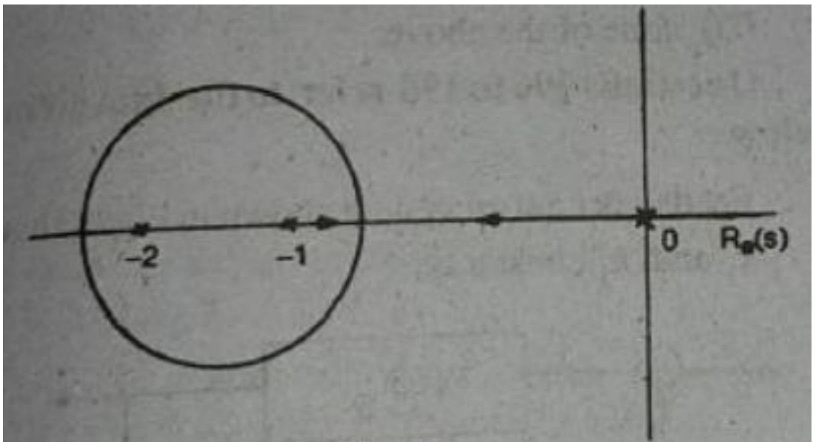


Fig. 30.

183. The Bode plot is used to analyze **maximum phase network**.

184. Which one of the following can be extended to systems which are non-linear? **State variable analysis.**

185. **The output of a linear system for a unit step input is given by t^2e^{-t}. The transfer function is given by**

$$\frac{\mathbf{2}}{(s+\mathbf{1})^{\mathbf{3}}}$$

186. For type 2 system, the velocity error is **zero.**

187. A unity feedback control system with plant $\frac{2s}{(s+1)^3}$ and proportional plus integral controller would require how many state variables for a state model description? **4.**

188. The Nyquist plot (for positive frequencies) of open loop transfer function is shown in Fig.31. the gain margin is **5.0.**

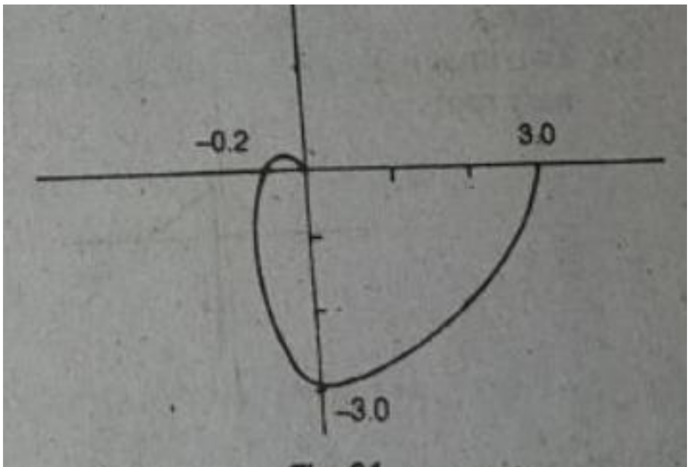


Fig. 31

189. For a transfer function G(s) = s, the Bode plot will be **20 dB/decade and phase shift of π/2.**

190. The unit step response of a linear time invariant can be obtained by **integration of the impulse response.**

191. The open loop transfer function of a unity feedback control system is

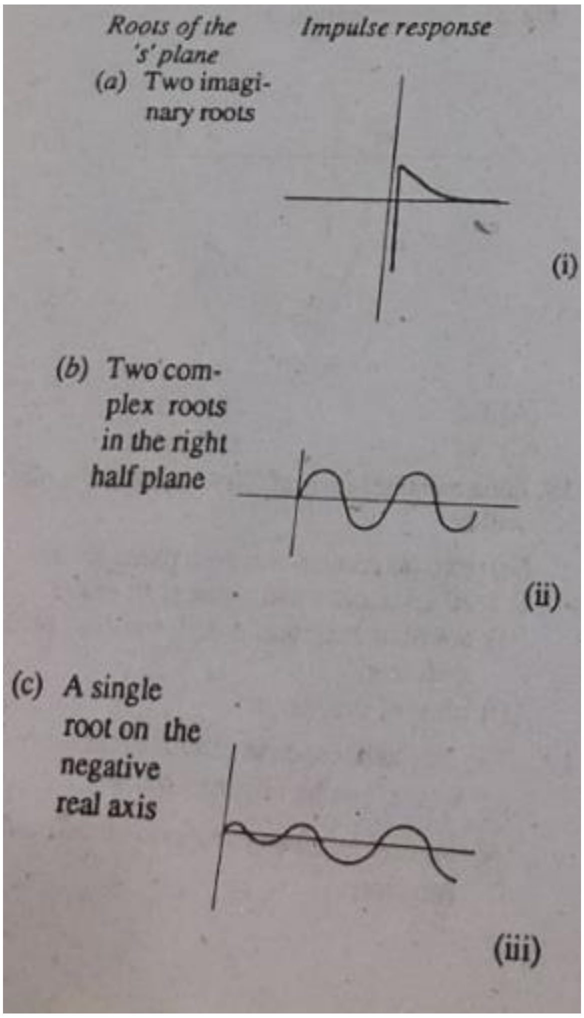
$$G(s) = \frac{K}{s(s+1)(s+5)}$$

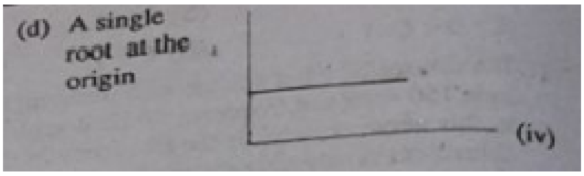
The range of K for stable operation is **0 to 30**.

192. The system response can be tested better with **unit impulse input signal.**

193. Well designed first order control systems have a **large negative transfer function pole.**

194. Match the following: **a-(ii), b-(iii). C-(i), d-(iv)**





195. Zero initial condition means that the system is **at rest and no energy is stored in any of its components.**

Question 196 to 198 refer to data given below:

Feedback control system shown in Fig.33 has k_1 and k_2 components.

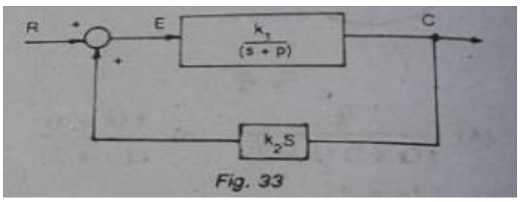


Fig. 33

196. The loop transfer function is $\frac{\mathbf{k1\ k2}}{\boldsymbol{s+p}}$.

197. The control ratio is $\frac{\mathbf{k1}}{\boldsymbol{s(s+p-k1k2)}}$.

198. The error ratio is $\frac{\mathbf{s+p}}{\boldsymbol{(s+p-k1k2)}}$.

199. Consider the following signal flow graph. How many feedback paths can be identified? **Twelve.**

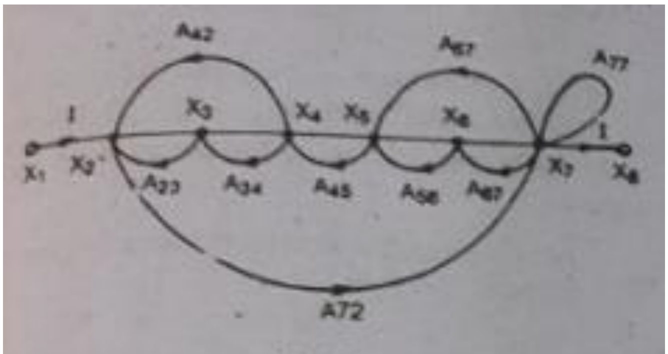


Fig. 34.

200. In second order control system the value of the resonant peak will be unity when the damping ratio has a value of $\frac{\mathbf{1}}{\sqrt{\mathbf{2}}}$.

201. Root locus diagrams exhibit which one of the following? **The poles of the transfer function for a set of parameter values.**

Question 202 to 203 refer to data given below:

202. A closed loop control system has an open loop gain of 100. Its feedback loop has a gain of 0.005. Its sensitivity for positive feedback is **0.67.**

203. Sensitive for negative feedback is **2.0**.

Question 204 to 208 refer to data given below:

A model for a mass damper system, with linear approximations, relates the applied force u(t) to the output velocity y(t) using the transfer function

H(s) = $\frac{Y(s)}{U(s)} = \frac{6}{s+2}$

204. The system's time constant T describing the time required for the step response to reach 63 % of its steady state value **0.5.**

205. Transient behavior of this system is a **decreasing exponential.**

206. If as system is viewed as a processor of sinusoidal input signals to generate the frequency response, it would be a **low pass filter.**

207. What is the value of system bandwidth? **2.**

208. If a sinusoidal input force with frequency exactly at the system bandwidth is applied, what is the value of the gain factor? $\frac{3\sqrt{2}}{2}$ **.**

209. **Which of the following is not true for Signal Flow Graph? Branch directing from node y_k to y_j represent the dependence of variable y_j upon k and vice versa.**

210. What is the Laplace transform of a step function of a magnitude a?$\frac{a}{s}$ **.**

211. The advantage of Nyquist stability test is: **its applicability to experimental results of frequency response to open loop system, its ability to predict its closed loop stability from open loop results & its ability to indicate how to stabilize an unstable system (all of the above).**

212. Which of the following can be extended to systems which are time varying? **State model representatives.**

213. The unity circle of Nyquist plot corresponds to the 0 dB line for the Bode plot for **all frequencies.**

Question 214 to 217 refer to data given below:

A chemical reactor with input flow u(t) and output concentration j(t)is modelled as a linear system with impulse response

$h(t) = (4 + 8t)\, e^{-2t}$ for t>= 0.

214. The number of state variables needed to represent this system is **2.**

215. Transients in this system are **critically damped.**

216. The steady state unit step response has magnitude **4.**

217. The complete solution for the unit step response contain an exponential term of the form Cert where the number r is **-2.**

218. The slope in Bode plot is expressed as (per unit change in low ω) **-6 dB/octave.**

Question 219 to 226 refer to data given below:

A unity feedback system has an open loop transfer function

$$G(s) = \frac{25}{s(s+8)}$$

219. The damping ratio is **0.8.**
220. The percentage peak overshoot is **1.5 %.**
221. The time required to reach the peak output is **1.045 seconds.**
222. In the above system, now a derivative component having transfer function of $\frac{s}{10}$ is introduced in the system. Now the damping ratio will be **1.05**.
223. It can be concluded that as a result of above, the system has become **overdamped**.
224. The natural frequency will remain **unchanged**.
225. As a result of above the time to reach the peak overshoot is **reduced**.
226. As a result of the above the value of percentage peak overshoot is **reduced**.
227. The effect of error rate damping is **to reduce steady state error**.
228. For type 3 system the asymptote at lower frequency will have a slope **-18 dB/ octave.**
229. The effect of adding poles and zeros can be studied quickly for determining phase and gain margin from **Bode plot.**
230. The effect of addition of pole and zero on phase margin and gain margin can be most conveniently seen in **Bode plot.**
231. Low friction coefficient in a system facilitates **reduced velocity lag error.**
232. The characteristic equation having more number of poles than zeros, the number of root locus branches will be equal to **no of poles.**
233. Hydraulic torque transmission system is analog **Motor generator set.**
234. The phase shift of third order system having transfer function as s^{-3} will be **-270.**
235. The unity circle of Nyquist plot corresponds to the 0 dB line of the Bode plot for **both low as well as high frequencies.**
236. A 1000 turns potentiometer is excited by 10 V source, its percentage resolution will be **0.1 %.**
237. In root locus plot the angle of asymptote is 360 divided by **(no of poles -no of zeros).**
238. The negative real axis of Nyquist plot corresponds to **a negative 180 phase line of Bode plot.**
239. Which of the following will increase the steady state accuracy? **Integrator.**

240. In system using relays, the signals in the part of the system are in the form of **rectangular wave with polarity depending upon that of the actuating signal.**
241. Pressure error can be measured by **differential bellows and strain gauge.**
242. The Bode plot is applicable to **minimum phase network.**
243. Z-transform of unit impulse function is **1.**
244. A phase lag lead network introduces in the output **lag at low frequencies and lead at high frequencies.**
245. The negative real axis of Nyquist plot is plotted on Bode plot as a **negative 180 phase**.
246. Non-linearity caused by servomotor is **saturation**.
247. Differentiators are not used in systems because **they cause noise and saturation in amplifier**.
248. Which of the following technique gives quick transient and stability response? **Root Locus**.
249. Regulator can be categorized as **type 0 system**.
250. Steep cut-off characteristics will have **low stability margin**.

Chapter # 7 Engineering Materials

1. "Silver" has the highest electrical conductivity.
2. Resistivity of metals is expressed in term of "µ ohm".
3. Resistivity of copper is of the order of "1.56 µ ohm-cm".
4. Resistivity of copper at absolute zero is "negligibly small".
5. A copper conductor of one square millimeter can safely carry a current of "10A".
6. For carrying an electric current of 75 A an aluminium conductor should have minimum cross section of "25 mm2".
7. The atomic radius in case of face centred cubic lattice is "a/2".
8. "Pure annealed" variety of copper has the best conductivity.
9. "Hard drawn" variety of copper has the best mechanical strength.
10. Aluminium core is known "bauxite".
11. "Carbon" has the negative resistance temperature coefficient.
12. Nickel is used in "electrodes of the thermionic valves".
13. "Lead" can be used for making cable sheaths.
14. Application of tin is in "low current fuses".
15. Constantan contains "copper and nickel".
16. German silver is an alloy of "Copper, Zinc and Nickel".
17. Nichrome is an alloy of "Nickel, Chromium and Iron".
18. The resistance of conductor does not vary in accordance with the Ohm's laws it is known as "Non-linear conductor".
19. If a body has identical properties all over, it is known as "Homogeneous".
20. The atomic radius in case of body centred lattice is "a.
21. If a piece of metal is made to have a temperature gradient between its two ends, an e.m.f is observed to exist between those ends. The above phenomenon is known as "Thomson effect".
22. The atomic radius for simple cubic lattice is "a/2".
23. The materials which undergo recoverable deformation and exhibit rubber-like elasticity are called "Elastomers".

24. The materials which exhibit the same elastic properties in all directions are called “Isotropic”.
25. “Aluminium wire” is expected to be strongest in tension.
26. “Electron” is the heaviest.
27. “Magnesium oxide” MgO is a ceramic material.
28. Poorest conductor of electricity is “Carbon”.
29. “Bimetallic” type of thermostat is generally used in appliances with heating elements.
30. “Manganin” has zero temperature coefficient of resistance.
31. Bakelite is “uncombustible”.
32. Insulating material used in spark plugs is “Porcelain”.
33. When a loop composed of two dissimilar metals could be made to carry a continuous current simply by maintaining the two junctions at different temperatures, the effect is known as “Seeback effect”.
34. Thermocouple works on “Seeback effect”.
35. When a current is passed through the junction of two different metals, heat is absorbed for liberated depending on the direction of the current, the phenomenon is known as “Pltier effect”.
36. “Copper constantan” pairs is commonly used in thermocouples.
37. The property of materials by which they can be drawn into wires is known as “ductility”.
38. Dielectric constant for vacuum is “1”.
39. For most of the solid substances, the value of dielectric constant is “between 1 and 10”.
40. Electric stress is expressed in terms of “kV/cm”.
41. The electric breakdown strength of a material depends on its “composition, thickness and moisture current”.
42. “Polystyrene” has the highest dielectric strength.
43. “Teflon” can be used at temperatures above 100°C.
44. “Mica” can be used for temperatures upto 500°C.
45. Materials having a high dielectric constant, which is non-linear, are known as “ferroelectric materials”.

46. The temperature beyond which substances lose their ferroelectric properties, is known as “Curie temperature”.
47. The dielectric strength of ferromagnetic materials depends to a large extent on “intensity of electric field”.
48. “Rochelle salt, Potassium dihydrogen phosphate and Barium titanate” are the ferroelectric material.
49. The curie point for Rohelle salt is about “240°C”.
50. Piezoelectric materials serve as a source of “ultrasonic waves”.
51. Materials which lack permanent magnetic dipoles are called “diamagnetic”.
52. Germanium has “covalent bond”.
53. When the atomic magnetic moments are randomly oriented in a solid its magnetic behaviour is termed as “paramagnetic”.
54. In ferromagnetic materials “the atomic magnetic moments are antiparallel and unequal”.
55. The intensity of magnetization, M, of ferromagnetic solid “decreases with increasing temperature”.
56. When a ferromagnetic substance is magnetised small changes in dimensions occur. Such a phenomenon is known as “magnetostriction”.
57. Magnetic recording tape is most made from “silicon-iron”.
58. Addition of 0.3% to 4.5% silicon to iron “increases the electrical resistivity of iron”.
59. The permeability of iron can be increased by “alloying with cobalt”.
60. A material with unequal anti-parallel atomic magnetic moments is “an anti-ferromagnet”.
61. The resistivity of semi-conductors at room temperatures is “0.01 to 50 ohm-cm”.
62. “Kelvin double bridge method” is suitable for the measurement of resistivity of good conductors of electricity.
63. An alloy containing 71% copper, 28% and 1% tin is known as “Admirality brass”.
64. The common household glass is “soda lime glass”.
65. “Polyethylene” polymer is crystalline.
66. The structure of a semi-conductor is like that of a “diamond”.
67. “Homopolar” type of electron pair exists in a semi-conductor.
68. Bronze is an alloy of “Copper and Tin”.

69. Brass is an alloy of “Copper and Zinc”.
70. Constantan is an alloy of “Copper and nickel”.
71. Gun metal contains “81% Cu+ 2%Zn+10%Sn”.
72. Cementite is “Fe3C”.
73. Ionisation of gas cannot be produced by “gold leaf electroscope”.
74. German silver is an alloy of “Nickel, Copper, and Zinc”.
75. Babbit is an alloy of “Tin, Antimony and Copper”.
76. “Silicon” is a semi-conductor material.
77. Selenium is “intrinsic semi-conductor”. ??
78. Silicon doped with phosphorous is a “n-type semi-conductor”.
79. Silicon doped with gallium is a “p-type semi-conductor”.
80. “Rubber” is a viscoelastic material.
81. “Quartz” is a piezo-electric material.
82. Neoprene is “rubber like plastic”.
83. “Polyvinyl chloride” material is used for cable insulation.
84. Electrical contact resistance is better between “carbon and metal”.
85. Carbon electrodes are not used in “GLS lamps”.
86. Overhead telephone wires are “Steel wires”.
87. The effect of moisture in the insulating material is “to increase dielectric loss”.
88. The relative permeability of super-conducting material is “zero”.
89. Silicon steels are specified as E11, E41, E320 etc. In this first figure after E represents
90. “percentage of silicon in steel”.
91. The number of semi-conductors in a periodic table is “13”.
92. “Cast iron” material has the best damping properties.
93. Acoustical materials “absorb sound”.
94. Porous materials generally “absorb most of the sound”.
95. The property of material by which it can be rolled into sheets is called “Malleability”.
96. The ability of material to absorb a large amount of energy is “resilience”.
97. “Glass” is the amorphous material.
98. Solder is an alloy of “tin and lead”.
99. The process of zinc coating used extensively for protecting steel from atmospheric deterioration is known as “Galvanizing”.

100. Dies for wire drawing are generally made of "carbides".
101. The percentage of carbon in cast iron is "2 to 4 percent".
102. Hardness of a material is resistance to "scratching".
103. For elastic materials stress and strain are related by "Hooke's law".
104. Main constituents of glass is "SiO2".
105. The permeability and permittivity of a medium are "independent of each other".
106. An atom in a crystal vibrates at a frequency determined by "the temperature of the crystal".
107. Alloying elements added to steel are "Molybdenum, Vanadium and Chromium".
108. Mer is "the smallest repetitive unit in a polymer".
109. Bakelite is a "Phenol formaldehyde resin".
110. "Silver" has the maximum electrical conductivity.
111. "Nichrome" is particularly suitable for use in standard resistance coils and in instrument shunts.
112. Magnetic recording tape is most made from "ferric-oxide".
113. An alloy of copper and zinc is called "brass".
114. Permivar is an alloy of "45% Ni + 30% Cu + 25% Co" composition.
115. Bronze is an alloy of "Copper and Tin".
116. Stainless steel is an alloy of "Iron, Chromium and Molybdenum".
117. The percentage of carbon in mild steel is "0.08 to 0.3%".
118. Gun metal is an alloy of "86% Cu + 9% Zn + 5% Sn".
119. Silicon steels used for electrical purposes have silicon percentage "0.5%".
120. The resistivity of a metal is a function of temperature because "the amplitude of vibration of the atom varies with temperature".
121. The resistivity of all normal metals as temperature is lowered "tends to zero".
122. "Carburizing" processes is used to harden a steel.
123. Wear resistance of a material depends on "hardness".
124. The structure of common glass is "amorphous".
125. Neoprene is "rubber".
126. The principal property of a refractory material is its "high melting point".
127. "Quartz" is an example of piezo-electric material.

128.The main constituent of glass is “SiO_2”.

Chapter # 8 Electrostatics

1. Permittivity is expressed in **farad/m**.

2. Absolute permittivity of vacuum is taken as **8.854*10^-12**

3. Relative permittivity of vacuum **is unity**.

4. A charge which when placed in vacuum from an equal and similar charge repels with a force of 9000N, is known as **micro-coulomb**.

5. Force between two charged particles is proportional to **inverse square of distance**.

6. **Electric field intensity** is a vector quantity.

7. Unit of electrostatic flux density is **coulomb per square meter**.

8. By increasing the area of overlap between the plates of a capacitor when keeping voltage across plates const, energy **increases**.

9. A force of 1N is experienced between two equal charges in space, separated by 1 meter and having a magnitude of **10 micro coulombs.**

10. A point charge in space is attracted towards a dielectric material because of the **max electrostatic flux.**

11. Point charges 30nC, -20Nc and 10Nc are located at (-1, 0, 2), (0, 0, 0) and (1, 5, -1) respectively. The total flux leaving a cube of side 6 meter centered at the origin is **10nC**.

12. A positive and a negative charge are initially 4 cm apart. When they are moved closer together so that they are now only 1 cm apart, the force between them will be **16 times larger than before**.

13. **Air** has least dielectric strength.

14. The force of attraction or repulsion between two charges q1 and q2 at a distance d meters apart is proportional to the product of charges and inversely proportional to the distance square between the two charges." Above statement is attributed to **Coulomb's Law**.

15. The unit of intensity is **N/C**.

16. The electric field on a plane is described by V=20[1/r + 1/r*r]. The field is due to a **dipole and a monopole**.

17. Two capacitors of each breakdown voltage 500V are connected parallel. The breakdown rating of the combination will be **500V**.

18. A plane Z=10m carries charge 20nc/m^2. The electric field intensity at the origin is **-360*pi*Ax/V/m**.

19. Two capacitors each of breakdown voltage 250V are connected in series. The breakdown voltage of the combination will be **500V**.

20. The work done by force F = 4Ax – 3Ay + 2Az. Newton in giving a 1nc charge a displacement of D = 10Ax + 2Ay – 7Az is **20nJ**.

21. Coulomb's Law for the force between electric charges most closely resembles with **Newton's Law of gravitation**.

22. A charged oil drop is stationary between a pair of horizontal parallel plates. If the drops carries a charge 3.2 * 10^-10 coulomb and has a mass 1.6 * 10^-19 kg, then the potential difference between the plates is **cannot be calculated on the basis of the information given**.

23. A region around a stationary electric charge has **electric field**.

24. Inside a hollow spherical conductor **electric field is zero**.

25. 1V/m is the same as **1N/C**.

26. One thousand electrons, each of which carries a charge of -1.6 * 10^-12 coulomb are removed from an initially neutral pitch ball. The resulting charge on the pitch ball is 1.6 * 10^-15 C.

28. When the potential difference across the electric field intensity between the parallel plate air capacitor is doubled, plates is **independent of the potential difference**.

29. If small charged drops are combined to give a bigger drop, the rise in potential will **be directly proportional to the radius of the bigger drop**.

30. Midway between two equal and similar charges, a third equal and similar charge is placed, then this third charge will **remain in stable equilibrium**.

31. One volt is the same as **1J/C**.

32. One farad is the same as **1C/V**.

33. When a dielectric is placed in an electric field, the field strength **decreases**.

34. The electric field intensity between the plates of a parallel plate condenser is I. Now if a dielectric medium is introduced between the plates, the strength of electric field will become **E/S**.

35. If v,w,q stand for voltage, energy and charge then v can be expressed as **v = dw/dq**.

36. The unit of electric energy is **KWh**.

37. The potential inside a charged hollow sphere is **same as that on the surface**.

38. Electric current density J is defined as **I/A**.

39. Two copper spheres A and B are of the same radii. Sphere A is hollow and sphere B is solid. If both spheres are charged to the same potential **Both will hold the same charge**.

40. For dielectrics, flux is proportional to **potential difference between electrodes**.

41. An electric potential field is produced by points charges 1uc and 4uc located at (-2,1,5) and (1,3,-1) respectively. The energy stored in the field is **5.14mJ**.

42. For a capacitance of 10uf the potential difference is increased uniformly from 0 to 600v in 2 seconds. The charging current must be **3mA**.

43. The capacitance between two plates increases **with larger plate area and shorter distance between plates**.

44. A capacitor having a capacitance of 30uf is connected across a 200v dc source. The charging current will be least **when capacitor is fully charged**.

45. Relaxation time for mica having sigma = 10^-15 mhos/m and E=6 is **15hrs.**

46. The current in a single element circuit leads the voltage 65 degree at all times. The circuit element is **a capacitor.**

47. In case of a lossy capacitor, its series equivalent resistance value will be **large**.

48. A parallel plate capacitor connected to a battery store twice as much charge with a given dielectric as it does with air as dielectric the susceptibility of the dielectric is **1.**

49. The number of image charges for a point charge between 2 conducting plates inclined at an angle of 30 degree to each other **11**.

50. A sphere of one meter radius can attain a maximum potential of **3 million volts**.

51. A capacitor of 200uf is charged to a potential of 100v. The stored energy in watt seconds will be **100**.

52. A capacitance C is charged through a resistance R. The time constant of the charging circuit is given by **RC**.

53. The capacity of capacitor used in power factor correction is expressed in terms of **KVAR**.

54. A 3uf capacitor is given charge of 2*10^-3C. The potential difference between the plates in volts is **3000**.

55. A capacitor is charged and source is then disconnected, When the plates are now separated **potential difference changes.**

56. The dielectric of a charged capacitor experiences **compressive force**.

57. A circuit component that opposes the change in the circuit voltage is **capacitance**

58. A capacitor of 100uf is connected in series with a resistance of 1000 ohm. The time constant of the circuit is **0.1s**.

59. Three capacitors 2,3 and 6uf respectively are connected in series across a 500v dc supply. Which of the following will be same for all of the three capacitors? **Energy stored**

60. The dissipating factor of capacitor can be measured by using **schearing bridge**

61. The capacitance reactance of an AC circuit containing 35uf capacitance at a frequency of 60Hz will be **75 ohm**.

62. The power dissipated in a pure capacitor is **zero.**

63. The back of two 0.5uf capacitors, 450v in series will have capacitance and breakdown voltage of **0.25uf, 900v**

64. The total capacitance of two condensers is 0.03uf when joined in series and 0.16uf when connected in parallel. The ratio of two capacitances will be **3**

65. The capacitance of a pair of parallel wires increases **with radius and decreases with separation**

66. A condenser is connected for 0.35 second across a 220v supply the current being kept steady at 0.22A. The value of capacitance must be **250uf**

67. The total capacitance of two condensers is 0.03uf when joined in series and 0.16f when connected in parallel. The capacity of two condensers must be **0.04uf and 0.12uf**

68. If Q be the charge and C be the capacity of a condenser, then the energy stored in the capacitor is given by **(Q*Q)/2C**

69. A condenser of 4uf each are connected in parallel. Their equivalent capacitance will be **16uf**

70. A capacitor is charged through a resistor of 1M ohm by dc source. If in one second the P.D. across the capacitor reaches 80% of its final value, the capacitance must have value closer to **0.62uf**

71. A capacitor of 40uf is charged to a potential difference of 500v, the charged acquired by it in coulomb is **0.02 C.**

72. If a current of one ampere passes through a lamp for 100 second, the number of coulombs of charge passing through the lamp in that time must be **100C**.

73. Two infinitely extended metal plates are both charged with equal surface density of the same polarity. The electric field in the gap between them is **0**

74. The electric flux inside a conducting sphere is **0**

75. In a parallel plate capacitor, a dielectric slab is introduced, the PD between slab will **decreases**

75. A 0.1uf capacitor has its voltage increasing linearly at the rate of 100v each m second. The current flowing through the capacitor will be **0**

76. A 0.1uf capacitor has its charge increasing on one plate and decreasing on the other at the rate of 0.03C/s. The current flowing through the capacitor will be **10mA.**

77. In a capacitor the electric charge is stored in **dielectric as well as in metal plates**

78. A constant current of 5m A charges a 10uf capacitor for 1s. How much is the voltage across the capacitor? **500v**

79. Two plates each with an area of 2 m^2, are separated by 1cm with air as dielectric. The value of capacitance will be **1770pf**

80. A capacitor is charged to 100v and has 100uC of charges. The value of capacitance will be **10uf**.

81. A mica capacitor and ceramic capacitor have the same physical dimensions. Which has higher value of capacitance? **Ceramic capacitor**

82. For the same rating which capacitor is physically smaller? **Ceramic capacitor**

83. If an ohmmeter, values immediately goes practically to zero and stays there, capacitor is **short circuited**

84. For a good 0.05uf capacitor, ohmmeter reading should **show low resistance momentarily and back off to a very high resistance**

85. A 10uf capacitor charged to 10v has a stored energy equal to **100uC.**

86. Voltage applied across a ceramic dielectric produces an electrostatic field 100 times greater than in air. The dielectric constant of the ceramic equals **100**

87. The charge in a 4uf capacitor charged to 100v will be **400uC**.

88. A six dot mica capacitor color coded white, red, green, brown, red and yellow has the capacitance value of **250pf**

89. A capacitor has a value of 100pf. It means **capacitor can store 100*10^-12C of charge with 1v**.

90. If a capacitor shows charging but the final resistance reading is appreciably less than normal, the capacitor is **of high capacitance value**

91. The ohmmeter reading for a short capacitor is **0**

92. Capacitance increases with **larger plate area and less distance between plates**

93. The electric field on equipotential surface is **parallel to surface**

94. Surface integral of electric field intensity is **differential of volume flux**

95. Which of the following capacitors will have least energy stored in it? **A 500pf capacitor charged to 10kv**

96. A 2uf capacitor is charged by a constant 3uA charging current for 4s. The voltage across the capacitor will be **6v.**

97. If I be the current, C the capacitance and V the PD then I/CV will have the **frequency**

98. If earth is assumed to be metallic sphere of radius 6400 kms, its capacitance will be nearly **0.71uf**

99. A capacitor has two **conductors separated by an insulator**

100. Voltage applied across a ceramic dielectric produces an electrostatic field 100times greater than in air. The dielectric constant K of the ceramic will be **100**

101. Twenty seven identical drops of mercury are charged simultaneously to the same potential of 10v. Assuming the drops to be spherical, if all the charged drops are made to combine to form one large drop then its potential is **90 units**.

102. Two metal plates each 20cm*20cm are separated by a sheet of plastic (Er=3.0) 3.5mm thick. The capacitance of capacitor so formed will be **2120pf**

A 4000uf capacitor of an electronic flash unit is charged to a potential of 300v.

103. According to above data the charge stored in the capacitor will be **1.2C**

104. According to above data the energy stored in the capacitor will be **180J**

105. An electric field can deflect an **Alpha particles.**

106. The effective capacitance between point x and y is **4uf**

107. The combined capacity of the parallel combination of two capacitors is four times their combined capacity when connected in series. It can be concluded that **their capacitance are equal**

A capacitor to the terminal of which a potential of 300v has been applied, consists of 54 aluminium-foil plates interleaved with sheet of mica (Er=5.0) each 0.1mm thick. The size of each metal plate is 12mm*16mm.

108. According to above data, the capacitance of the capacitor is **4160pf**

109. According to above data, the potential gradient in the dielectric will be **3KV/mm**

110. According to above data, the charge in the fully charged capacitor will be **1.25*10^-6 C**

111. According to above data, the electric flux density in C/m*m will be **0.1325*10^-3**

112. During dielectric breakdown of a capacitor **permanent conduction path is established between plates**

113. In a uniform electric field, field lines and equi-potentials **are orthogonal**

114. At the surface of two conducting surfaces **tangential components of both electric intensity and current density are continuous**

115. A potential of 200v is applied to a capacitor, the plates of which are 2mm apart. The strength of electric field in kVm is **100**

The plate area of a parallel plate, capacitor is 0.3m^2 and the thickness of the paper dielectric is 0.12mm. The relative permittivity of the paper dielectric is 2.5 and its dielectric strength is 3000V/mm.

116. According to the above data, the capacitance of the capacitor is nearly **0.55uf**

117. According to the above data, the voltage rating of the capacitor is **360v**

118. The positive terminal of a 6v battery is connected to the earth. Then the negative terminal will be at **-6v**

119. A hollow insulated conducting sphere is given a positive charge of 10uC. What will be the electric field at the center of the sphere if it reduces in 2m? **0**

120. A tiny particles carrying a charge of 0.3C is accelerated through a PD of 1000V. The kinetic energy acquired by the particle will be **300J**

121. An electric field of 100kV/m is the same as **100V/mm**

122. Three capacitors of 1, 2 and 3uf respectively are connected in series to a 60v dc source. How many capacitors will have voltage drop of more than 20v across themselves? **One**

123. What is the work done by a constant force F=(3x + 4y)N in moving an object over a straight line path defined by means of the vector R=(-x + 6y + 3z) m? **0**

124. A charge of 75uc is stored in a capacitor. The area of each of the two plates is 300 cm^2. The flux density in milli-coulombs per square meter is **2.5**

125. A cloud is at a potential of 10^6 volts relative to the ground. A charge of 6C is transferred in a lightning stroke between the cloud and the earth. The energy dissipated is **6*10^6 J**

126. An infinite number of charges, each equal to 1q, are placed at n=1,3,9,27,81,….. The electric potential at n=0 will be **3/2q**

127. Two spheres of radii R1 and R2 (R2>R1) are connected by a conducting wire. Each of the spheres has been given a charge q. Now **potential of both the spheres will be equal**

128. The energy stored in the electric field is proportional to the square of the …., whereas the energy stored in the electric magnetic field is proportional to the square of the **voltage, current**

129. Three capacitors having capacitances 2, 5, 10 and 12uf are connected in parallel across 600V mains. The capacitor having least charge will be **2uf capacitor**

130. A capacitor having a capacitance of 200uf is connected across 600V main. If the current is kept constant at 0.1A, the time during which current must be maintained in order to charge the capacitor to 600V will be **1.2 minutes**

131. If the dielectric of the capacitor is replaced by a conducting material **the plate will get short circuited**

132. In a dielectric the electrons get detached from the atoms under **breakdown**

133. At the air dielectric interface **normal component of displacement vector and tangential component of electric field are continuous**

134. What capacitance must be placed in series with a 15uf capacitor to give a total capacitance of 5uf? **7.5uf**

135. The presence of an uncharged conductor near charged one increase the **capacity of the charged conductor**

A 12uf and 3uf capacitors have been fully charged from voltage sources of 150V and 750V respectively. The terminals of corresponding polarity of these charged capacitors are connected together.

136. According to the above data, the total charge of the combination will be **4.05uc**

137. According to the above data, the voltage across the terminals of the combination will be **270**

138. According to the above data, the total energy stored will be **0.547J**

139. An uncharged conductor is placed near a charged conductor, then **the uncharged conductor gets charged by induction and then attracted towards the charged body**

140. A capacitor has a capacity C, when air is present in the two plates. A dielectric of values k is placed between the plates. The new capacity will be **KC**

141. The electric intensity inside a hollow sphere is 0. **True**

142. A stationary electric charge produces electric as well as magnetic field. **False**

143. One electron volt of energy is equal to 1.6*10^-19 J. **True**

144. Electric field intensity can also be defined as the charge of potential per unit distance. **True**

145. Three capacitors of different values are in parallel across a source of voltages V. The charge across each capacitor will be the same. **False**

146. The potential of every point inside a hollow charged sphere is the same. **True**

147. Electric field intensity is a scalar quantity. **False**

148. In series system of capacitors, the charge on each capacitor is the same as the total charge of the circuit. **True**

149. Electric field intensity is numerically the same as potential gradient at that point. **True**

150. Electric lines of forces repel each other, never intersect and are always in a state of tension. **True**

151. Electric charge is measured in coulombs and the coulomb is also the unit of electric flux. **False**

152. The electric field strength in the space between the plates of a capacitor is directly proportional to the distance between to the plates and inversely proportional to the applied voltage. **False**

153. The capacitance of a capacitor filled by a linear dielectric is independent of charge on the plates and the potential difference between the plates. **True**

154. In a single phase motor, condenser is used for power conservation. **False**

155. In a tube light circuit condenser is used for phase splitting. **False**

156. Potential V=r*cos(pi) satisfies Laplace equation. **False**

157. The dielectric strength of air is 3kV/mm. **True**

158. Electrostatic lines of force originates from a positive charge and terminate on a negative charge. **True**

159. A capacitor is a sort of open circuit to dc. **True**

160. The current through a capacitor is zero if the voltage across it is not changing with time. **True**

161. A capacitor never store energy, but only dissipates it. **False**

162. Absolute permittivity of vacuum is taken as 8.854*10^-12 farad/m. **True**

163. A capacitor assist an abrupt change in the voltage across it. **False**

164. It is impossible to change the voltage across a capacitor by a finite amount in zero time. **True**

165. For a electrostatic field to be conservative the potential difference any two points is zero. **True**

166. Both Xe and e0 are dimensionless. **False**

167. Electric current flowing in a copper wire is not an example of convection current. **True**

168. The electric flux density on a spherical surface r = b is same for a point charge Q located at the origin and for charge Q uniformly distributed on surface r = a (a<b). **True**

169. A point charge Q3=-3nc located at midpoint between Q1=1nc and Q2=2nc experience no net force. **True**

170. For sea water with Er=80, permittivity is 5.074*10^-10 F/m. **True**

171. Charge and potential inside and outside an electric screening are completely dependent of one another. **True**

172. A conductor is an equi-potential body and **E** is always tangential to conductor. **True**

173. In a linear dielectric, **P** varies linearly wit **E**. **False**

Chapter # 9 Magnetostatics

1. Unit of relative permeability is **it is dimensionless**
2. A magnetic pole is **that pole which when placed in vacuum at a distance of one meter form a similar and equal pole repels it with a force of $1/4\pi\mu_o$ newtons**
3. Which of the following is a vector quantity: **Magnetic field Intensity**
4. The ratio of intensity of magnetization to the magnetizing force is known as **susceptibility**
5. Unit of susceptibility is **Henry/meter**
6. A conductor of length L has current I passing through it, which when placed parallel to a strong magnetic field. The force experienced by the conductor will be **Zero**
7. A wire 2.5m long is bent into a square. A current of 100A flowing through the wire will produce a magnetizing force at the center of the square equal to **144AT/m**
8. In case the wire in above problem is bent in the form of a circle, for the same current of the coil will **same as 144AT/m**
9. Two infinitely long parallel conductor in vacuum are separated 1m between centers, when a current of 1 ampere flows through each conductor, produce on each other a force of **$2x10^{-7}$ N per meter length**
10. If the circle and square have the same area, the magnetizing force at the center of the coil, as a result of current flowing through the coil, will be in the ratio $\left(\frac{\pi}{32}\right)^{1/3}$
11. If the bar magnet is bent at its center to form the shape of L, the magnetic moment of the bent magnet will be **1/√2 times the original**
12. Two straight parallel conductors carry equal currents in opposite directions. The force between them is **repulsive**
13. A property of a material which opposes the creation of magnetic flux in it is known as **reluctance**
14. The unit of reluctance is **$Henry^{-1}$**
15. Reciprocal of reluctance is **permeance**
16. Whenever a conductor cuts magnetic flux, an e.m.f. is induced in that conductor. Above statement is due to **Faraday's law**

17. A coil of 100ohm is placed in a magnetic field of 1m Wb. The coil has 100 turns and a galvanometer of 400 ohms resistance is connected in series with it. If the coil is moved in $1/10^{th}$ second from the given field to 0.2mWb, average emf will be **0.4V**
18. In the above problem current induced will be **1.6mA**
19. A conductor of length 100cm moves at right angles to a uniform field flux density of 1.5 Wb/cm^2 with a velocity of 50 m/s. The emf induced in the conductor will be **75V**
20. In the above problem the induced emf will be reduced to half if the conductor moves at an angle of 30^o to the direction of the field.
21. The unit of retentivity is **Weber/sq.m**
22. The unit of retentivity is **Ampre turn/weber**
23. The left-hand rule correlates **Current, magnetic field and direction of the force on a conductor.**
24. In the left hand rule the thumb always represents **Direction of force on conductor**
25. A point pole has a strength of $4\pi \times 10^{-4}$ weber. The force in newtons on a point pole of $4\pi x1.5 x10^{-4}$ weber placed at a distance of 10cm from it will be **15N.**
26. If current changing at the rate of 1amp/sec in one coil, induces a emf of 1V in the other, then the two coils are said to have a mutual inductance of **1 Henery**
27. ---DIAGRAM QUESTION---
28. The force between two long parallel conductors is inversely proportional to **distance between the conductors.**
29. ---DIAGRAM QUESTION---
30. The co-efficient of coupling between two air core coils depends on **Mutual inductance and self-inductance of the two coils**
31. ---DIAGRAM QUESTION---
32. While comparing magnetic and electric circuits the flux of magnetic circuit is compared with which parameters of electrical circuit **Current.**
33. While comparing magnetic and electric circuits, the point of dissimilarity exists while considering **flux and current flow.**
34. ---DIAGRAM QUESTION---
35. For a coil the co-efficient of self-inductance is given **NΦ/I**
36. In a B-H curve **B is along Y-axis and H is along X-axis.**

37. For a B-H curve if area under the curve is A sq.cm and for H, 1cm =xAT/m, and for B 1cm= y Wb/m^3, then work done in joules per m^3 per cycle is given by **Xxy**
38. ---DIAGRAM QUESTION---
39. ---DIAGRAM QUESTION---
40. ---DIAGRAM QUESTION---
41. Which of the following properties are desired in materials for permanent magnets **I-High retentivity and II-High coercivity.**
42. Materials subjected to rapid reversal of magnetism should have **High Permeability and low hysteresis loss**
43. The Hysteresis loss for a material has an area of 100cm^2. The scales are 1cm= 0.1Wb/m^2 and 1cm= 100AT/m. The hysteresis loss in joule/m^2/cycle/m^3/cycle will be **1000**
44. The hysteresis loop of a specimen weighing 12kg is equivalent to 300 joules/m^3. The loss of energy per hour at 50Hz will be **86,400J**
45. According to Stenz metz Hysteresis law, Hysteresis loss in a material is proportional to $\mathbf{B^{1.6}}$
46. Biot-Savart's law states the relation between magnetic intensity and **Filament current, Surface current and volume current.**
47. A square loop carrying current is made to enter in a uniform magnetic field inclined at an angle θ with the perpendicular to the plane. The coil experiences a torque proportional to Cos θ
48. The magnetic vector potential due to a single conductor carrying current is **Infinite**
49. Substances having permeability less than the permeability of free space are known as diamagnetic.
50. Which of the following is a ferromagnetic material **Nickel**
51. A conductor of length 1m moves at right angle to a magnetic field of flux density 1Wb/m2 with a velocity of 25m/s. The induced emf in the conductor will be **25V**
52. The working of a meter is based on the use of a permanent magnet. In order to protect the meter functioning from stray magnetic fields **a shielding of soft iron used.**
53. Main constituent of permalloy is **Nickel**
54. Ferrites are a sub-group of **Ferro-magnetic materials**
55. Paramagnetic materials have relative permeability **slightly more than unity**
56. The unit of magnetic permeability is **Henry per meter**

57. The unit of magnetic charge is **ampere-meter square**
58. A degaussing is the process of **demagnetizing metallic parts**
59. ---Diagram Question---
60. In a B/H curve OR is known as **remanent flux**
61. In order to minimize loss due to hysteresis, the magnetic material should have **low hysteresis coefficient**
62. Gilbert is the unit of **magnetomotive force**
63. Reciprocal of permeability is **reluctivity**
64. One watt is not the same as **980 dynes**
65. A ferro-magnetic core subjected to cycles of magnetization will exhibit hysteresis when the cycle is **Alternating, rotating and pulsating.**
66. The electromagnetic force or torque developed in any physical system tends to **decrease the reluctance**
67. The mmf of magnetic circuit is analogous to which quantity of electric circuit **emf**
68. The relative permeability of is less than unity in case of **diamagnetic materials**
69. The core of a transformer for microwave frequency should be made of **ferrites**
70. Hysteresis loss least depends on **ambient temperature**
71. Which coil will have least inductance **A coil in which current of 10mA increasing at the rate of 2amp/sec represents a power flow of 60microWatt**
72. Which of the following is the unit of magnetic flux density **Tesla**
73. A crack in the magnetic path of an inductor will result in **reduced inductance**
74. The Z-axis carries filamentary current of 10piA along a_z. Which of these is incorrect **H=-a at (5, 3pi/2, 0)**
75. The circuit elements which will oppose the change in circuit current are **Inductance**
76. The law that the induced emf and current always oppose the cause producing them is due to **Lenz**
77. Which of the following is the unit of inductance **milli-Henry**
78. A ferrite core has less eddy current loss than an iron core because **ferrites have high resistance**
79. The magnetism left in the iron after exciting field has been removed is known as **permeability.**
80. ---Diagram Question---

81. Reluctivity is analogous to **Resistivity**
82. ---Diagram Question---
83. Which of the following is not a unit of inductance **Coulomb/volt ampere**
84. For DC voltage an inductor is virtually a **short circuit**
85. Which of the following circuit elements will oppose the change in the circuit current **Capacitor**
86. Which of the following is not the unit of flux **Tesla**
87. 1 Maxwell is the same as **10^8 Webers**
88. For an inductance, current is proportional to **magnetic field**
89. Which of the following statements concerning an electric filed is not true **The electric field intensity at a point is numerically equal to the force exerted upon a positive charge placed at that point**
90. A pure Inductance when connected across 220V, 50Hz supply consumes 100W. From this statement it can be concluded that **The statement is false.**
91. The area of Hysteresis loop is a measure of **energy loss per cycle**
92. The unit of flux density is **Webers/m^2**
93. ---Diagram Question---
94. Which of the following is true for a purely inductive circuit **Actual power is zero**
95. Which of the following magnetic paths will require the largest mmf **Air Gap**
96. Plane y = 0 carries a uniform current of 10 a_z mA/m. At (1, 10 -2), the magnetic field intensity is **-15a_x mA/m**
97. Which of the following can induce the maximum induced voltage **1amp, 100Hz**
98. Permeance is to reluctance as conductance is to **resistance**
99. If Φ is 9000 maxwells through 3cm^2, what will be B in gauss units **3000 G**
100. How much will be B in tesla units for Φ of 90micro Wb through 0.0003 m^2**0.3T**
101. When a magnet is in motion relative to a coil the induced emf does not depend upon **resistance of the coil**
102. Lenz's law is a consequence of the law of conversation of **energy**
103. An average voltage of 20V is induced in a 500-turn solenoid as the result of a change in flux which occurs in 0.5 second. The total flux change is **0.02 Wb**

104. A 1000 turn solenoid develops an average induced voltage of 120V. Over what time internal must a flux change 60 mWb occurs to produce such a voltage **0.5sec**
105. ---Diagram Question---
106. ---Diagram Question---
107. ---Diagram Question---
108. A small piece of wire is dropped through the gap between poles of a magnet in 0.1 second. An emf of $6x10^{-3}$ V is induced in the wire. The magnetic flux between the poles is **4×10^{-4}**
109. A multi-layer coil of turns of fine wire carrying 5A is 20mm long and has a thickness 5mm of winding. The mmf generated is **10 A-t**
110. On tripling the number of turns of a coil the inductance **becomes 9 times as large**
111. 1 tesla = **$1Wb/m^2$**
112. A magnetic material has a total flux B of 80microWb with an mmf of 160At. The reluctance in ampere turns per weber is **2×10-^{6}**
113. Super-magnetic materials are composed of an assemblage of **ferromagnetic particles in a non-ferromagnetic matrix**
114. ---Diagram Question---
115. A long solenoid of 2000 turns is 0.8m long. Magnetizing force in the center of this solenoid, if the exciting current is 2A is **5000AT/m**
116. The force required to separate two surfaces with a constant area measuring 5cm by 6cm when the flux density normal to the surface is 0.8tesla, will be **765N**
117. An electric current is flowing in an infinitely long straight conductor. The magnetic field at a distance of 4cm from the wire is 0.6 gauss. The magnetic field at a distance of 2cm from the wire will be **0.12 gauss**
118. A conductor of 0.2 meter long is carrying a current of 30 amperes at right angle to a magnetic field of 0.4 tesla. The force acting on the conductor will be **2.4N**
119. A conductor carries 250 amperes of current under 60^o to a magnetic field of 1.1tesla. The force on the conductor will be nearly **240N**
120. A conductor of 1.5 min length carrying a current of 100 amperes at a right angle to a magnetic field having a flux density of 0.67 tesla. The force acting on the conductor will be **100N**
121. If two ends of a circular uniform wire are jointed to the terminals of a battery, the field at the center of the circle **will depend on the radius of the circle.**

122. The iron core within a solenoid has a cross sectional area of $2cm^2$ and the flux density within the iron is 0.8 Tesla. The total flux is **0.16mWb**
123. A flux of 0.6 Wb passes through the air gap of an electric motor. Area of the air gap of the flux density 1 tesla is **$600cm^2$**
124. The area of the face of the pole shoe is $1.5cm^2$ and the total flux is 0.18 mWb. The flux density in the air gap is **1.2 Tesla**
125. An aero plane with wing span of 50 meters flies at 540km/h. The component of Earth's magnetic field perpendicular to the velocity of the plane is 0.2 gauss. The potential difference between tip will be (1 weber/m^2 =10^4 gauss) **0.15V**
126. Susceptibility is positive for **Ferromagnetic substances**
127. The parallel conductors of 10mm diameter each carrying 100 amperes in opposite directions are separated by an air space of 50mm. The conductors are 10m long. The force on each conductor will be in **0.33N**
128. A copper disc is rotated rapidly below a freely suspended magnetic needle. The magnetic needle starts rotating with velocity **less than that of the disc and in the same direction**
129. Ferromagnetic substances have **high permeability and susceptibility**
130. Earth's magnetic field always has a horizontal component except at **the magnetic poles**
131. ---Diagram Question---
132. A rectangular magnet of magnetic moment M is cut into two places of the same length. The magnetic moment of each place will be **M/2**
133. The permanent magnets are made of the **ferromagnetic** materials
134. A permanent magnet **attracts some substances and repels others**
135. Magnetic moment is a **vector quantity**
136. The property retentivity of material is useful on the construction of **permanent magnets**
137. A wire carrying current is bent in the form of a circular loop. Then the magnetic field around each portion of the wire will be **parallel to half portion and perpendicular for the other half.**
138. A solenoid has a flux of 12 mWb and a flux density of 0.9 tesla. The inside diameter if the solenoid must be **13cm**
139. Match the following

    Material/Medium Permeability

i-Free Space **Constant**

ii-Paramagnetic **Slightly more than 1**

iii-Ferromagnetic **100-100,000**

iv-Diamagnetic **Slightly less than 1**

Questions 140 to 142 refer to given data:

It is desired to send a flux of 500microWb across an air gap, 0.1cm long and $25cm^2$ in cross section, located in a certain magnetic circuit

140. The reluctance of the air gap is **3.19 x 10^5 ampere turns / weber**
141. The magnetic force in the air gap will be **15000At/m**
142. The number of ampere turns required to produce that flux is 159AT
143. ---Diagram Question---
144. The correct relation is **1Ampere-turn =4pi Gilberts**
145. The magnetizing force on an iron ring is 1750 AT/m when the flux density is 1.1 T. The relative permeability if iron is **500**
146. The quickest and the most effective way of making a magnet from soft iron is by **placing it inside a coil carrying current**
147. Hard magnet materials are used **for making permanent magnets**
148. A material commonly used for shielding or screening magnetism is **soft iron**
149. A keeper is used to **provide a closed path for flux**
150. In electrical circuits, resistance is to current is the same as in magnetic circuits reluctance is to coercivity
151. The lagging of flux density behind the applied magnetizing force is known as **hysteresis**
152. Reluctance: Inductance:: AT/Weber : Henry

Questions 153 and 154 refer to data given below:

Two conductors A and B are insulated from each other and contained within a single electric cable. Conductor A has a current of 25A while the current in conductor B is 9.5A. A 15cm length of the electric cable is situated within a magnetic field at right angles to the field. The flux density of the field is 0.85T

153. The force on the cable, when the conductor currents are in the same direction, will be **4.4N**
154. The force on the cable, when the conductor currents are on the opposite directions, will be **2N**

155. A 0.5mm air gap has a cross-sectional area of $7cm^2$. The mmf required to generate a total flux of 50 microWb in the air gap **28.4A**

Chapter # 10 Electromagnetics

1. Mark the correct relation **= j.j = k. k = 1**
2. Which of the following relation is valid?**i x j = k**
3. Which of the following relation is valid?**A x (B x C) = (A.C) B – (A.B) C**
4. Which of the following relation is valid? $\nabla \times \nabla \times A = \nabla(\nabla . A) - \nabla^2 A$
5. The magnitude of the vector 3ax+4ay-5az is **7.07**.
6. Which of the following represents the Maxwell's divergence equation for static electric field? $\nabla . B = 0$.
7. Which of the following represents the Maxwell's curl equation for static magnetic field? $\nabla \times B = \mu_0 J$.
8. Conductivity is measured in terms of **mhos/metre**.
9. The magnitude of the vector $\cos\alpha a_x + 2 \sin\alpha\, a_y = 7 a_z$ will be **7.21**.
10. Which of the following relation is valid? **D=εE.**
11. The component form of the unit vector which is directed along a line from the origin to (-2,1,2).$-\frac{2}{3}ax + \frac{2}{3}ay + \frac{2}{3}az.$
12. The do product of the vectors A and B when $A= 3a_y - 2a_x$ and B= 2 A will be**0**.
13. A medium behaves like dielectric when **the displacement current is much greater than the conduction current**.
14. If the magnetic field vector H has only Z component given by H= 3x cosβ + 6y sinγ and if the field is invariant with time, the expression for current density J will be **J=-6 k sin γ.**
15. Which of the following field satisfies Maxwell's equation?
    $B=8X10^4 Y^2 + 4 X 10^9 t^2$
    $E= 9x10^{10} yt\, a_x$
16. The relative dielectric constant of a non-magnetic material through which a uniform plane wave is propagating and intrinsic impedance is 180 Ω will be **2.25**.
17. What is the relative dielectric constant of a non-magnetic material through which a uniform plane wave is propagating if the wave-length at 10Hz is 2 cm? **3.65**.

18. The wavelength in a material for which $\varepsilon_R = 4$, $\mu_R=1$, $f=3x10^8$ Hz and the loss tangent is 0.01, will be **3.455m.**
19. The percentage of the incident power that is reflected when uniform plane wave travelling in region 1 normally incident on region 2 if region 1 and 2 are respectively**polysterene and air.**
20. In case of semi-conductors the ratio of conduction current to displacement current is **less than 100 but greater than $\frac{1}{100}$.**
21. The magnitude of the intrinsic impedance of a good conducting medium is given by $\sqrt{\frac{\omega\mu}{\theta}}$**.**
22. Which of the following represents the continuity equations for discrete components?**∇. J= 0**.
23. Which of the following equation represents the relation between the magnetizing volume current density J_m and the magnetization polarization M?**J_m= ∇x M**

Question 24 to 25 refer to data given below:

24. It is given that for rural ground er=14 at low frequency and = 10-2. At which frequency the behavior of rural ground will be like a conductor **1 kHz.**
25. At which frequency it behaves like a dielectric? **30 MHz.**
26. The characteristics impedance of the free space is taken as **377 ohms.**
27. The vector product of electric intensities E and magnetic field intensity H at any point is a measure of the rate of energy flow per unit area at that point. The above statement is known as**Poynting theorem.**
28. The Poynting vector P measures **the rate of flow of energy.**
29. The ratio of the velocity of a wave in free-space to that in the conducting medium is knowns as **refractive index.**
30. Which of the following is not Maxwell's equation?**∇ . E = -B.**
31. Which of the following is not Maxwell's equation?**E=εD.**
32. Poynting vector signifies **power density vector producing electro-magnetic field.**
33. Poynting vector has the units of **watts/metre^2**.
34. Poynting vector gives the **rate of energy flow**.
35. Maxwell's equation in free space is **∇ .B = 0.**

36. $\nabla^2 . H= \mu_0 \varepsilon_0 \frac{\partial^2 H}{\partial t^2}$ is a **wave equation**.
37. Poynting theorem relating the electric intensity E, magnetic intensity H and the rate of energy flow per unit area at a point gives pointing vector P as equal to **E x H**.
38. Which of the following represents the Maxwell's continuity equation for time varying electromagnetic fields**, $\Delta.J + \frac{\partial p}{\partial t} = 0$.**
39. Velocity of plane electromagnetic waves in vacuum equals $\sqrt{\mu 0\ \varepsilon 0}$.
40. Where two sinusoidally time varying vectors having different amplitudes and phases are added up, the resulting vector is **elliptically polarized**.
41. For an EM wave transmitted in a good dielectric having $\Theta/(\omega\varepsilon) >> 1$, the attenuation constant α and phase shift factor β are given by

$$\boldsymbol{\alpha = \frac{\Theta}{2}\sqrt{\frac{\mu}{\varepsilon}}\ ;\ \beta = \omega\sqrt{\mu\,\varepsilon}}$$

42. A time varying magnetic field produces **both magnetic and electric fields**.
43. The following waves don't exist in waveguides: **TEM waves**.
44. For normal incidence, the angle of incidence is $\mathbf{0^0}$.
45. The angle for which there is no reflection and the incident wave is vertically polarized, is known as **Brewster angle**.
46. A circularly polarized wave incident at the Brewster angle on reflection becomes **linearly polarized.**
47. In a perfect dielectric, wave propagation occurs; **with zero attenuation**.
48. The Brewster angle is given by**tan θ= $\sqrt{\frac{\varepsilon 2}{\varepsilon 1}}$.**
49. A parallel polarized wave is incident from air to paraffin. If ε_r for paraffin is 2, the Brewster angle will be nearly $\mathbf{55^0}$.
50. Poynting vector has the dimensions **Watts/metre^2**.
51. Poynting vector is a measure of the rate of energy flow per unit area and is given by **P = E x H**.
52. The Poynting vector is associated with **power flow in electrostatic field**.
53. The polarization of dielectric materials results in **creation of electric dipoles**.
54. According to Snell's law, for electromagnetic waves

$\frac{\cos\theta i}{\cos\theta r} = \frac{n1}{n2}$

55. Δ^2 v = - $\frac{p}{\varepsilon}$ is known as **Poisson's equation.**
56. The direction of which of the following vector gives the direction of propagation of electromagnetic waves? **Vector (E x H)**.
57. When n1 and n2 are the refractive indices of two mediums, then according to Snell's law $\frac{\sin\theta r}{\sin\theta i} = \frac{n1}{n2}$
58. The current density J is related with current as **J=** $\frac{I}{A}$ **.**
59. The energy stored in a magnetic field is given by **W=** $\frac{\mu H2}{2}$ **.**
60. Characteristic equation of plane wave in E, independent of two dimensions y and z, is $\frac{\partial E}{\partial t} =$ **0**

Chapter # 11 Vacuum Tubes

1. Vacuum tube has electrodes confined inside an evacuated**1. glass envelope only 2. metal envelope only 3. either of 1 and 2 above**
2. In **radio transmitter** application vacuum tubes are still being used
3. Vacuum tubes in a radio transmitter are used to **generate high power radio waves**
4. Transistor have not replaced vacuum tubes because **high power transistors are not available**
5. Vacuum tubes are still used in some electronic device due to **their capacity to handle high power**
6. The emission of electrons in a vacuum diode is achieved by **heating**
7. At ordinary temperature energy of free electrons in metal as compare with work function is **less**
8. The energy can be provided to electrons to cross the surface barrier by**1.heating 2. Electric field 3. Light 4. Any of the above**
9. The principle of emission of electrons from a metal surface under the influence of light is known as **photo electric emission**
10. With an indirectly heated cathode , the heater voltage **is separate from the cathode circuit**
11. Secondary emission of electrons occurs when the metal surface is **bombardment with high energy electrons**
12. **Thermionic emission** electron emission process is widely used in vacuum tubes
13. Generally metals with low work function have **low melting point**
14. **Oxide coated** Emitted material has the lowest work function
15. In a vacuum diode provided with directly heated cathode **electrons are emitted from the filament itself**
16. The filament of a vacuum tube can be heated by**1. Dc voltage 2.low frequency ac voltage 3. rectified 4. Any of the above**
17. The heater filament of a vacuum tube is usually supplied with ac voltage for heating because **ac voltage can be easily obtained from mains**
18. The work function for oxide coated emitter material is **1.0eV**

19. The work function in case of thoriated tungsten is **2.63eV**
20. The work function of pure tungsten is **4.5eV**
21. **Oxide coated** Emitter material usually needs less than 1000 V as plate voltage
22. In a vacuum tube diode, the rate of collection of electrons at plate is equal to the rate at which electrons are emitted by the cathode, only when the tube is working in **temperature limited conditions and space charge limited conditions**
23. Oxide coated cathodes are used for the tubes **designed to handle small power**
24. In case of oxide coated electrodes the sleeve is coated with a layer of **barium oxide and strontium oxide**
25. The emission efficiency of a cathode is **emission current/W**
26. Thoriated tungsten is used as emitter material in tubes upto**1000 W**
27. An oxide coated cathode cannot be used if the voltage at the anode is **500V**
28. The ratio of small change in plate current to small change in grid voltage at constant plate voltage is known as **transconductance (gm)**
29. A directly heated cathode may be made of**1. Tungsten 2. Thoriated tungsten 3. Tungsten coated with strontium oxide 4. Any of the above**
30. In case of indirectly heated tubes the heater filament is usually made of **tungsten**
31. In case of indirectly heated cathode , the cathode is usually in the shape of **cylinder**
32. The anode material is usually **nickel**
33. Fins are often provided on **anode**
34. Fin are provided on anode to **dissipate heat produced**
35. The surface of anode is usually blacked and roughened to **dissipate heat produced at the anode**
36. The reciprocal of the characteristic curve of the diode is the **output resistance of the diode**
37. The characteristic of a vacuum diode is similar to that of a semi-conductor diode except for one difference that **when a vacuum diode is forward biased ,saturation of plate current occurs at high voltages**
38. In a vacuum diode , the plate current can be varied by1.**changing the plate voltage2.changing the heater voltage 3. Any of the above**
39. In triodes , the grid is made in the form of **mesh**

40. A control grid is provided in a pentode tube to **control the number of electrons moving from cathode to plate**
41. In a triode , the third electrode is kept **near the cathode**
42. The grid of a triode is normally maintained at **a negative potential with respect to cathode**
43. The transfer characteristics of a triode Is a relation between **grid voltage and plate current for constant values of plate voltage**
44. The characteristics of a triode between grid value and plate voltage for constant value of plate current is known as **constant current characteristics**
45. When the cathode of vacuum tube is heated and anode is not connected to any external circuit **electrons from a space charge**

Question 46 to 48 refer to fig. 12.

The V-I characteristic of a diode are shown in fig.12

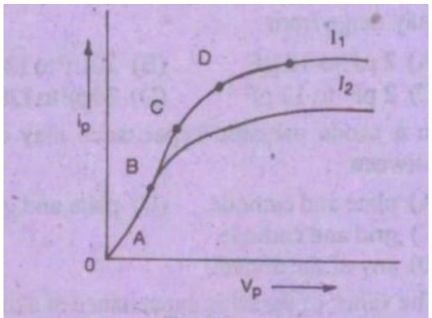


Fig. 12.

46. The space charge limited current exist between **O AND D**
47. All emitted electrons are collected by the plate **beyond D**
48. The space-charge limited current is given by the relation **ip=k vp^3/4**
49. In a diode the plate current increase when the **plate voltage is made more positive**
50. A triode can also be used as an amplifier because **any small change in grid voltageis capable of causing a larger change in plate voltage**
51. In a vacuum diode **cathode emits electrons and the plate voltage is positive with respect to cathode**
52. In a cathode ray tube, **anode** electrode has the highest positive voltage
53. The characteristics of triode shown in fig.13 is known as **static plate characteristics**

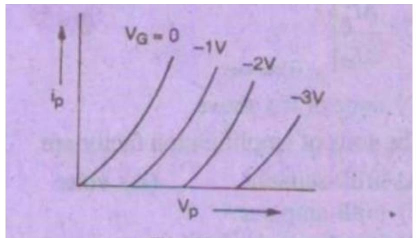


Fig. 13.

54. For a triode the ratio of a small change in plate current to the charge in grid voltage producing it, when plate voltage remains constant, is known as **mutual conductance**
55. The mutual conductance of triode is usually expressed in terms of **mili-seimens**
56. The mutual conductance of a triode is usually in the range **1 to 10 ms**
57. For a triodethe characteristic between plate voltage and plate current for constant value of grid voltage is known as **static plate characteristics**
58. represents the amplification factor for a triode **Δip/Δvg (Ip constant)**
59. The unit of amplification factor are **it is dimensionless**
60. The amplification factor for a triode usually range from **15 to 100**
61. The characteristic of triode shown in fig. 14 is known as **mutual characteristics**

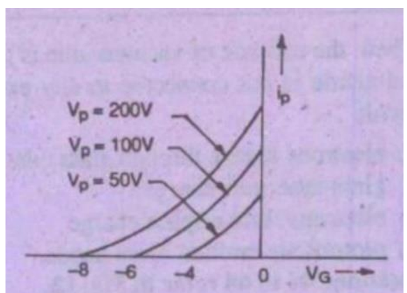


Fig. 14.

62. The value of plastic capacitances for a triode may range from **20 uf to 120uf**
63. In a triode parasitic capacitance may exist between **1. Plate and cathode 2. Plate and grid 3. grid and cathode 4.any of the above**
64. The value of parasitic capacitance of a triode increases as **signal frequency increases**
65. The control grid of a triode is usually given negative potential with respect to the cathode so as to **reduce the grid current to zero**
66. Under **when plate voltage is less than the screen grid voltage** conditions, the negative resistance region can be observed in a triode
67. In a tetrode tube, secondary emission means the emission of **electrons from the plate due to bombardment of the fast moving electrons emitted from the cathode.**

68. Mutual characteristic is the curve between **plate current and grid voltage**
69. In pentode , the suppressor grid is placed between **plate and screen grid**
70. In a pentode,the control grid is provided between **cathode and screen grid**
71. In a pentode the suppressor grid is used to **suppress secondary emission**
72. The suppressor grid in pentode **eliminates the problem of secondary emission from the plate**
73. In a triode , tetrode or pentode, the plate current increase when the **control grid voltage is made less negative**
74. The screen grid in a pentode **decreases the grid plate capacitance as compared with a triode**
75. In a half wave rectified circuit the diode conducts when the **plate is made positive by the positive alternation of the ac input voltage**
76. **Diode** Vacuum tube cannot be used as an amplifier
77. Function of suppressor grid is
    1. **Suppressor secondary emission effects 2.increase amplification factor 3.reduces C**gp
78. A thermionic cathode is heated to emit electrons. **T**
79. The anode has a positive potential with respect to the cathode to attract electrons. **T**
80. In a diode, plate current can flow in only one direction. **T**
81. An open heater result in zero plate current. **T**
82. Graphical relations between Ib, Eb and Ec which the triode contains load in the plate circuit are known as dynamic characteristic of triode. **T**
83. Triodes , tetrodes and pentodes can be used as amplifiers. **T**
84. Vacuum tubes can be used for amplifiers , rectifiers and oscillators. **T**
85. Single diode can be used as a half wave as well as full wave rectifier. **F**
86. With an indirectly heated cathode, a separate heater makes the insulated cathode emit electrons. **T**
87. The function of the triode is to amplify a grid voltage variation. **T**
88. The mutual conductance of pentode is nearly same as that is triode. **T**
89. The screen grid of pentode tube is maintained at a more negative potential than the control grid. **F**

90. Triode usually produce more noise as compare to pentodes. **T**
91. At high frequencies, plate to grid capacitance in triode cause serious complications. **T**
92. Reduction of plate current in a tetrode due to secondary emission is known as dynatron effect. **T**
93. In a cathode ray tube the anode voltage ranges from 2kv to 80kv. **T**
94. The space charged formed around the cathode of a vacuum tube is always positive. **F**
95. When vacuumdiode is working under space charge limited conditions, its dynamic plate resistance is lower at higher plate voltage , that at lower plate voltage. **T**
96. The plate ac resistance of a pentode is of the order of 12,000 ohms**F**
97. Typical the amplification factor of a triode is about 30 **(T)**
98. The cathode of a thermionic tube cannot be heated by dc current(F)
99. Oxide coated cathodes are generally used for low power tube**(T)**
100. In temperature limited region of its characteristic , the plate of diode collects electrons at a faster rate than they are emitted from the cathodes**F**

Chapter # 12 Semi-conductors

1. **Semi-conductor device** constitutes an active component.
2. **SCR** is an active device.
3. The conductivity of materials found in nature ranges from 10^{9} ohm^{-1}m^{-1} to nearly 10^{-18} ohm^{-1} m^{-1}. From this it can be concluded that the conductivity of silicon in ohm cm will be nearly $\mathbf{0.5\times10^{-3}}$.
4. The process by which impurities are added to a pure semi-conductor is **Doping.**
5. **Capacitors** are passive components.
6. **Capacitor** is used as a passive component in electronic circuits.
7. A Germanium atom contains **four valance electrons**.
8. If the conductivity of pure germanium is 1.54 siemens/meter, its resistivity in ohm-meter will be nearly **0.065.**
9. The type of atomic bonding in most common in semi-conductor is **Covalent.**
10. When an atom either gains or losses an electron it is said to be **ionized**.
11. The diameter of an atom is $\mathbf{10^{-10}}$ **meter**.

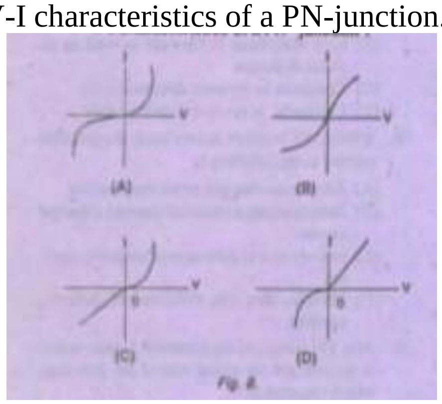
12. The atomic weight of an atom is determined by the **number of protons and neutrons**.
13. The mass of **proton and neutron** is nearly the same.
14. The number of protons in an atom is called its **atomic number**.
15. The maximum number of electrons in third orbit can be **18.**
16. Valence electrons are the **electrons present in outermost orbit.**
17. **Boron** has lowest atomic number.
18. **Helium** element does not occur in third group of periodic table.
19. The atomic number of silicon is 14. It can be therefore concluded that

a) a silicon atom contains 14 protons
b) a silicon atom contains 14 neutrons
c) a silicon atom contains 14 electrons.

20. If the atomic number of germanium is 32, the number of electrons in the outermost shell will be **4.**
21. **Phosphorous** element does not have three valence electrons.
22. **Indium** element does not have five valence electrons.
23. **Silicon and Germanium** have four valence electrons.
24. The total energy of an electron in an atom will be maximum when it is **in an orbit farthest from the nucleus**.
25. **Silicon** has four valance electrons.
26. A germanium atom has **two electron orbits.**
27. If an electron moves through a potential difference of 500V, the energy possessed by it will **500eV.**
28. One electron volt is equivalent to $\mathbf{1.6\times10^{-19}}$ **joules.**
29. The forbidden energy gap for silicon is **1.12eV**.
30. The forbidden energy gap for germanium is **0.72eV**.
31. Free electrons exist in **conduction band**.

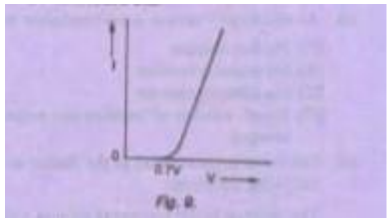
32. The forbidden energy gap between the valence band and conduction band will be least in case of **metals**.
33. The forbidden energy gap between the valence band and conduction band will be wide in case of **insulators**.
34. An insulator will conduct when **the voltage applied is more than the break down voltage and temperature is raised very high level.**
35. A semi-conductor in its purest form is called **intrinsic semi-conductor**.
36. At absolute zero temperature a semi-conductor behaves like an **insulator**.
37. When atoms are held together by the sharing of valence electrons **they form a covalent bond**.
38. An electron in the conduction band **has higher energy than the electron in the valance band**.
39. When an electron breaks a covalent bond and moves away, **a hole is created.**
40. E_0 for silicon is 1.12eV and that for germanium is 0.72eV. Therefore, it can be concluded that **less number of electron hole pairs will be generated in silicon than in germanium at room temperature.**
41. E_0 for silicon is 1.12eV and that for germanium is 0.72eV. Therefore, it can be concluded that **the conductivity of silicon will be less than that of germanium at room temperature**.
42. The resistivity of a semiconductor decreases as **the temperature increases**.
43. Semi-conductors have **negative temperature coefficient of resistance**.
44. The process of deliberately adding impurity to a semi-conductor material is called **doping**.
45. A doped semiconductor is called **extrinsic semi-conductor**.
46. Before doping the semi-conductor, material is **purified**.
47. **Phosphorous** is donor impurity element.
48. **Gallium** is acceptor impurity.
49. **Antimony, Gallium and Arsenic** have five valence electrons.
50. **Silicon** has four valence electrons.
51. **Boron, Indium and Gallium** have three valence electrons**.**
52. **Antimony** has the highest atomic number.
53. As the temperature of an intrinsic semi-conductor material is increased **energy of the atom is increased**.
54. **A vacancy is filled by a valance electron from the neighboring atom** results in the movement of hole.
55. Addition of a small amount of antimony to germanium will result in **formation of p-type semiconductor**.
56. A donor type impurity must have **only five valance electron**.
57. At room temperature when a voltage is applied to an intrinsic semiconductor **electron moves towards positive terminal and holes towards negative terminal**.
58. The energy of the atoms of a semi-conductor material is increased when **temperature is increased.**
59. The conduction band is **a range of energies compounding to the energies of the free electrons**.
60. The forbidden energy gap in semiconductors **lies between valance band and conduction band.**

61.
62. In a N-type semi-conductor, the concentration of minority carriers mainly depends on **the temperature of the material**.
63. When a semi-conductor is doped, its electrical conductivity **increases**.
64. When a normal atom loss an electron, **the atom become a positive ion**.
65. Resistivity is a property of a semiconductor that depends on **the shape of the semiconductor.**
66. An electrically neutral semiconductor has **equal number of positive and negative charges**.
67. The electron in the outermost orbit is called **valence electrons**.
68. The semi-conductors have **negative** temperature coefficient of resistance.
69. The larger the orbit, the **greater** is the energy of the electrons.
70. In N-type semiconductors free electrons are the **majority** carriers.
71. The merging of a free electron and a hole is called **recombination.**
72. Excess minority carriers are the carriers that are **in excess of the equilibrium number**.
73. A PN-junction offers conducts in **forward direction only**.
74. When a PN junction is unbiased, the junction current at equilibrium is **mainly due to the diffusion of majority carriers**.
75. At a PN-junction, the potential barrier is due to the charges on either side of the junction, which consists of **fixed donors and acceptor ions**.
76. In PN junction, the region containing the uncompensated acceptor and donor ions is called **depletion region**.
77. A PN junction is said to be forward biased when **positive terminal of battery connected to P-side and negative side to the N-side.**
78. When PN-junction is in forward bias, by increasing the battery voltage **current through PN-junction increase.**
79. **Figure A** represents the V-I characteristics of a PN-junction.



80. In a reverse biased P-N junction, the current through the junction increases abruptly at **breakdown voltage**.
81. The holes diffuse from P region to the N region in a PN-junction diode because **there is greater concentration of holes in the P-region as compared to N-region**.
82. Ina semi-conductor diode, the barrier offers opposition **to majority carriers in both regions**.
83. For a PN diode the number of minority carriers crossing the junction mainly depends on **rate of thermal generation of electron hole pairs.**

84. The V-I characteristics of a semiconductor diode is shown in Fig.9. From this figure it can be concluded that **the diode is silicon diode**.



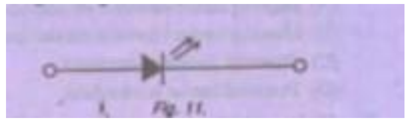
85. If too large current passes through the diode **excessive heat may damage the diode.**
86. **10 A** could be the maximum current rating of junction diode.
87. When reverse bias is applied to a junction diode **potential barrier is raised**.
88. For a PN-Junction diode, the current in reverse bias may be **few micro or Nano amperes**.
89. **Figure A** represents an ideal diode characteristic.
90. **Potential barrier is decreased** when forward bias applied to a junction diode.
91. **When reverse bias exceeds a certain value** avalanche breakdown in a semi-conductor diode occurs.

Question 92 and 93 refer to data given

The turns ratio of a transformer used in half wave rectifier is 10: 1. The primary is connected to the power mains, 220 V, 50 Hz.

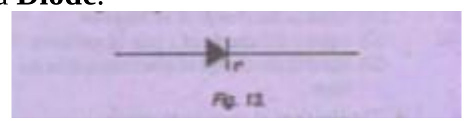
92. If the diode resistance in forward bias is zero, the dc voltage across the load will be nearly **10 V.**
93. The peak inverse voltage of the diode will be **31V**.
94. Bridge rectifier needs **four diodes**.
95. The ripple factor for a half wave rectifier is **1.21**.
96. The ripple factor for a full wave rectifier is **0.482**.
97. Maximum rectification efficiency for a half wave rectifier is **40.6%**.
98. The maximum rectification efficiency in case of full wave rectifier is **81.2%**.
99. A full wave bridge rectifier is supplied voltage at 50 Hz The lowest ripple frequency will be **100Hz**.
100. For signal diodes the PIV rating is usually in the range **30V to 150V**.
101. The maximum forward current in case of signal diode is in the range of **few mili amperes**.
102. Zener diode is designed to operate in the **breakdown region.**
103. Power diodes are generally **silicon diodes**.
104. Wiedemann-Franz law correlates **electrical and thermal conductivities.**
105. In a semi-conductor avalanche breakdown occurs **when reverse bias exceeds the limiting value**.
106. In a half wave rectifier, the load current flows only **for the positive half cycle of input signa**l.
107. If 10 Vis the peak voltage across the secondary of the transformer in a half wave rectifier (without any filter circuit), then the maximum voltage on the reverse biased diode will be **10V**.
108. In a center tap full wave rectifier, 50V is the peak voltage between the center tap and one of the ends of the secondry. The maximum voltage across the reverse biased diode will be **100V**.
109. In a zener diode sharp break down occurs at **low reverse voltage**.

110. The dc output voltage from a power supply **increase with higher values of filter capacitance and decreases with more load current**.
111. With an ac input from 50 Hz power line, the ripple frequency is **50Hz in the DC output of half wave as well as full wave rectifier**.
112. Fig.11 represents a **LED**.



113. Fig.12 represents a **Varactor Diode**.

114. Fig.13 represents a **Diode**.



115. Fig.14 represents a **Tunnel Diode**.

116. Fig.15 represents a **Zener Diode**.

117. Any semi-conductor material has valence of electrons **4.**
118. In N-type semi-conductor **electrons are majority career while holes are minority careers**.
119. A semi-conductor that is electrically neutral **has equal amount of positive and negative charges**.
120. Resistivity of a semi-conductor depends on **atomic nature of semiconductors**.
121. . When holes leave the p-material to fill electrons in the n-material the process is called **diffusion**.
122. In case of selenium, under the influence of varying light intensity **electrical conductivity changes**.
123. Diffusion current in a diode is caused by **crystal formation**.
124. Depletion region in a PN diode is due to **reverse biasing**.
125. Depletion region in a PN junction diode consists of **fixed donor and acceptor ions**.

126. The photo electric current in amperes per watt of incident light depend on **frequency of incident light**.

127. When a diode is forward biased **barrier potential decrease.**
128. In case of photo conductor for Germanium when forbidden energy gap is 0.72 eV, the critical wavelength for intrinsic excitation will be **1.73 micro m**.
129. The work function of a photo surface whose threshold wave length is 12,00 A, will be **1.03eV**.
130. A potential difference is developed across a current carrying metal strip when the strip is placed in a transverse magnetic field". The above effect is known as **Hall's effect**.
131. As the temperature of a semi-conductor is reduced to absolute zero **all valance electrons tend to remain in the valance band**.
132. **Carbon** belongs to the same group of periodic table as that of Germanium and Silicon.
133. The crystal structure of silicon is **diamond**.
134. Forbidden energy gap is highest for **Gallium arsenide**.
135. Silicon semi-conductor has the highest **melting point**.
136. The minimum charge carried by an ion is **equal to the charge of an electron**.
137. The electrons in an atom moves in **elliptical orbits**.
138. The impurity added to extrinsic semi-conductor is of the order of **1 in 100,000,000**.
139. The mean life time of the minority carriers is in the range of a few **nano seconds**.
140. For insulators the energy gap is of the order of **5 to 15eV**.
141. Thermionic emission of electrons is due to **high temperature**.
142. **N-P-N transistor** electrons will be the majority carriers.
143. **Germanium with Indium** doping will produce P-type semi-conductor.
144. The difference between a hole and electron is that a hole **is always in the valance band**.
145. When an electron rises through a potential of 100 V. it will acquire an energy of **100eV**.
146. Hall's effect can be used to **measure magnetic field intensity**.
147. **CdS** photo conductor is commonly used.
148. The photo electric threshold of tungsten is 2300 A. The energy of the electrons ejected from the surface by ultra-violet light of wave length 1800 A, will be **1.5eV**.
149. A solar cell is an example of **photo voltaic cell**.
150. Barrier potential for silicon diode is **0.7V**.
151. When light is directed at the metal surface, the emitted electrons **have energies that depend on frequency of lights**.
152. A strong electric field across a P-N junction that causes covalent bonds to break apart **it is called lever break down**.
153. An ideal diode **should have zero resistance in forward bias and an infinity large resistance in reverse bias**.
154. The bulk resistance of a diode is the resistance of **the P and N material only**.
155. **Electrons** only can exist outside of a semiconductor material.

156. In case of semi-conductors, recombination is **merging of an outside electron with semiconductor electron**.
157. When a PN-junction is reverse biased **holes and electrons moves away from the junction**.
158. In case a PN-junction is forward biased **holes and electrons moves towards the junction**.
159. Mobile electrons of P-side of the PN-junction diode constitute **minority current carriers**.
160. When a PN-junction is reverse biased a very small amount of reverse current called **leakage current flows**.
161. The reverse resistance of a PN-junction diode is given by **Break down voltage/reverse leakage current.**
162. The depletion layer of PN-junction diode has **neither free mobile electrons nor holes**.
163. With the rise in temperature of a PN junction, **reverse leakage current will increase**.
164. For a PN-junction we have **width of depletion layer and junction barrier voltage**.
165. A zener diode is invariably used with **reverse bias**.
166. The temperature coefficient is positive in case **extrinsic semiconductor**. 167.
167. A light emitting diode produces light when **forward bias**.

Questions 168 and 169 refer to Fig.16

The voltage wave form resulting from a three phase half wave rectifier is shown in Fig.16

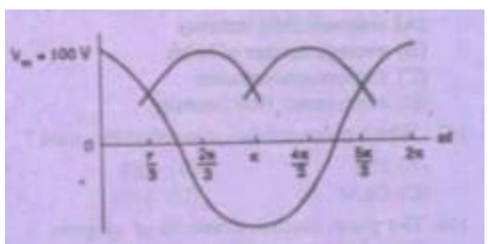


Fig. 16.

168. The average value of voltage is **82.7V**.
169. Therms value is **84V**.

Question 170 to 173 refer to Fig.17

A delayed half-wave rectified sine wave of voltage shown in Fig.17. The delay angle is 45^0

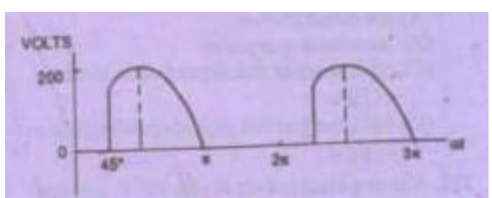


Fig. 17.

170. The value of Vav will be **54.4 V**.

171. The value of Vmax will be **47.7 V**.
172. **Vav= 31.9V and Vmax=70.8V** if delay angle is 90^0.
173. **Vav= 9.32 V and Vmax=30.12 V** if delay angle is 135^0.

Question 174 to 175 refer to Fig.18

Full wave rectified sine wave shown in Fig.18 has a delayed angle of 60^0.

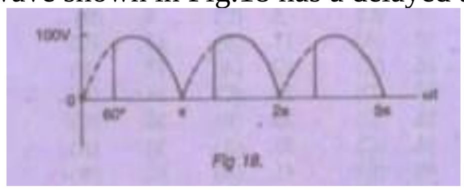


Fig 18.

174. The average value of voltage will be **47.8 V.**
175. The rms value of voltage will be **63.3 V**.
176. A rectified sine wave is clipped at one half of its peak as shown un Fig.19. The rms value of the voltage will be **42.2 V**.

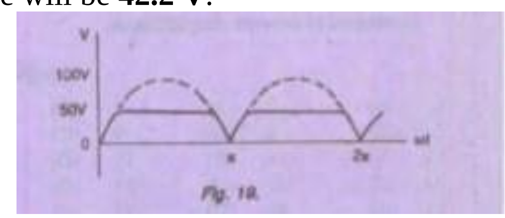


Fig. 19.

177. The effective value of voltage of the wave is clipped at 60^0, will be **66.8 V**.

Chapter # 13 Transistors

1.The advantage of transistor over vacuum tube is A. No heat is required B. Small size and light in weight C. Very low power consumption D. all of the above.

2.Aging effect exists in vacuum tubes only

3.A collector collects holes from the base in case of PNP transistor

4.In a PNP transistor, with normal bias the collector-base junction is reverse biased and the emitter base junction is forward bias

5.A PNP transistor is made of Either silicon or germanium

6. In most transistors, the collector region made physically larger than for dissipating heat.

7.In a transistor which of the following region is very lightly doped and is very thin ? Base

9.In a PNP with normal bias, the emitter junction offers a-low resistance .

10. In an NPN transistor, when emitter junction is forward biased and collector junction is reverse biased, the transistor will operate in active region.

11.A transistor will operate in inverted region when emitter junction is reverse biased and collector junction is forward biased.

12.In a PNP transistor, electrons flow into the transistor at the base and the collector leads

13. Which of the following statement is correct? The FET is unipolar, while junction transistor are bipolar.

14.Most small signal transistors are NPN, silicon, in a plastic package.

15.A transistor may fail due toA . Open weld at the wire leads to the semiconductor B. Short circuit caused by momentary overloads C. Overheating due to circuit failures D. any of above.

16.The transistor is usually encapsuled in epoxy resin.

17.Arrow head on a transistor symbol indicates direction of hole current in emitter.

18.Power transistor are invariably provided with heat sink.

19.Heat sink disposes off heat mainly by natural convection.

20. Largest current flow of a bipolar transistor occurs in emitter.

21.Which of the following number specification refers to FET with one gate 3N.

22. In an NPN transistor if the emitter junction is reverse biased and collector junction is also reverse biased, the transistor will operate in cut off.

23.In a normally biased NPN transistor the main current crossing the collector junction is a drift current.

24.A transistor has PNP the electron flow into the transistor at collector and base.

25.A diac is a semiconductor device which acts as a 2-terminal bidirectional switch.

26. In a NPN transistor, when emitter junction is forward biased and collector junction is reverse biased the transistor will operate in saturation region

27. In a transistor, current$_{Icbo}$flows when some dc voltage is supplied in the direction to the collector junction with the emitter open circuit.

28. Which of the following is necessary for transistor action the base region must be very narrow.

29. Conventional baising of a bipolar transistor has EB forward biased and CB reverse biased.

30.A triac is a semiconductor device which acts as a 3 terminal bidirectional switch

31. Which of the amplifier circuit using junction transistor has the best gain common emitter.

32.Which circuit has its output signal from the emitter emitter follower.

33. In a transistor with normal bias the emitter junction has a very low resistance.

34.The current Icbo increase with increase in temperature.

35.The Icbo flows in base and collector leads.

36. In PNP junction transistor as compared to base region the emitter region is more heavily doped so that the flow across the base region is mainly because of holes.

37. In a transistor alpha is related to beta by the relation beta =-alpha/alpha -1

38. In a transistor leakage current mainly depend on temperature

39. Thermal runaway of a transistor occurs when there is axcessive leakage current due temperature rise.

40. The leakage current is CB configuration may be around few micro amperes.

41. The input and output signals for CE amplifier are always out of phase.

42. As compared to a CB amplifier, a CE amplifier has higher current amplification.

43. In a resistance loaded, RC coupled amplifier the dc component is blocked by Cc.

44. Which junction transistor is preferred for high input and low out impedance common collector.

45. Common base configuration is little used because it has low input impedance.

46. Common emitter transistor has high current and high voltage gain.

47. Which of the following circuit would be preferred for a 455 kHz IF amplifier double tuned transformer.

48. A FET has a gate source bais of -2v. The ac input signal is +- 1.2 V. The class of operation will be A.

49. For a transistor the normal collector voltage is 12v. If actually it is load to be 28 + v .the double could be Re is open.

50. The emitter bais largely depends on Ig.

51. Emitter region in NPN transistor is more heavily doped than base region so that flow across the base region will be mainly of holes.

52. The leakage current in CE configuration may be around few micro amperes.

53. Which class of amplifier operates with least distortion class A.

54. In a RC coupled amplifier for improving the low frequency response higher Cc is used.

55. Which of the following plot can be directly used to determine beta Vce versus Ic for constant Ib.

56. When a transistor is connected in common emitter mode, it will have medium input resistance and high output resistance.

57. Which of the following statement correct? The emitter injects holes into the base region of the PNP transistor and electrons into the base region of the NPN transistor

58. A FET has very high input resistance.

59. A quiescent state of a transistor implies no input signal

60. Which of the following plot can be used to show the input volt – ampere characteristics of a common emitter configuration Vbe versus Ib for constant values of Ib

61. A reverse bais saturation current for a particular. PN junction is 1 micro amperes at 300 k .its dc slope resistance at 150 mv forward bias will be closer to 78 ohm

62. Which of the following is not provided in a PNP transistor heater.

63. Which of the following amplifier circuit using junction transistor has the best gain common emitter.

64.Each of two cascade stage has a voltage gain of 30. The overall gain is 900.

65. The Darlington pair consists of the following two stages both CC.

66. In amplifier, the parasitic oscillations result due to transistor inter junction capacitance.

67. Which of the following combination has no phase inversion of the signal two CE stages.

68. The circuit consisting of two transistor connected in series with the dc supply voltage is called stacked v+.

69. In oscillator class C operation in preferred because it is most efficient.

70.Three cascade stages have gain of 10,20 and 25. The overall gain will be 5000.

71. How many cascaded stages of CE amplifier will result in polarity inversion of the input signal three or five.

Type equation here.72. Which coupling produces the minimum interference with frequency response direct coupling.

73. Complimentary symmetry use two transistor that are PNP AND NPN.

74. Which of the following circuit can operate class AB for audio power output Darlington pair.

75. A dc amplifier both ac and dc.

76. For an amplifier the power gain in decibels will be equal to voltage gain in decibels only when R0=Ri.

77. The bandwidth of the amplifier is BW. If n stages of an such an amplifier are cascaded, the bandwidth will be

78. A bipolar transistor is a current controlled device whereas a FET is a voltage-controlled device.

79.Which of the following devices acts as a NPN and a PNP transistor connected base to base and

$$\frac{BW}{\sqrt{2^{1/n} - 1}}$$

emitter to collector SCR.

80. Which of the following is the fastest switching device MOSFET.

81. Which of the following is the point of reference JFET source.

82. A JFET can operate in depletion mode only.

83. The properties of JFET resemble those of NPN transistor.

84. The input gate current of FET is closure to negligibly smaller value.

85.Which one of the following is a unipolar device FET.

86. Which of the following statement is no true in case of FET it has large (gain x bandwidth).

87. When n channel depletion type MOSFET are used in enhanced mode the gate will be positive.

88. In an amplifier the degree by which the output signal wave shape differs from the input signal wave shape is known as distortion.

89. Which of the following represents the efficiency of an amplifier ac power output/dc power dissipated at the output electrode.

90. Icbo current is increases with temperature.

91. The cascade amplifier which is often used in ICs is direct coupled.

92. Which one of the following is expected to have the highest input impedance MOSFET.

93. Highest operating frequency can be expected in case of MOSFET.

Chapter # 14 Amplifiers

1. An Amplifier should have **all of them (high Fidelity, low noise, stable operation).**
2. If the operation of an NPN transistor amplifier is selected in saturation region, it is likely to result in **chopping of output in positive half of input signal.**
3. The input signal is to amplifiers having a gain of 400 is given as 0.5 cos (313t). Then output signal is **20 cos (403t).**
4. The power gain of an amplifier is 40 and its voltage gain is 200. Then current gain will be **1/5.**
5. The signal handling capacity of an amplifier will be high when the operating point is selected in **middle of the active region.**
6. An amplifier circuit has voltage gain of 400. If the output is 4 V. the input voltage should be **10mV.**
7. The 3 bipolar transistor configurations provide best power gain in **Common Emitter.**
8. A transistor with 85% efficiency is likely to be **Class C.**
9. **Class B** amplifier is corresponds to half-wave rectifier (for voltage waveform).
10. **The double tuned transformer** used for 455 kHz IF Amplifier.
11. A class A amplifier is the one in which **$\underline{I_E}$** flows all the time.
12. In case of amplifiers **transformer coupling** gives highest gain.
13. In a resistance loaded, RC coupled amplifier the dc component blocked by **coupling Capacitor C_c.**
14. In a RC Coupled amplifier, low frequency response is improved with **higher C_C**.
15. **Class A** of amplifier has lowest efficiency.
16. Emitter bias depend upon **emitter current I_E**.
17. For a FET, I_s = 5 mA, and R_s = 330. Then source bias will be **1.65 V**.
18. A transistor that can be used in enhancement mode is **MOSFET**.
19. In general the gain of an amplifier is **complex.**
20. An FET has a gate source bias of 2 V. the ac input signal is $\pm$ 1.2 V. the class of operation is **A**.
21. A push pull amplifier is biased in **Class B.**
22. An IGFED is a **square law device**.

23. **Class A** amplifier has least distortion.
24. In a resistance loaded amplifier, the gain decrease at higher frequency with **decreasing reactance of the stray C_T**.
25. In an amplifier the collector voltage equals to full V* of 28 V instead of normal 12 V because of **R_E is open**.
26. In a resistance loaded amplifier, the gain decrease at low frequency because of **increasing resistance of C_C**.
27. **Class A** amplifier is used when minimum distortion is desired.
28. In an ideal op-amp the output impedance is **Zero**.
29. The bandwidth of an audio amplifier extends from 20 to **20,000 Hz**.
30. The noise figure F of amplifier is defined as $\mathbf{(F = 10 \log_{10} \frac{S_i / N_i}{S_o / N_o})}$
31. The gain of an amplifier with feedback is given by the relation $\dfrac{A}{1 - BA}$
32. An ideal voltage amplifier should have **(R_i = infinite, $R_0 = 0$)**.
33. An ideal current amplifier should have **($R_i = 0$, R_0 = infinite)**.
34. **Non linearity in active device** contributes to harmonics distortion in amplifiers.
35. In logarithm amplifiers, output voltage is equal to **input voltage.**
36. Logarithm amplifiers used in **dividers.**
37. **Radio Frequency** amplifiers used a variable capacitor tuning.
38. In high frequency region, an amplifier behaves like a **low pass filter**.
39. **Cascode amplifier** will be preferred for highest gain.
40. A cascaded amplifier will have higher cut-off frequency **less than that of single stage amplifier.**
41. **Class B** amplifier has less efficiency as compared to Class C.
42. Push pull amplifiers not necessarily **removes odd and even harmonics**.
43. Decibel is defined in **Power ratio**.
44. An amplifier's changes from 10 watts to 20 watts. The equivalent dB gain will be **3 dB**
45. Which of following is false statement? **Class AB operation cannot be used for a push pull audio power output phase.**
46. A push pull amplifier balance out **odd harmonics.**

47. In voltage amplifiers, the load resistance **should be as large as possible.**
48. **Phase distortion** is least objectionable in case of audio amplifiers.
49. **Wave traps in each stage** method cannot be used to increase the bandwidth for cascaded RF amplifier stages.
50. If **f_r = 455 kHz ; Q = 100** circuit has the greatest bandwidth.
51. In an amplifier if conductor during the cycle is from 0 to 90 and again from 180 to 270, the amplifier will be termed as **Class B.**
52. The voltage gain of an amplifier is 100. On applying a negative feedback with B = 0.05 its gain will reduce to **25**.
53. Negative feedback is used in audio amplifier **to reduce distortion**.
54. Less capacitive reactance in shunt with an audio amplifier has the effect of **treble boost**.
55. High cut-off frequency can be expected in case of **Common Base**
56. For high frequency response of transistor amplifier, suitable model to use is **Hybrid**.
57. Transformer coupling in transistor amplifier, circuit provides high efficiency, because **DC resistance is low**.
58. A complementary symmetry amplifier ha **1 PNP and 1 NPN transistor**.
59. Introduction of feedback in an amplifier increase the input impedance from 1 k ohm to 40 k ohm.it is due to **series-current negative feedback**.
60. A pulse transformer uses **ferrite core**.
61. A boost strap generally incorporates **emitter follower.**
62. Low frequency response of amplifier is mainly limited by **By-pass capacitor**.
63. The bandwidth of a differential amplifier is comparable to that of **Cascaded amplifier**.
64. For an ideal noise free transistor amplifier, the noise factor is **Zero dB**.
65. The third Harmonics of 300 Hz is **900 Hz**.
66. The main function of transformer used in output of a power amplifier is **to match the load impedance with the dynamic output resistance of the transistor.**
67. The maximum efficiency of Class C amplifier is **100%**.
68. The maximum efficiency of Class B amplifier is **78.5%**.
69. Harmonic distortion of the signal is produced in an R-C coupled transistor amplifier. The probable source responsible for this distortion is the **transistor itself**.

70. The voltage gain of an amplifier is 100, the current gain is 2. The power gain of the amplifier will be **200**.
71. When both the primary and secondary resonant circuit of a double tuned transformer have a Q 50, the value of critical coupling is **0.2**.
72. The 45^o-45^o system refers to **phonograph records**.
73. **Complimentary symmetry** would be applied to the audio power outage stage.
74. For a good voltage amplifier, its input impedance with respect to the resistance of the source, **should be high**.
75. **3 dB** will be gain for increase of power level from 13 mW to 26 mW.
76. A resistance attenuator reduces a 10 mW input to 5 mW. Its loss will be **-3 dB.**

Chapter # 15 Oscillators

1.Crystal controlled oscillator is most stable oscillator.

2.f=1/2*pi sqrt RC for Wein Bridge Oscillator Frequency

3.Barkhausen criterion for oscillator stability is -Ạß=1

4.A Hartley Oscillator Circuit uses for Tapped inductor for inductive feedback

5.Rc phase shift Oscillator will not produce any Oscillation Until and unless Voltage gain of its internal Amplifier is around 3

6.for Good stability tuned circuit should have high Q

7.varactor in voltage-controlled oscillator needs Reverse Dc control Voltage

8.The phase Comparator in PLL circuit is used to Provide Dc Control Voltage

9.Crystal control Oscillator can be expected to give highest Q factor

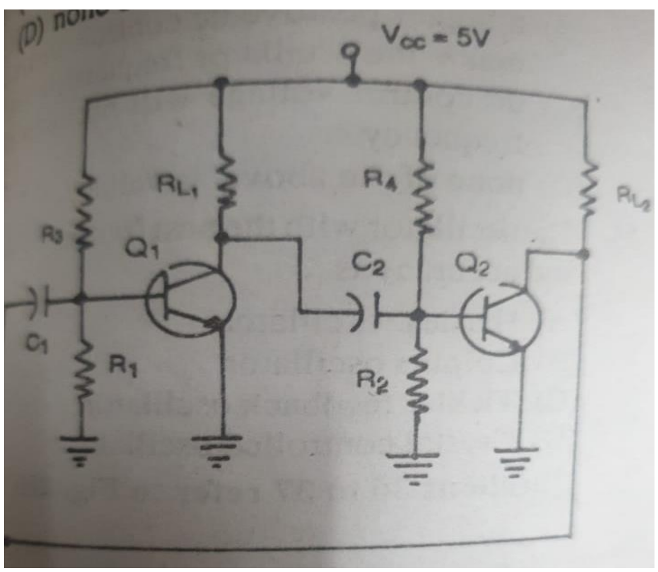
10.Beat frequency oscillator consists of Two oscillator.

11.Blocking Oscillator are used as High Impedance switches and frequency divider.

12.In a practical Oscillator AB is slightly greater than 1.

13.In Case of RC a phase shift Oscillator, the Frequency oscillation is f=1/2*pi sqrt RC

14.Oscillator Circuit can be operated in class A condition for better wave shape.



15.In Circuit shown feedback to Q1 through C1 fig 17

16.free running applies to mutlivibrator circuit.

17.A phase shift Oscillator Consist of number of RC Circuits.

18.The loop gain in phase shift Oscillator is 360 degree.

19. f=1/2*pi sqrt LC Hartley oscillator.

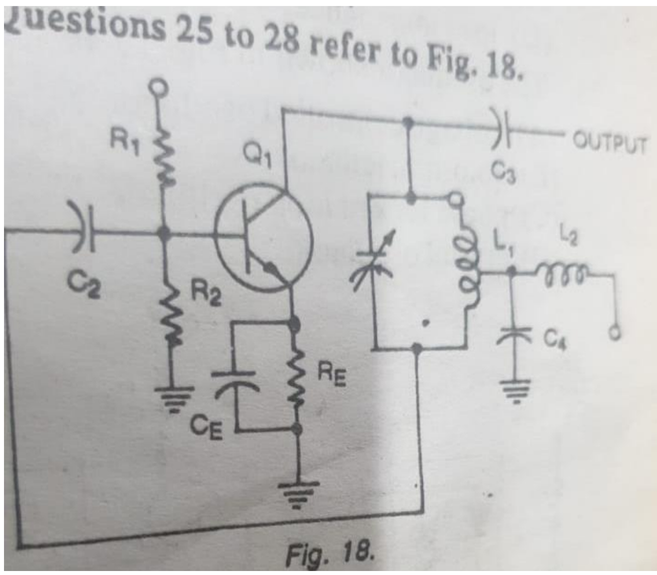
20.Monostable Multivibrator Can be used to Generate sweep.

21.Schmitt trigger Circuit Can be used for converting a sine wave to square wave.

22.tuned circuit is used for frequency stabilization of an oscillator.

23.relaxation oscillator incorporates two interdependent circuits in such way that output of each control the input of other.

24.By increasing in transistor gain Oscillator can stop Oscillating.



25.In Oscillation shown the feedback is regenerative

26.which component varies the oscillator frequency C1

27. typical frequency for a RC feedback Oscillator is 1KHz.

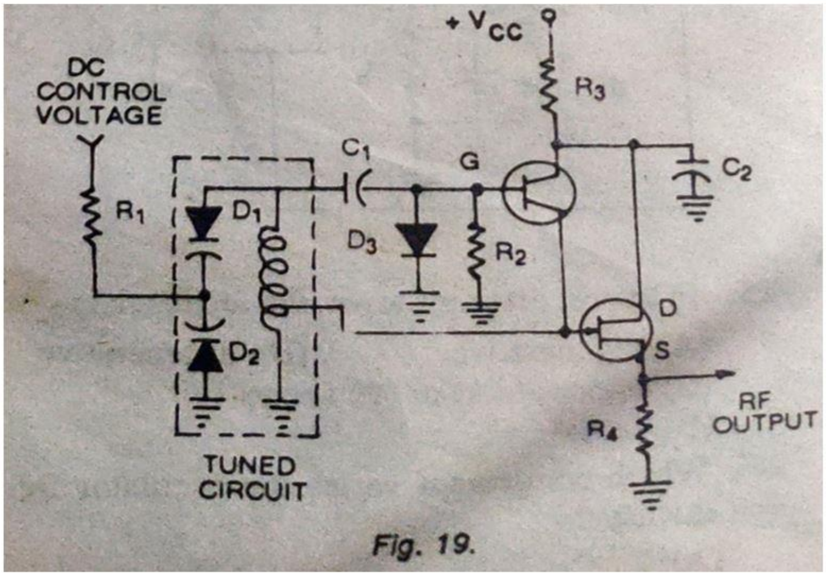
28When a 6 MHz crystal is followed by a frequency tripler, the output will be 18 MHz.

29. A typical resonant frequency for a crystal oscillator. is 3.275 MHz

30.Typical Q for a crystal is 25000.

31. An oscillator using a capacitive voltage di vider to provide feedback is Colpitts.

32. RF feedback oscillators are usually tuned by varying the L or C.



33.Oscillator shown is Voltage controlled Oscillator.

34.higher positive Dc control Voltage will make the Oscillator frequency higher.

35.Crystall controlled Oscillator is best frequency stability and accuracy.

36.Colpit Oscillator fig 20.

38. L1 component is varied to tune OSCILLATORS.

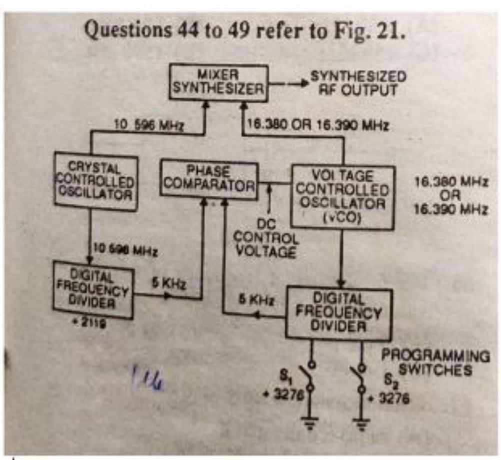
39. In a free running multivibrator, each stage is cut-off for 1 us. the oscillator frequency is 0.5 MHz.

40. TO generate a I kHz note, the most suitable circuit is Wein bridge oscillator.

41. When L is doubled and C is halved, the frequency is unchanged.

42. Positive feedback is the same as Regeneration.

43.An oscillator that uses a tapped coil in the LC tuned circuit is the Hartley Oscillator



44.The input to the phase comparator is 5kHz

46.When the VCO is operating at 16.400 MHz what divisor is needed to get 5 KHz is 3280

47.One of the synthesized output frequency is 26.975MHz.

48. The frequency division for the crystal oscillator is 1/2119.

49. If C be the capacitance, then frequency of oscillations in case of Wein bridge oscillator is proportional to 1/C.

50. Oscillators have positive feedback.

51. The frequency of a tuned RF feedback oscillator with 240 pH fprLand 180 PF force is 765.7KHz.

52. L is needed with a C of 20 PF for an oscillatory frequency of 110.7 MHz is 0.1uH.

53. The crystal oscillator frequency is very stable due to High Q of the Crystal.

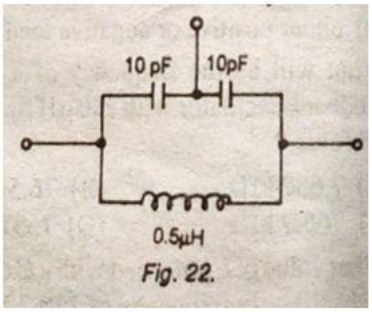
54.Parasidc oscillations are unwanted oscillations created due to stray capacitances and inductances.

55. A crystal oscillator is used because the frequency of oscillations remains substantially constant.

56. Surface Acoustic wave oscillators are suitable for I-C applications..

57. The value of L needed with C of 20 PF for an oscillator frequency of 110.7 MHz is 0.1uH

58 A tuned circuit used in Colpitts oscillator is shown in Fig.22. The frequency of oscillations will be 100MHz



59. A Wein bridge oscillator has Rt=R = 220kQ and Ci = 250 pF. frequency of oscillations will be nearly 2.89KHz

60. Spot the odd one out Stellite

61. Wein Bridge Oscillator for generating a 1 kHz

62. LC oscillators can be used to produce frequencies as high as 500MHz

63. An oscillator using LC tuned circuit ha.sLe 58.6 PH and C = 300 pF. The oscillations will be nearly 1200kHz

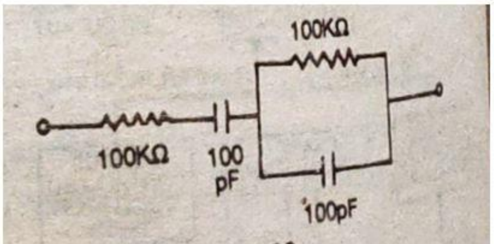


Fig. 23.

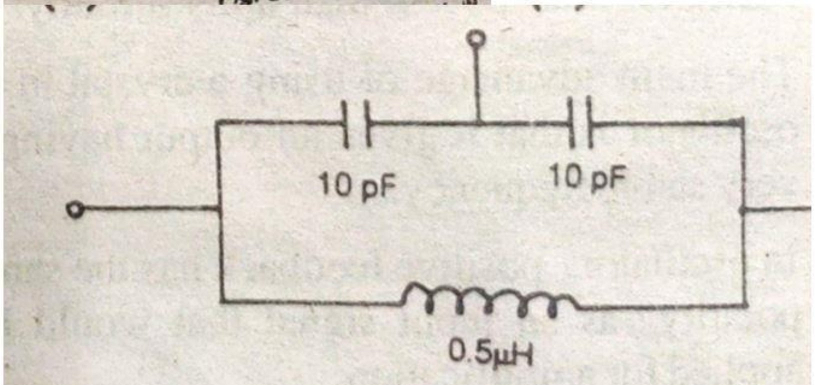


Fig. 24.

64. Colpitts scillator will be ferred for generating 1 MHz

65. RC network shown in Fig. 23 is used inalow frequency oscillator circuit. The frequency of oscillations will 15.9kHz

66.for producing a frequency of 1.6 kHz, the values of capacitors should be 995pF

67.Oscillators are widely used in Radio, television broadcasting.

68.A multivibrator produces Square Waves.

69. When positive feedback amplifiers are used as Oscillator, the condition is known as AB=1 Barkhasen criterion of oscillation.

70. The requirement of an oscillator using positive amplifier as an oscillator, is that here must be positive feedback, initially the value of loop gain Åß must greater than unity,

after the desired level is reiEhed the loop gain AP must decrease to unity.

71. The main advantage of using crystal oscillators is constant frequency of oscillations.

72. for oscillation to start., the loop gain AB of the Oscillator must be more than One

73.A tuned circuit used in Colpitts oscillator is shown the frequency of oscillators will be 100MHz

74.sinusoidal oscillator is preferred for microwave frequencies is Negative Resistance Oscillator.

Chapter # 16 Digital Electronics

1. The number of levels in a digital signal is **two**.
2. In any flip-flop, when the Q output is 1, state of $\bar{Q}$ terminal is **Zero**.
3. The slow turning of a potentiometer is **analog output**.
4. **Square wave** provides digital signal.
5. The high voltage level of a digital signal in positive logic is **1.**
6. A device that converts from decimal to binary numbered is called **encoder**.
7. Decimal 15 in binary system can be written as **1111**.
8. If 4 in binary system is 100 then 8 will be **1000**.
9. Binary 1010 in decimal system is equivalent to **10**.
10. Binary 1111 when subtract from binary 11111, the result in binary is **10000**.
11. Binary 1111 when added to binary 11111 is **101110**.
12. Binary 1000 multiplied by binary 1000 gives **1000000**.
13. **0 X 1** is not valid in binary system.
14. **0.4375** represents the decimal from of binary 0.0111.
15. **127** is the decimal equivalent of binary 1111111.
16. The decimal equivalent of the binary number 10110.0101011101 is 22.**3408203125**.
17. **1011.01+0.1101=1.1** is incorrect.
18. **1100.011+1022.011=10111.100** is incorrect
19. **100101-100011=000000** is incorrect.
20. **Decimal 6** $\mathbf{\frac{1}{4}}$ **to Binary 110.01** is incorrect
21. **none of above** Binary product is incorrect.
22. **1111-111** = 1000
23. **11111+11111=100000** is incorrect
24. Binary 101010 is equivalent to decimal number **42**.
25. Decimal number 5436 when converter into 9's complement will become **4563**.
26. Decimal 1932 when converted into 10's complement will become **8068**.
27. Decimal 45.15 when converted into 9's complement will become **54.84**.
28. Decimal 18.293 when converted into 10's complement will become **81.707**.
29. **64** different binary numbers can be stored in a register consisting of six switches.

30. **1000** different BCD numbers can be stored in a register containing 12 switches using an 8,4,2,1 code.
31. The hexadecimal number B6C7 is equivalent to decimal number **46791**.
32. The hexadecimal number 64AC is equivalent to decimal number **25772**.
33. The hexadecimal number A492 is equivalent to decimal number **42130**.
34. The hexadecimal number D2763 is equivalent to decimal number **862051**.
35. The binary number 101101 is equal to octal number **55**.
36. Binary number 1011 when converted to its 1's complement will become **0100**.
37. Binary number 1011 when converted to its 1's complement will become **01100**.
38. Binary number 1011.01 when converted to its 2's complement will become **0100.10**.
39. Binary number 1011.01 when converted to its 2's complement will become **00100.11**.
40. The binary number 0111011011 is equivalent to decimal number **3.554**.
41. Octal number 66.3 is equal to **110110.011** in binary number.
42. Decimal number 4429.625 is equal to octal number **10515.5**.
43. Octal number **1041.3** is equal to 545.375 in decimal number.
44. The binary number 0.10110111101 is equal to **B7A** in hexadecimal.
45. The digit 0 with carry of 1 is the sum of binary addition **1+1**.
46. $(39)_{10}$ in binary system is **100111**.
47. In decimal system the base or radix is the **10**.
48. The radix of a hexadecimal system is **16**.
49. A binary system has radix of **2**.
50. The binary number 101100.140 in octal number will be **154.6**.
51. $(62)_{10}$ in binary system is **111110**.
52. One's complement of binary number can be found out by changing all **one's to zero's and all zero's to one's**.
53. 10 in BCD code is represented as 0001 000. (**none of the above** in book)
54. Decimal 17 in octal system is represented by **21**.
55. Octal 16 is equal to decimal **14**.
56. $11010_2 \neq 3_8$
57. The binary equivalent of 4096.90625 is **1,000,000,000,000.11101**.

58. Which of the following is incorrect (**none of above**).
59. $(8)_8 + (2)_8 = (11)_8$ is **incorrect**.
60. (1001- 10) is equal to **7**.
61. $(8)_{16} = (8)_8$ is **incorrect**.
62. Square root of 4 is $\mathbf{(F)_{16}}$.
63. The binary number 101100.110 in octal number will be **154.6**.
64. The binary sum of 111010_2 and 11011_2 is $\mathbf{1010101_2}$.
65. The sum of 111010_2 and 11011_2 in decimal for is **85**.
66. In decimal system the base or radix is **10**.
67. The radix of a hexadecimal system is **16**.
68. $(100101)_2$ is $\mathbf{(37)_{10}}$.
69. Decimal 9 is represented as 1001 in BCD code is **incorrect statement**.
70. $(1111.11)_2$ is $\mathbf{(15.75)_{10}}$.
71. The decimal equivalent of the hexadecimal number E5 is **229**.
72. In 8421 binary coded decimal system the decimal number 237 is represented by **001000110111**.
73. **1011 + 1010 = 10101** and **1010 + 1101 = 10111** are correct binary addition.
74. In the 8421 BCD code, the decimal number 125 is written as **1111101**.
75. In a decimal digital computer, the number 127 is stored as **1111111**.
76. $10101.11_2 = 26.5_8$ is **incorrect**.
77. **Binary = 001 to hexadecimal 2** is incorrect.
78. **Decimal = 0.796875 to binary = 0.100010** is incorrect.
79. $\mathbf{101101_2 \neq 45_8}$.
80. **0.0011 + 0.1110 ≠ 1.1001**.
81. **1011101.1 – 101010.11 ≠ 110010.1**.
82. $22.7 \times \frac{1}{47.5} = 1111010.110$ is **incorrect**.
83. **Decimal number = 5436 to 9's compliment= 4652** is incorrect.
84. **Binary = 45.15 to 10's compliment = 54.58** is incorrect.
85. **Binary = 11011.01 to 1's compliment 00111.10** is incorrect.
86. For the binary number 101101110 the equivalent octal number is **556**.

87. For the octal number 66.3 the equivalent binary number is **110110.011**.
88. For the octal number 3.554 the equivalent binary number is **011.1011011**.
89. The decimal number 932 when converted to octal number will be equal to **1644**.
90. The decimal number 4429.625 when converted into octal number will be equal to **10515.5**.
91. The octal number 1170, 76051 when converted to decimal number will be **632.97**.
92. The binary number 0.10110111101 is equal to hexadecimal number **B7A**.
93. The hexadecimal number 5F is equal to binary number **101111**.
94. The binary number 0.01111110 is equivalent to hexadecimal number **0.7F**.
95. The decimal number 3964 is equal to the octal number **7574**.
96. The hexadecimal number AB6 is equal to decimal number **2742**.
97. In digital computer the number 127 is stored as **1111111**.
98. 10110 – 10011 = 00011
99. 11111 + 00001 = 100000.
100. The decimal equivalent of the hexadecimal number E5 is **229**.
101. **AND** gate is similar to the function of two series switches.
102. **OR** gate is similar to the function of two parallel switches.
103. **NAND** logic function has the output low only when both inputs are high.
104. **X + X = 0** is invalid according to Boolean algebra.
105. **X.X = 1** is not valid according to Boolean algebra.
106. According to Boolean algebra $\bar{X}$ **= 1** is not valid relation.
107. **X(X + Y) = 1** is not valid according to Boolean algebra.
108. **XY + YZ +** $\bar{Y}$**Z = XYZ** is not valid according to Boolean algebra.
109. According to Boolean algebra 1 + A + B + C is equal to **1**.
110. (A + $\bar{B}$ + $\bar{A}$B) is same as **1**.
111. A (A +B) is same as **A + AB**.
112. Three Boolean operators are **OR, NOT, AND**.
113. In Boolean algebra A+A+A+….+A is same as **A**.
114. If A = 0, B = 0, then $\overline{AB}$ is **1**.
115. The truth table is given below is for **AND gate**.

Input		Output
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

116. **A.B = Y** is Boolean function of AND gate.

117. Positive logic in a logic circuit is one in which **logic 0 voltage level is lower than logic 1 voltage level**.

118. A + B = Y is the Boolean function for **OR** gate.

119. In case of OR gate, no matter what the number of inputs, are **1 at any input causes the output to be at logic 1**.

120. The truth table is given below is for **OR gate**.

Input		A
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

121. **Common emitter amplifier** is an inverter.

122. A combination of AND function and NOT function results in **NAND gate**.

Question 123 to 127 refer to figure given below:

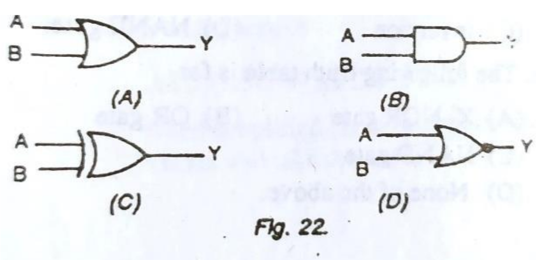


Fig. 22.

123. **Figure D** corresponds to a NOR gate

124. **Figure A** corresponds to OR gate.

125. XNOR gate is represented by **none of the four figures**.

126. Figure C represent **XOR gate**.

127. Boolean expression for B is **A.B=Y**.

128. It is required to determine the logical output of the circuit shown in figure, build using NAND gates. The correct answer is **A + B**

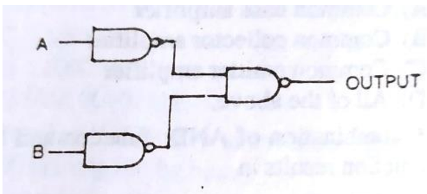


Fig. 23.

129. Boolean expression for NAND gate is $\overline{\boldsymbol{AB}}$ **= Y**.

130. $\overline{A + B}$ = Y is Boolean expression for **NOR gate**.

131. The following truth table is for **X-NOR gate**.

Input		A
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

132. **NAND gate** is formed by inverting the out of the AND gate.

133. **OR gate** corresponds to the action of parallel switches.

134. The Boolean expression for the truth table given below will be **C** $\overline{\boldsymbol{B}}$**A + CB**$\overline{\boldsymbol{A}}$ **= Y**

135. The number of full adders in a 4-bit parallel adder will be **three**.

136. A half adder includes **a AND gate with XOR gate**.

137. For the circuit shown in Fig. 25 the output X is given by **X=** $\overline{\boldsymbol{A}} + \overline{\boldsymbol{B}}$.

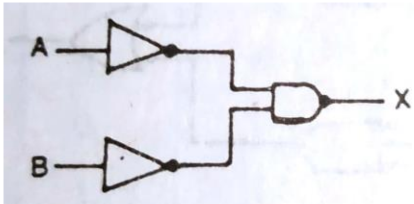


Fig. 24.

138. $\mathbf{A.\overline{B} = \overline{A}.\ \overline{B}}$ is the correct relation.

139. A logic circuit corresponding to "_____ " is **NOT gate**.

140. The variable in Boolean algebra can take **one of the two possible values**.

141. A NAND gate is called a universal logic element because **any logic function can be realized by NAND gates alone**.

142. The Boolean expression $A\overline{BC} + \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + \overline{A}\overline{B}C$ is equal to $\mathbf{\overline{B}\overline{C} + \overline{A}\overline{C} + \overline{A}\overline{B}}$.

143. The Boolean expression $ABC + \overline{A}BC + A\overline{B}C + AB\overline{C} + \overline{A}\overline{B}\overline{C} + \overline{A}\overline{B}\overline{C}$ will be equal to $\mathbf{\overline{C} + \overline{B} + A}$

144. The Boolean expression $A(A + B + C)(\overline{A} + B + C)(A + \overline{B} + C)(A + \overline{B} + \overline{C})$ will be same as $\mathbf{A(\overline{B} + C)}$.

145. The Boolean expression $(A + B + C)(A + \overline{B} + \overline{C})(A + \overline{B} + \overline{C})(\overline{A} + \overline{B} + C)$ can be simplified as **A**.

146. The expression XY $(\overline{X}YZ + \overline{XYZ} + \overline{XYZ})$ when simplified will become **0**.

147. The expression $XY + XYZ + XY\overline{Z} + \overline{X}YZ$ when simplified will become **Y**.

148. The expression $ABC(AB\overline{C} + A\overline{B}C + \overline{A}BC)$ when simplified for no assignment of binary values will take the value **1**.

149. The expression $AB + A\overline{B} + A\overline{C} + \overline{AC}$ will be equal to **1**.

150. The expression of (A + BC + AB) will be $\mathbf{\overline{A}(\overline{B} + \overline{C})}$.

151. The complement of (A+B)(B+C)(A+C) will be $\mathbf{\overline{A}\overline{B} + \overline{B}\overline{C} + \overline{A}\overline{C}}$.

152. The following expression when converted to sum of products from, will become $\mathbf{(\overline{A}BC + A\overline{B}C + AC + BC)}$.

153. The expression $((\overline{A} + C)(\overline{A} + \overline{B} + \overline{C})(A + \overline{B})$ when converted to sum of product form will become $\mathbf{A\overline{B} + A\overline{C} + ABC + AB\overline{C} + \overline{A}BC + B\overline{C}}$.

154. The expression (A+C)(A$\overline{B}$ + AC)($\overline{AC}$ + $\overline{B}$) when converted to sum of products from will become **AB + ABC**.

155. ($\overline{\mathbf{X}}\overline{\mathbf{Y}}\overline{\mathbf{Z}} + \mathbf{X}\overline{\mathbf{Y}}\mathbf{Z}$) is the Boolean expression (in sum of products form) for a logic circuit when will have all output when X = 0, Y = 0 and Z = 1 and a O output for all other input state.

156. for the logic diagram shown in Fig. 25 the output will be $\boldsymbol{\overline{XY}\ Z + XY\overline{Z}}$.

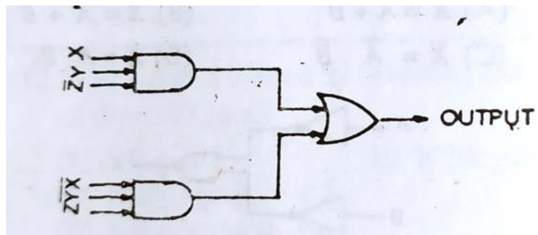


Fig. 25.

157. XY + X$\overline{Z}$ is the Boolean expression in the sum of products from for a logical network which will have a 1 output when

X = 0, Y = 1 , Z = 1

X = 1, Y = 1, Z = ◙

X = 1, Y = 0, Z = ◙

X = 1, Y = 1 , Z = 1

158.

Inputs X Y Z	Output F1	Output F2	Output F3
000	0	0	1
001	0	1	1
010	1	1	1
011	1	0	0
100	0	0	0

101	0	1	1
110	1	1	1
111	1	0	1

159. The sum of the products expression for the above table will be $\mathbf{Y\overline{Z} + \overline{Y}Z}$.

160. The product of the sum form of expression for the above truth table will be $\mathbf{(X+Y)(\overline{Y} + \overline{Z})}$.

161. The bubble or small circle on the output of the NAND gate and NOR gate represents **Complementation**.

162. The output of the circuit shown in Fig. 27 will be $\mathbf{Y(\overline{X} + Z)}$.

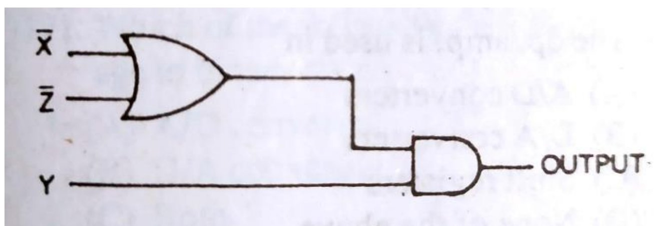


Fig. 27

163.

164.

165. The output from AND-to-OR gate combination, shown in Fig. 30 will be $\boldsymbol{X\overline{Y} + \overline{XYZ}}$.

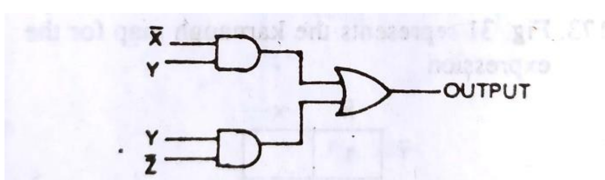


Fig. 30

166. The complement of (A + BC + AB) is $\mathbf{\overline{A}(\overline{B} + \overline{C})}$.

167. The complement of $AB + \overline{B}C + C\overline{D}$ is $\mathbf{\overline{A}\overline{C} + B\overline{C} + \overline{A}BD}$.

168. The complement of $AB(\overline{C}D + \overline{B}\overline{C})$ is $\mathbf{\overline{A}\overline{B} + C + \overline{D}}$.

169. The complement of A(B+C)($\overline{C}$ + $\overline{D}$) is $\mathbf{\overline{A} + \overline{BC} + CD}$.

170. The Boolean expression (A+C+D)(B+D+C) may be simplified as **AB +C+D**.

171. The Boolean expression (AB+C+DC)(AC+BC+D) may be simplified as **AC+BC+DC+ABD**.

172. The expression $(A\bar{B}+\bar{A}B+A\bar{C})(\bar{A}\bar{B}+A\bar{B}+A\bar{C})$ will be simplified as $\mathbf{A\bar{B}\bar{C}+ABC}$.

173. Fig. 31 represents the karmaugh map for the expression

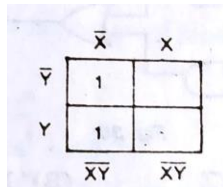


Fig. 31.

174. In positive logic, a pulse at -3V to chassis ground will be at **0 level**.

175. **Four** inputs can be supplied to a logic gate with a fan in factor of four.

176. **A free running MV** circuit is used for a clock generator.

177. **Four** flip-flop circuits are needed to divided by 16.

178. An index register in a digital computer is used for **address modification**.

179. An index register in digital computer is register to be used for **address modification process**.

180. A toggle operation is used **with a flip-flop**.

181. **Two** flip-flop is needed for a 4 bit counter.

182. **Multiplexer** is used as a data selector.

183. The op. amp. Is used in **shift register**.

184. The circuit shown in Fig. 32 represents a **half adder**.

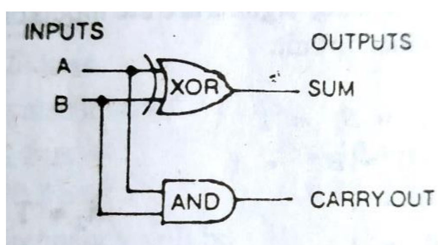


Fig. 32.

185. DC forward voltage is needed to emit light in case of **LED**.

186. When all the seven segments of a display are energized, the number **8** will be shown.

187. **CMOS** family of logic circuit uses field effect transistor.

188. **Read mode** is there in extracting information from storage.

189. Read and write capabilities are available in **RAM**.

190. **RAM** is temporary memory.

191. **A/D converter** changes analog voltage to binary data.

192. **D/A converter** has a binary input.

193. Out of LCD and LED, **LCD** consumes the least power.

194. **Astable** multi-vibrator can be used as a clock timer.

195. In the circuit shown the output will be **square wave pulse**.

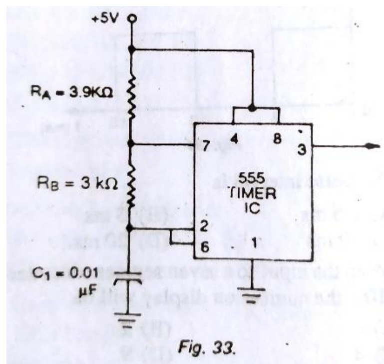


Fig. 33.

196. The frequency f for the circuit shown will be **14545**.

197. Frequency will decrease to the clock frequency when **R_B is increased.**

198. In the above circuit the output frequency will reduce when **R_A,R_B and C_1 increases.**

199. A half adder has **2 inputs and 2 outputs**.

200. **MOSFET** is an electrostatic device.

201. The pulse width of the wave form shown is **5 ms**

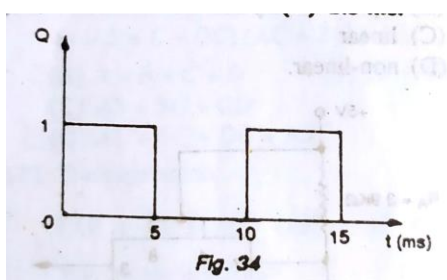


Fig. 34

202. The pulse interval is **5 ms**.

203. When the input to a seven-segment decoder is 0100, the number on display will be **4**.

204. The half adder circuit in Fig. 35 has input AB =11. The logic levels of the S and C output will be **S=0, C=0**.

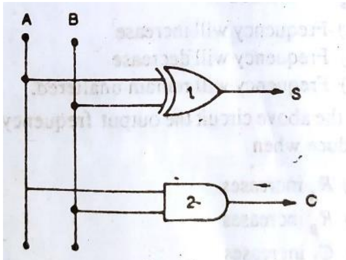


Fig. 35.

205. The following signals are the inputs of a 7480 full adder circuit $\boldsymbol{\Sigma = 1}$ $\boldsymbol{\overline{\Sigma} = 1}$

$A_c = B_C = 1$

$A^* = B^* = 1$

$A_1 = 1$ $A_2 = 1$

$B_{1 = 1}$ $B_{2 = 1}$

$C_i = 0$

Question 206 to 208 refer to Fig. 36.

The astablemultivibrator shown in Fig. 36 has R_1=300 Ω and C_1 =5000 pF.

206. The pulse width is **1 microsecond**

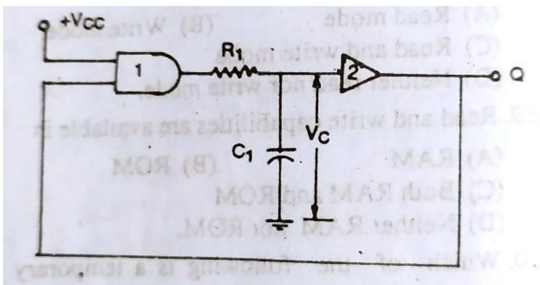


Fig. 36.

207. The pulse interval is **1 microsecond**.

208. Frequency of the square wave at output is **500 Hz**.

209. In the above circuit if R_1=500 ohm and C_1=0.3 µF, the=pulse width will be 10.4 µs.

210. The pulse interval will be **10.4 µs**.

211. The frequency will be **48.1 kHz**.

212. $F = A\overline{B}C + A\overline{B}\overline{C} + ABC$ when simplified is $\boldsymbol{F = AC + A\overline{B}}$**.**

213. The expression $F = \overline{A}\overline{B} + \overline{A}B$ can be simplified to $\boldsymbol{F = \overline{A}}$**.**

214. Using Boolean algebra, the expression F = $A\overline{B}CD$ + ABCD can be simplified to **F = ACD**.

215. Using Boolean algebra, the expression F = $\overline{A}BC + AB\overline{C} + ABC$ can be simplified to **F = AB+BC**.

216. Using Boolean algebra, the expression F= $(A+B+C+D)(A+B+\overline{C}+D)(\overline{A}+B+C+D)$ can be simplified as **B+D+AC**.

217. Decimal number 84 in BCD code is **10000100_{BCD}**.

218. The decimal value for the BCD coded number 00010010 is **12**.

219. Decimal 42 in XS-3 code is **01110101**.

220. Decimal number 937 in gray code is written as **110 100 100 100**.

221. The segments of a seven-segment display are lettered to a **clockwise direction**.

222. Current drawn when the number 8 is on an LED display is **140 mA**.

223. Current supply to a four-digit liquid crystal display that reads the number 8888 is of the order of **560 nA**.

Question 224 to 227 is from fig 37

224. Boolean expression for the output of f1 is **A**.

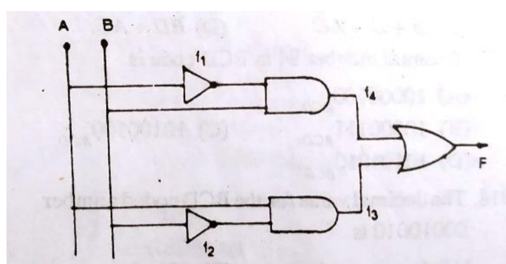


Fig. 37.

225. Boolean expression for the output of f3 is **A$\overline{B}$.**

226. Boolean expression for the output of f4 is **$\overline{A}$B**.

227. Boolean expression for the output F is **A$\overline{B}$ + $\overline{A}$B**.

228. For the circuit shown in Fig. 38 **F=AB**.

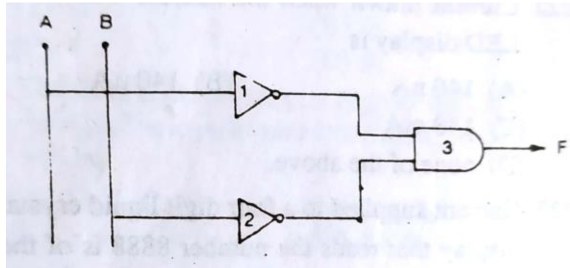


Fig. 38.

229. For the circuit shown in fig. 39 the ouput F=0 when **both f_2 and f_3 are 1**.

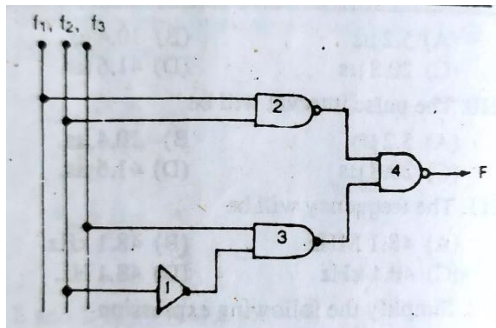


Fig. 39.

230. The fan out of a 7400 NAND is **10** TTL.

231. The input of a 7420 four-input NAND gate are $V_A = 3.9$, $V_B = 4.0$, $V_C = 4.1$ and $V_D = 3.7$. the output logic level is **0**.

232. The three inputs on a 7411 AND gate IC are measured to be $V_A = 3.8$, $V_B = 4.1$, and $V_C = 4.3$. The binary level of the output F will be **0**.

233. The A_2 input at pin 4 of a 7400 NAND gate is +5V, and the other input B_2 at pin 5 is also +5V. the logic level of the inputs and output F_2 respectively are**$A_2B_2 = 11$, $F_2 = 1$**.

234. The inputs of a 7400 NAND gate are V_A equals 0.2 V and V_B equals 0.35 V. The logic level of output will be **F = 1**.

235. In the above case **2.4** would be the minimum voltage that could be measured at F.

236. **10** is the octal number that come after 7.

237. **16^1**is the weight of the second hexadecimal digit to the left of the point.

238. **Non of the above** conversion is incorrect.

239. **Non of the above** conversion is incorrect.

240. **Weight** term is used to refer to the positional value of a digit.

241. **Bit** is the name given to a binary digit.

242. $\mathbf{2^{-1}}$is the weight of the second bit to the left of the binary point.

243. Monolithic technology is widely used in the manufacture of **integrated circuit**.

244. **None of the above** conversion is incorrect.

245. A three-input AND gate is shown in Fig. 40. If the circuit works off the positive voltage mode logic with logic levels 1 = +5 V and 0=0 V, the binary state of output will be **F=0**.

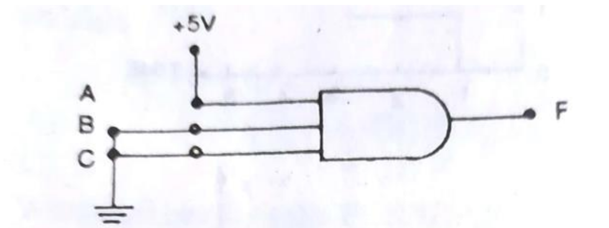


Fig. 40.

246. In Fig. 41 the inputs to a two-input OR gate are shown. This gate works off positive voltage mode logic. The logic levels are 1=+5 V and 0=0 V. The output will be **F=1**.

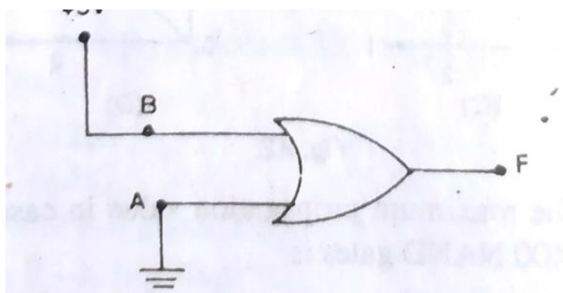


Fig. 41.

247. The binary logic levels of a gate circuit are 1 = +12V and 0 = 0V. **Voltage mode, positive logic** is used.

248. **F=1** is the output of a NOT gate when its input C = 0.

249. Inputs for a NOR gate are A and B waveforms as shown in Fig. 41. The output will be as shown in **figure B**.

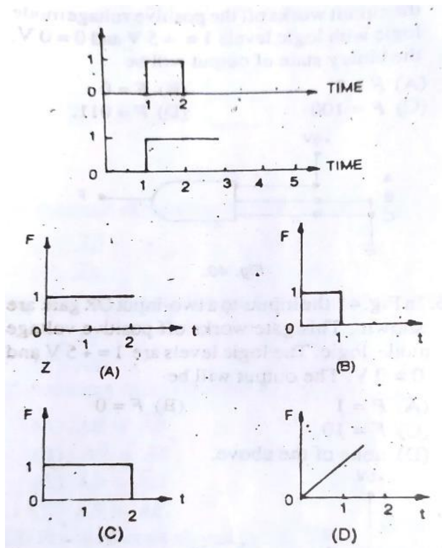


Fig. 42.

250. The maximum propagation value in case of 7400 NAND gate is **less than 20 nano-seconds**.

251. The zero-state output of a gate circuit is measured and found to be the 0.2 V typical value. **0.6 V** noise voltage could the output receive without causing a false 1 to the circuits tied at its output.

252. The voltage needed for a TTL IC power supply is **5V dc**.

253. The simplified complement of the function $\overline{C}$D + BD is $\overline{\mathbf{D}} + \overline{\mathbf{B}}\mathbf{C}$.

254. A simplified complement of the function $A\overline{B}C + A\overline{BD} + BD$ is $\overline{\boldsymbol{AB}} + \boldsymbol{B}\overline{\boldsymbol{D}} + \overline{\boldsymbol{BC}}\,\boldsymbol{D}$.

255. The Boolean function F = $\overline{A}BC + \overline{A}BD$ don't care = (AB + $\overline{AB}$) $(C + D)$ when simplified it becomes any of the following EXCEPT$\overline{\boldsymbol{A}}\boldsymbol{C} + \boldsymbol{A}\overline{\boldsymbol{D}}$.

256. The Boolean function F = $\overline{BC} + \overline{A}B + A\overline{B}C$ don't care = $ABC + \overline{A}B\overline{C}$ when simplified becomes $\overline{\boldsymbol{B}} + \boldsymbol{C}$.

257. The Boolean function **AB +** $\boldsymbol{A}\overline{\boldsymbol{B}}\boldsymbol{C} + \overline{\boldsymbol{A}}\boldsymbol{C}$ when simplified become **AB + C**.

258. A minterm is **a square on a karnaugh map**.

259. A certain 3-input, 1-output device has the voltage characteristics displayed (numerical values are volts)

A	B	C	OUT

0	0	-	0
-	-	5	0
0	5	0	5
5	-	0	5

If the logical 0 is equivalent to 5 volts and the logical 1 is equivalent to 0 volts, the logical equation describing this device is $\boldsymbol{AB+\overline{C}}$.

260. An operating system that allows the user to correct input data has **Text editing**.

261. **X− X³/3!+X⁵/5! − X⁷+…** does the following subroutine computer

SUBROUTINE MYSTERY/(X,S)

T=X

S=X

1. CONTINUE

T = − T*X*X**2/(Z*(Z− 1.0))

S1 = S

S=S+7

Z=Z=2.0

IF(S.N.E.S 1)GOTO 1

END

262. The subroutine of the previous question **will terminate when T <<S**.

263. FORTRAN variables may not be declared as **TRIPLE PRECISION**.

264. **2** is the value of the FORTRAN integer variable M=2+6**2/3**3.

265. Number **6** is printed by the FORTRAN code segment DO 1, I 3,7,3

J=1

1. CONTINUE

PRINT 2J

2. FORMAT(.1 X, 1 3)

266. **49152** bytes does a 48K computer memory contain.

267. the circuit given below is **R-S latch**.

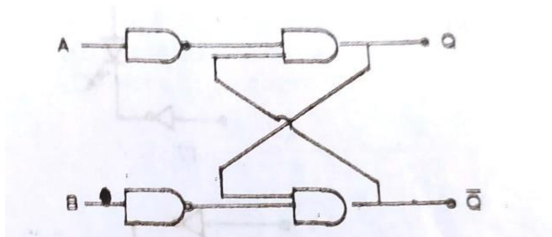


Fig. 43

268. in register index addressing mode the effective address is given by **the sum of the index register value and the operand**.

269. The circuit shown in fig.44 is a **full subtractor**.

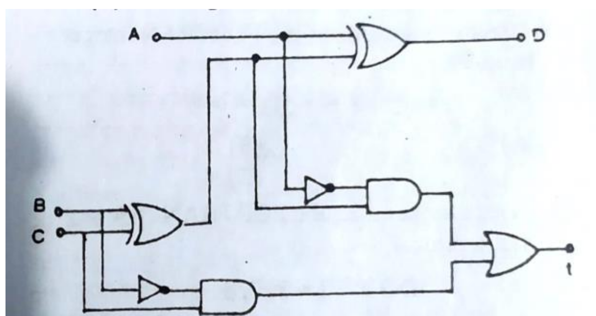
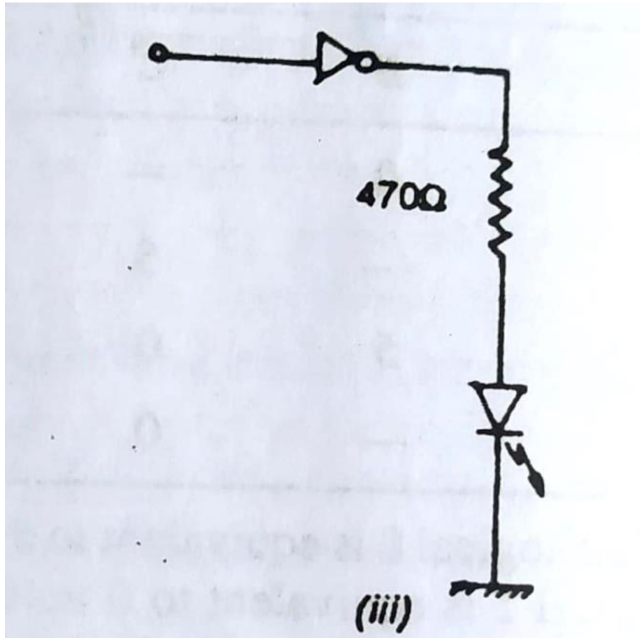


Fig. 44

270. The I^2L (integrated injection logic) has higher density of integration than TTL because it **uses compact bipolar transistors**.

271. The most satisfactory LED driver circuit using a TTL gate is



272. The refreshing rate of dynamic RAMs is in the range of **2 micro-seconds**.

273. A Schmitt trigger is a digital circuit that produces a **rectangular** output regardless of the input waveform.

274. In a positive edge triggered JK flip-flop , a low J and a low K produce the **inactive** state. A high J and a high K mean that the output will **toggle** on the rising edge of the clock.

275. The **EPROM** is ultraviolet light erasable and electrically programmable.

276. **CMOS** is used extensively where lowest power consumption is necessary.

277. **The instruction just being processed is stored in the CPU** is correct statement.

278. The circuit shown in fig.46 is that of a **TTL inverter**.

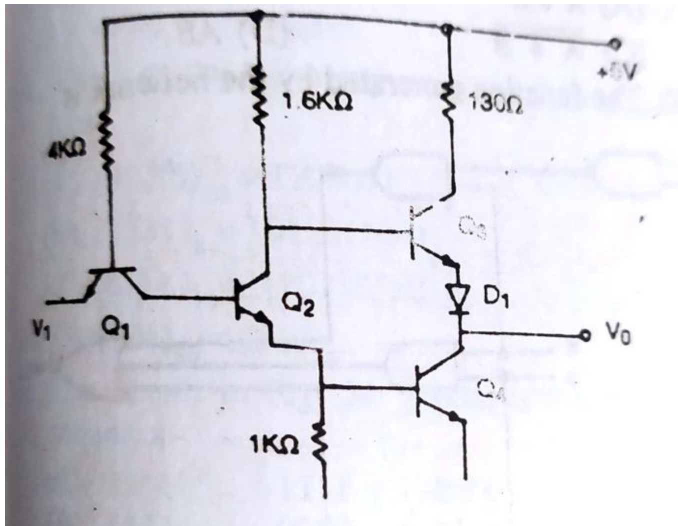


Fig. 46.

279. 2's complement of -24 in a 16-bit microcomputer is **1111 1111 1110 1000**.

280. With a JK master slave flop-flop the master is clocked when the clock is **high**.

281. The Boolean expression for the logic diagram shown in Fig.47 is $\boldsymbol{X} = (\overline{\boldsymbol{A}} + \boldsymbol{B})\boldsymbol{C} + \overline{\boldsymbol{B}}\boldsymbol{D} + \boldsymbol{A}\overline{\boldsymbol{CD}} + \boldsymbol{E}$.

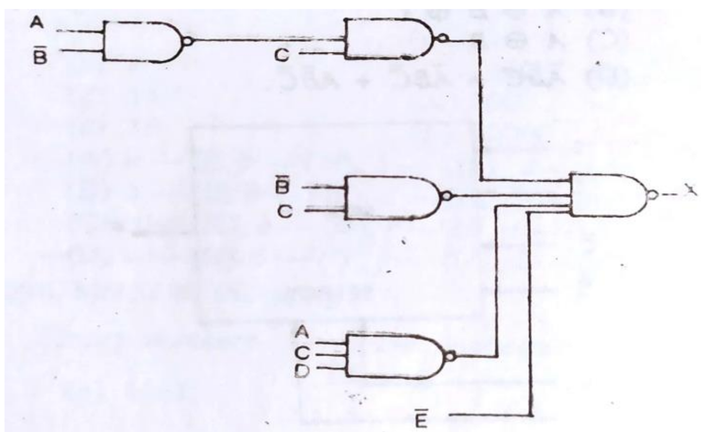


Fig. 47.

282. The Boolean expression for the Karnaugh map shown below is **Y= BCD+ABC+ACD**.

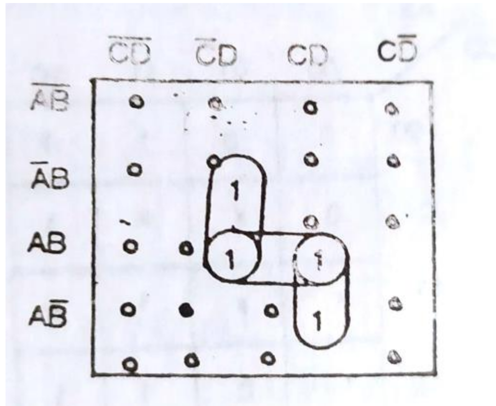


Fig. 48

283. Match the following

Boolean equation GATE

(a) A+$\overline{B}$ = Y (i) OR

(b) A+B = Y (ii) NAND

(c) $\overline{AB} = Y$ (iii) NOR

(d) $A.B = Y$ (iv) AND

(a) –(iii), b—(i), (c)—(ii), (d)—(iv)

284. The output F of the multiplexer circuit in Fig.49 can be represented by $\boldsymbol{\overline{AB}C + AB\overline{C} + A\overline{BC}}$.

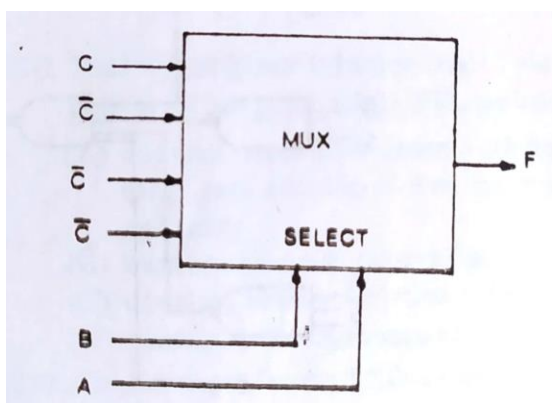


Fig. 49.

285. The simplified Boolean expression associated with the karnaugh map shown in fig.50 (X indicates ‘don’t care’) is **A+BC**.

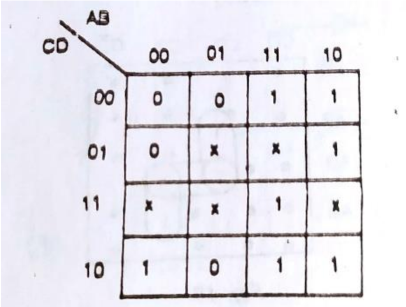


Fig. 50.

286. The minimum number of 2-input NAND gates required to implement the function F = $(\overline{X} + \overline{Y})\ (Z + W)$ is **4**.

287. For the circuit shown below, the output is given by **F=0**.

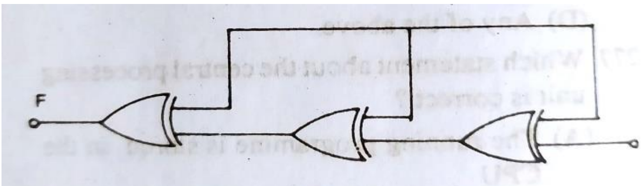


Fig. 51

288. The total number of Boolean function which can be realized with four variables is **256**.?

289. The Boolean expression $\overline{A}.B + A.\overline{B} + A.B$ is equivalent to **A+B**.

290. The function generated by the network is **(E'+ABF')(C+D+F')**

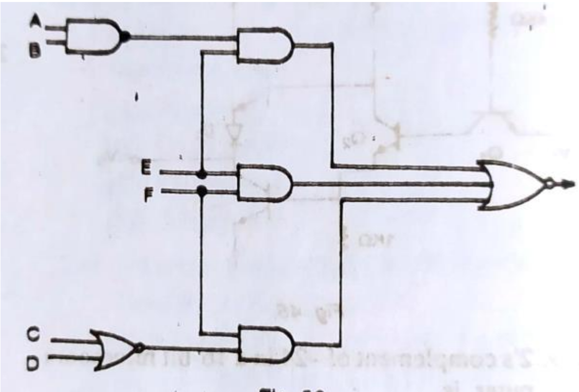


Fig. 52.

Question 291 to 293 refer to Fig.53.

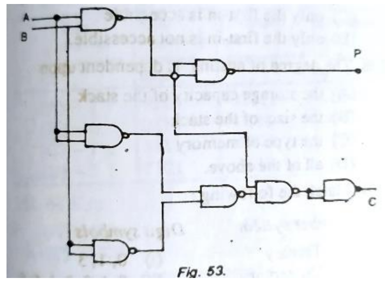


Fig. 53.

291. The Boolean expression for P will be **AB**.

292. The Boolean expression for Q will be $\boldsymbol{\overline{A}B + \overline{B}A}$.

293. The function of the circuit is that of **a half adder**.

294. **$(704)_{16}$ = $(614)_8$** is incorrect.

295. The circuit in fig. 54 produces the output sequence **1111 1111 0000 0000**.

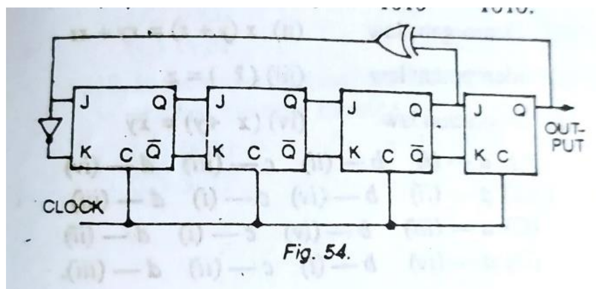


Fig. 54.

296. Match the following

Octal numbers	Decimal equivalents
(a) 10	(i) 56
(b) 16	(ii) 14
(c) 7	(iii) 7
(d) 70	(iv) 8

(a)---(iv), (b)—(ii), (c)—(iii), d—(iv)

297. Match the following

298. Match the following

Binary numbers	Decimal equivalents
(a) 1101	(i) $2\frac{1}{4}$
(b) 11011	(ii) $1\frac{3}{16}$
(c) 1.0011	(iii) 27

(d) 10.01 (iv) 13

a—(iv), b—(iii), c—(ii), d—(i)

299. For the circuit shown below, the output F is given by **F=0**.

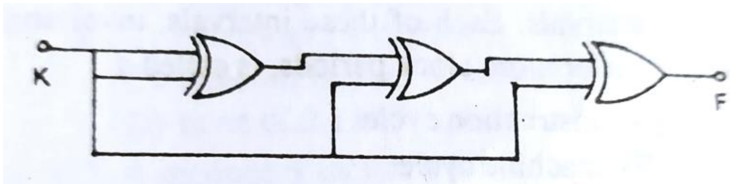


Fig. 55.

300. The minimum number of 2-input NAND gates required to implement the function F = $(\overline{X}+Y)(Z+W)$**3**.

301. Micro-processors find application in **pocket calculators, scientific instruments and medical equipment**.

302. Microprocessor were introduced in year **1971**.

303. In Von-Neumann-or-Princeton-type computer, the program **can appear anywhere within the memory**.

304. Once the information is placed into a read only memory **it can’t be modified easily**.

305. Flag bits in arithmetic unit provide **status type information**.

306. The fetching, decoding and executing of an instruction is broken down into several time intervals, Each of these intervals, involving one or more clock periods, is called a **machine cycle**.

307. In LIFO **only the top of the stack is immediately accessible**.

308. The degree of nesting is dependent upon **the storage capacity of the stack**.

309. Match the following:

Number system	digit symbols
(a) Ternay	(i) 0,1,3
(b) Quaternary	(ii) 0,1,2,3,4,5,6,7,8,9,A,B
(c) Quinary	(iii) 0,1,2,3,4
(d) Duodecimal	(iv) 0,1,2

a—(iv), b—(i), c—(iii), d—(ii)

310. **Option C** is correct

Signal decimal equivalent	Sign-magnitude representation	1's complement representation	2's complement representation
(A) −2	1010	1111	1110
(B) +3	0011	0011	0110
(C) +4	0100	0100	0100
(D) −5	1101	1010	1011

311. Match the following

Laws of Boolean algebra	Relation
(a) Distributive law	(i) x + x = x
(b) Demorgans law	(ii) x(y+z)=xy+xz
(c) Idempotent law	(iii) $(\overline{x})$ = x
(d) Involution law	(iv) (x+y) = $\overline{xy}$

a—(ii), b—(iv), c—(i), d—(iii)

312. **Option D** is correct

Sign decimal equivalent	Sign-magnitude representation	1's complement representation	2's complement representation
(A) +7	0111	01111	0111
(B) +6	0110	0110	0110
(C) −7	1111	1000	1001
(D) −5	1101	1010	1101

313. 64 K is **65536**.

314. $\mathbf{2\frac{1}{2}}$ bytes are there in 1111 1011 0111 0100 1010.

315. Fig.56 shows an 8 bit LED display. A light circle means a LED is on (binary 1) and a dark circle means a LED is off (binary 0) **172** is the decimal equivalent of the binary display. ○ ● ○ ● ○ ○ ● ●

316. A microcomputer has memory locations from 0000 to FFF, each storing 1 byte. **16,384** can be stored by memory.

317. A microcomputer has a 64 K memory, **0000** is the hexadecimal notation for the first memory.
318. In the above case the hexadecimal notation for the last memory location is **FFFF.**
319. **TTL** is the most widely bipolar family.
320. **ECD** is the fastest logic family used in high speed application.
321. MOS family that dominates the LSI field is **NMOS**.
322. MOS family is used extensively where lowest power consumption is necessary, is **CMOS**.
323. A charge coupled device has **low cost per bit**.
324. In magnetic film memory, the memory element consists of **nickel iron alloy**.
325. An eight-bit digital data 10101100 is fed to an ACD. The reference voltage is +10 volts. The analog output voltage will be **6.53**.
326. EAROM memory is **electrically alterable**.
327. A secondary memory is **always slower than primary memory**.
328. Micro-processor 8085 is the enhanced version of **8080** with essentially the same construction set.
329. A state during which noting happens is known as **nop**.
330. Opcode **that part of construction which tells the computer what operation to perform**.
331. In 8085 the instruction register is part of the control unit. The contents of the instruction register are split into two nibbles. The upper nibble goes to the **controller sequence**.
332. The mnemonics used in writing a program is called **assembly language**.
333. A fetch cycle is the **first part of the instruction cycle**.
334. The **program** counter, which is a part of the control unit, counts from 0000 to 1111. It sends to the memory the **address** of the next instruction.
335. In 8085, the MAR, or **memory address** register, latches the address from the program counter. A bit later, the MAR applies this address to the **RAM** where a read operation is performed.
336. SAP-I has **six** T states, period during which register contents change.

337. In micro-processer like 8080 and the 8085 the **instruction** cycle may have from one to five machine cycle.

338. Repeated addition in one way to do multiplication. Programmed multiplication is used in most micro-processors because, **their ALUs can only add and subtract**.

339. A **mask** is used to isolate a bit; it does this because the ANI sets all other bits to zero.

Question 340 to 342 refer to data below:

See the program

Label		Mnemonic
LOOP:	DCR C	
		JNZ LOOP HLT

340. In this **120** times (decimal) is the DCR C executed.

341. **119** times program jump to the LOOP.

342. The program can be changed to loop 210 times by **changing first instruction to MVICD211**.

343. Interaction between a CPU and a peripheral device that takes place during an I/O operation is known as **handshaking**.

344. Addressing in which the location of the data is contained within the mnemonic is knows as **implied addressing**.

345. Addressing in which the instruction contains the address of the data to be operated on, is known as **direct addressing**.

346. Match the following.

Column I	Column II
(a) Pop	(i) to save data in the stock
(b) Push	(ii) to read data from the stack
(c) Stack data	(iii) a portion of memory reserved for return addresses and
(d) Mask bits	(iv) a byte used with an ANI instruction to blankout certain

a—(ii), b—(i), c—(iii), d—(iv)

347. A floppy disc is a **thin plastic disc coated with magnetic oxide**.
348. Interrupt-driven I/O is a type of I/O transfer that **both hardware and software**.
349. Restart is special type of CALL in which **the address is not programmed but built into the hardware**.
350. 8085 has **8** software restarts and **4** hardware restarts.
351. Serial input data of 8085 can be loaded into bit 7 of the accumulator by **executing a RIM instruction**.
352. In 8085, TRAP is **used for catastrophic events like temporary power failure**.
353. The address to which a software or hardware restart branches is known as **vector location**.
354. Vectored interrupt is an interrupt that takes the program to a vector location, TRAP vectors to 0024 H, RST 7.5 to 003 CH, RST 6.5 to 0034 H and **RST 5.5 to 003 CH**.
355. In 8085 usually the vector location and the next two memory location contain a JMP instruction. This allows the program to branch to **a longer sub-routine**.
356. TRAP is **non-maskable** where RST 7.5. RST 6.5, RST, 5.5 are **maskable**.
357. In 8085, to disable the whole interrupt system(except TRAP) **the DI instruction may be used**.

Question 358 to 361 refer to data given below:

____

____

____

RIM

EI

RET

Suppose the accumulator contains CAH after the RIM is executed.

358. Serial input data is **high**.
359. **7.5** are pending interrupts.
360. Interrupt-enable flag is **high**.
361. **6.5** interrupt are masked
362. Here are some initializing instructions

MVI A, IDH

SIM

After the sim is executed, **7.5 and 5.5** are the interrupts that are masked.

Questions 363 to 367 refer to data given below:

Here is the program for serial input data

Label	*Mnemonic*	*Comment*
	MVI B, 00H	: Clear B register
	MVI C, 08 H	; Present counter to 8
LOOP	RIM	; Get SID bit
	ANI 80 H	; Isolate SID bit
	ORA B	; Update parallel word
	RRC	; Rotate right
	MOV B, A	; Save accumulator
	DCR C	; Count down
	JNZ LOOP	; Go back of not finished
	RLC	; Rotate left
	HLT	

This program loops 8 times. The successive SID bits after each RIM is executed are 1,1,0,0,0,0,1 and 0.

363. B register contain **40 H** after the first MOV B, A has been executed.
364. B register contain **60 H** after the second MOV B, A has been executed.
365. **43 H** are the contents of the accumulator after the RLC has been executed.
366. the above letter in ASC II code is **Cd**.
367. The SID data received **LSB first**.

368. For a microprocessor system using IO-mapped IO the following statement is NOT true **IO address space is greater**.
369. A microprocessor with a 16-bit address but is used in a linear memory selection configuration (i.e. address but lines are directly used as chip selects of memory) with 4 memory chips. The maximum addressable memory space is **64 K**.

370. An 8-bit micro-processor has 16-bit address but A_o – A_{15}. The processor addresses a 1-k byte memory chip as shown. The address range for the chip is **FOOOH TO F3FFH**.

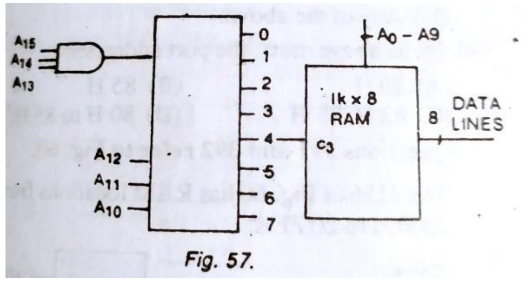


Fig. 57.

371. A micro-processor with a 16-bit address but is used in a linear memory selection configuration i.e., address bus lines are directly used as chip selects of memory chip with 4 memory chips. The maximum addressable memory space is **64 K**.

372. A microprocessor system using IO mapped IO the following statement is NOT true that **IO address space is greater**.

373. **1023** outputs are there in the output of a 10-bit D/A converter.

374. In the above case, the percentage resolution is **0.097**.

375. In Fig.58 R=20 k ohm and C = 73pF. The converter clock frequency will be **606 Hz**.

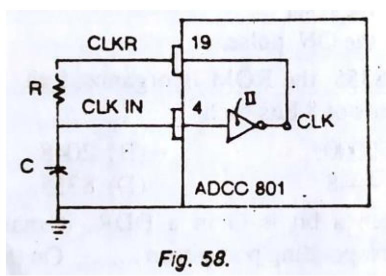


Fig. 58.

Question 376 to 378 refer to Fig. 59

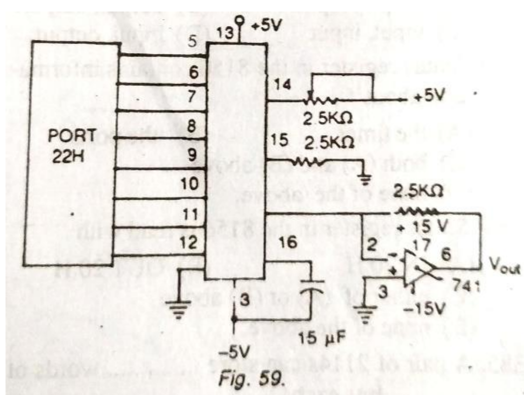


Fig. 59.

376. Normal range of analog input voltage is **0 to 5 V**.

377. If V_{in} is 0.99 V, the digital output **0011 0011** of the ADC 0801 after INTR goes low.

378. Maximum output voltage from the 741 op-amp is **approx 5 V**.

379. In 8156, the lowest timer byte is addressed with 24 H, and the upper times byte with **25 H**.

380. The timer is a preseutable 24-bit counter that count TIMER IN pulses. The number that is preset in the timer is called **the terminal count**.

381. In 8355, the ROM is organized as **2048** words of 8 bits each.

382. When a bit is O in a DDR, it makes the corresponding port pin an **input** on the other hand, a 1 bit program a **output** pin.

383. Status register in the 8156 contains information about **the timer and the port**.

384. Status register in the 8156 is read with **IN 20 H**.

385. A pair of 2114s can store **1024** words of **8 bit** each.

386. The contents of the command register are 23 H. the port C **is an input port**.

Question 387 and 388 refer to program below:

A program segment is given below:

```
MVI     A,2 BH
OUT     24 H
MVI     A,86 H
OUT     25 H
```

387. The terminal count in decimal form is **1579**.

388. **Single pulse** is produce by times.

389. An 8156 has A_{15} connected to its CE input. A_{14} to A_8 are unconnected, and AD_7 to AD_0 are connected. Ignoring shadows, **8000 H ---- 80 FFH** are the RAM locations.

390. In the above case the port addresses **80 H TO 85 H**.

Question 391 and 392 refer to Fig. 60.

The 8156 of Fig. 60 has RAM locations from 2000 H to 20 FFH.

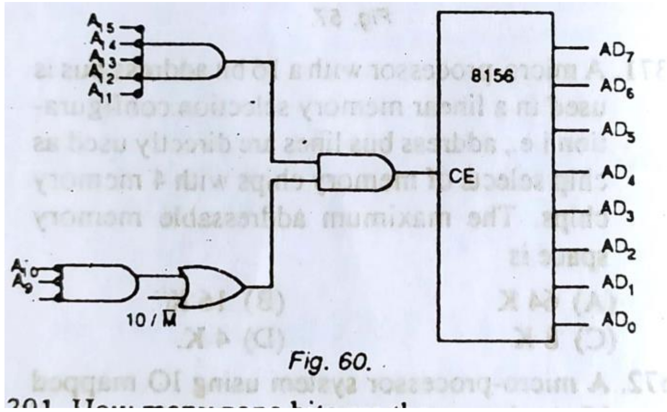


Fig. 60.

391. **8** zone bits are there.

392. If all bubbles are removed, the new RAM locations are **FFOOH ---FFFFH**.

393. The stack is a specialized temporary **sequential** access memory during **push** and **pop** instructions.

394. The generic microprocessor contains a zero and a carry flag. These are located on the **status register**.

395. In the generic microprocessor **machine cycle time period is shorter than instruction cycle time period**.

Question 396 to 398 refer to Fig. 61.

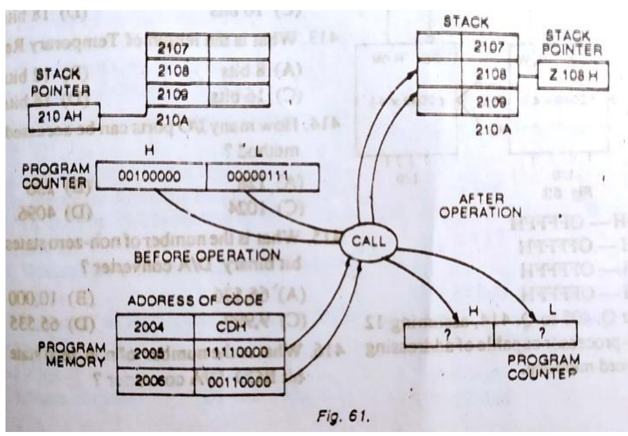


Fig. 61.

396. The contents of stack location 2019 H after the call operation will be **00100000**.

397. The contents of stack location 2108 H after the call operation will be **00000111**.

398. The contents of the program counter after the call operation will be **30 FOH**.

399. The contents of the program counter after the call operation point to the first instruction on the **subroutine**.

400. Flow charts that contain decision symbol **do not represent straight line program**.

401. The memory address of the last location of a 1 k byte memory chip is given as OFBFFH. The address of the first location is **OF 800 H**.

402. Line **3** goes low if the input to the 2-to-8 decoder (74L8º138) is ($A_7 – A_0$)

See Fig. 62.

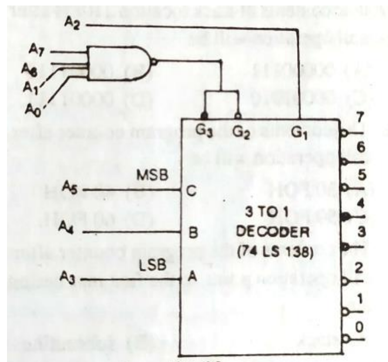


Fig. 62

403. Line **6** goes low if connection of A_3 and A_5 are interchanged. All other condition are same as in the previous question.

404. Memory map of the memory shown in fig.63 is **OFCOOH—OFFFFH**.

Note: **answer Q 405 to Q 414, assuming 12 bit microprocessor capable of addressing 256 K word memory.**

405. Memory word size for thin microprocessor is **18 bits**.

406. Length of the Accumulator is **12 bits**.

407. There are **18 bits** lines in address bus.

408. Length of stack Pointer is **18 bits**.

409. Length of instruction Register is **12 bits**.

410. Length of memory address Register is **18 bits**.

411. Length of Data Buffer Register is **12 bits**.

412. Length of program counter is **18 bits.**

413. Length of Temporary Register is **12 bits**.

414. **4096** I/O ports can be accessed in direct method.

415. The number of non-zero states for a 16 bit binary D/A converter is **65,535**.

416. The number of non-zero states for a 16 bit BCD D/A converter is **9,999**.

417. The percent resolution of a 12 bit BCD D/A converter is **0.1001%**.

418. In a 8 bit A/D converter the reference voltage used is 10 V. the voltage represented by 10100001 is **6.314**.
419. The least change in output voltage of 12 bit binary D/A converter using 12 V refrence supply voltage is **0.00293**.
420. Contents of program counter specify **the address of the next instruction to be executed**.
421. Contents of stack pointer specify **address of the top of stack**.
422. Contents of instruction register specify **Op code for the instruction being executed**.
423. **First** byte of an instruction is loaded into IR register.
424. Direction of the data bus is **Bi-directional**.
425. Direction of the address bus is **Uni-directional out of µp**.
426. The direction of the control bus is **mixed direction i.e some lines into µp and some others ouf of µp**.

Q 427 to Q 500 with respect to 8085 microporcessor.

427. There are **16** lines in address bus.
428. There are **8** lines in data bus.
429. There are **6** interrupt control lines are there.
430. Memory word size is **8 bits**.
431. Length of A-regiser is **8 bits**.
432. Length of IR (instruction register) is **8 bits**.
433. Length of PC (program counter) is **16 bits**.
434. Length of SP (stack pointer) is **16 bits**.
435. Length of status Word is **16 bits**.
436. Length of Temporary Register is **8 bits**.
437. Length of Data Buffer Register is **8 bits**.
438. There are **5**flage.
439. There are **5** interrupts.
440. Memory word addressing capability is **64 K**.
441. I/O ports can be accessed by direct method is **256**.
442. I/O ports can be accessed by memory mapped method is **32 K**.

443. **TRAP** interrupt has the highest priority.
444. **INTR** interrupt has the lowest priority.
445. If interrupt service request have been received from all of the following interrupts, then **RST 5.5** will be serviced last.
446. If interrupt service requests have been received from all of the following interrupts, then **RST 7.5** will be serviced first.
447. **RST 5.5, RST 6.5 and RST 7.5** are vectored interrupts.
448. **TRAP** interrupt is unmaskable interrupt.
449. If instruction RST is written in a program the program will jump to location **0028 H**.
450. TRAP interrupt is triggered program control is transferred to location **0024 H**.
451. The RST 5.5 interrupt service routine start from location **002 CH**.
452. An interrup service request is serviced **after the execution of the current instruction is compacted**.
453. Even after a Reset operation **TRAP** interrupts remain enabled.
454. In order to enable RST 5.5, RST 6.5 and RST 7.5 interrupts, **EI and SIM** instruction are needed.
455. In order to enable interrupt, **EI** only needed.
456. In order to enable TRAP **none** of the instruction is needed.
457. A RIM instruction is used to **Read in the serial input data and read in status of pending interrupts, if any**.
458. Refer to program in Fig.64. the microprocessor is interrupted while executing MOV instruction at location 0210 H. The location at which contents of register E are stored is **054 EH**.
459. Refer to program in Fig.64. the microprocessor is interrupted while executing MOV instruction at location 0210 H. The location at which contents of register D are stored is **054 FH**.
460. For the condition of Q 458. **0.211 H** is the memory address on the stack, when the program is interrupted.
461. For the condition of Q 458. The contents of register SP is **054 CH** after the interrupt has been started.

	Memory Address	*Mnemonics*
START :	0118 H	MOV A, C
	0119 H	LXI SP, 0550 H
	011 CH	EI
		↓
	0134 H	CALL 020 EH
	↓	↓
SUB :	020 EH	PUSH D
	020 FH	LDAXB
	0210 H	MOV B, A
	0211 H	IN × B
	↓	↓
	0230 H	RET

Fig. 64.

462. An active low signal INTA is not needed from µp to service **TRAP** interrupt requests.

Q 463 to Q 474, assuming accumulator contain A 64 and the carry is set (1)

463. Accumulator (A) and carry (CY) contain **A 6 H, 1** after ANA A.
464. Register (A) and carry (CY) contain **A 6 H,0** afterORA A.
465. Register (A) and carry (CY) contain **00 H, 0** after XRA A.
466. Register A and CY contain **4 AH, 1** after ADI 0A4H.
467. Register A and CY contain **4 BH, 1** after ACI 0A4H.
468. Register A and CY contain **DDH, 1** after SBI 0B7H.
469. Register A and CY contain **59 H, 1** after CMA.
470. Register A and CY contain **D 3 H, 0** after RAR.
471. Register A and CY contain **4 DH, 1** after RAL.
472. Register A and CY contain **53 H, 0** after RRC.
473. Register A and CY contain **4 DH, 1** RLC.
474. Register A and CY contain **06 H, 1** after DAA.

Q. 475 to Q. 482 for the following condition.

A contains 5 EH, B contains 27 H; C contains 4 FH, H contains 00 H, L contains OFFFH and memory locations EEH and 00 FFH contain 2 DH and 4 EH respectively. The following program begins at memory location 0110H:

ADD C

DAA

MOV B, M

MOV M, A

DAD B.

475. A will contain **13 H** after the program.

476. B will contain **4 EH** after the program

477. H will contain **28 H** after the program.

478. L will contain **4 EH** after the program.

479. Content of memory location 00 FFH after the program is **2 DH**.

480. The content of memory location 00 FFH after the program is **13 H**.

481. Content PC after the program is **0115 H**.

482. The value of CY and AC after DDA instruction is **1,1**.

483. Register pairs can be directly stored in memory **HL**.

484. The purpose of using ALE signal high is **to latch low order address from but o separate A_0 – A_7 lines**.

485. The purpose of READY signal is **it is used to provide for proper WAIT sates when µp is communicating with slow peripheral devices**.

486. The PC contains 0450 H and SP contain 08 D 6 H. the content of Pc and SP following a CALL to subroutine at location 02 AFH is **02 AFH, 08 D 4 H**.

487. The addressing mode used in instruction MOV M, C is **indirect**.

488. The addressing mode used in instruction LDA 0345 H is **Direct**.

489. The addressing mode used in instruction LXI B 0345 H is **immediate**.

490. The first machine cycle of an instruction is always **a fetch cycle**.

491. **2 , Fetch and but idle** machine cycle needed for execution of MOV A, M.

492. **1, Fetch** machine cycle needed for execution of MOV D,C.

493. **3, Fetch and memory write** machine cycle needed for execution of PUSH B.

494. **5, Fetch, 2 memory read and 2 memory write** are the machine cycle needed for the execution of XTHL.

495. There are **3** modes of operation in 8255 APPI.

496. **Port—C** of 8253 A PPI can be split into two halves.

497. **Group B** of ports of 8255 A PPI can be operated in two modes.
498. the delay between successive bits for 9600 band rate is approximately 0.1 ms is **true.**
499. The instruction RIM is equivalent to the instruction IN with one input data line (D_7) is **true**.
500. SID and SOD lines receive and transmit characters starting from **neither D_0 nor D_0** bit after the START bit.

Chapter # 17 DC Generators

1. In lap winding **the number of brushes is equals to number of poles.**
2. Rotor of a motor is usually supported **on ball or roller bearings.**
3. Each commutator segment is connected to the armature conductor by means of **copper lug.**
4. A two-layer lap wound 4 pole generator with 16 coils will have a pole pitch of **8.**
5. Dummy coils in generators are provided to **mechanically balance the rotor.**
6. In a dc machine if p is the number of poles, n is the armature speed in rpm, then the frequency of magnetic reversal will be **PN/120.**
7. For parallel operation the generators normally preferred are **shunt generators.**
8. The residual magnetism of a dc shunt generator can be regained by **connecting the shunt field to a battery.**
9. Lap winding on dc generators is preferred for generating **the large current.**
10. Load saturation characteristics of a dc generator gives relation between ***V and If.***
11. In an ideal dc generator, the regulation is **zero.**
12. The decrease in terminal voltage of a shunt generator is due to **armature resistance.**
13. In a dc generator the effect of armature reaction on the main pole flux is to **reverse it.**(in other sources the answer **is reduce it and distort it**)
14. In a 10-pole, lap wound dc generator the number of active armature conductors per pole is 50. The number of compensating conductors per pole required is **5.**
15. Maximum efficiency in machines occurs when **constant losses = variable losses.**
16. if *yf* is the front pitch ,*yb* is the back pitch *yc* is the commutator pitch then in wave winding ***yf*+*yb*=2 *yc*.**
17. Maximum power output is given by a machine at an efficiency of **50%.**
18. Equalizer rings are required in a lap winding dc machine **to prevent flow of circulating current through the brushes.**
19. For a fixed number of poles and armature conductor, **wave winding will give higher emf.**
20. For wave winding the average pitch must be **even or odd.**

21. If a is the degree of multiplicity and p is the number of poles, the number of parallel paths in a wave winding will be **2a.**
22. Hysteresis loss in a dc machine depends on **Volume and grade of iron ,Max value of flux density and frequency of magnetic reversals .**
23. The effect of iron losses on dc machines is **loss of efficiency, excessive heating of core.**
24. In dc machines the losses which has the highest proportion is **armature copper loss**
25. In dc machines the losses which has the least proportion is **mechanical losses.**
26. **Armature copper loss** in dc generator significantly varies with the load current.
27. In dc generator the loss which has a least proportion is **windage loss.**
28. A properly designed dc generator can have an overall efficiency of **95%.**
29. Eddy current loss will increase rapidly as compared to others when the number of magnetic reversals is **increased.**
30. For a shunt generator **copper loss** is considered as constant.
31. For reducing the hysteresis loss in a dc generator armature core material should have **low hysteresis coefficient.**
32. When B is the maximum flux density then eddy current loss varies as $\boldsymbol{B^2}$**.**
33. The armature voltage control is considered as suitable in case the dc machine is driven **at constant torque.**
34. Two dc generators have similar characteristics. The essential condition for stable parallel operation of these two generators is that they should have **same drooping voltage characteristics.**
35. While pole flux remains constant, if the speed of a shunt wound dc generator is doubled its generated **emf will be doubled.**
36. As a result of armature reaction, the total mutual air gap flux in a dc generator is approximately **5%.**
37. Interpoles are usually wound with **heavy guage copper wire.**
38. **Cool armature by ventilating air** is not the function of the interpoles in dc generators.
39. In dc generators the change in voltage when the load is reduced from rated value to zero, expressed as a percentage of the rated load voltage, is known as **regulation.**
40. If θm be the mechanical degree θe be the electrical degree and *P*be the numbers of poles on a dc generator, then relation will be **θm=2θe/*P*.**

41. The number of mechanical and electrical degrees for a dc generator will be the same when the generator has **2 poles.**
42. A dc generator running at 1600 rpm gives 240 V dc. If the speed is dropped to 1400 rpm without change in flux. The new emf will be **210V.**
43. In dc generators, an interpole field coils are connected **in series with armature.**
44. In a dc generator the polarity of interpole **is same as the polarity of the main pole that precedes in the direction of rotation.** (**In motor, reverse**)
45. When a dc generator is operating at constant speed, variable load, **copper loss is likely to vary significantly.**
46. Total losses in a properly designed 1kW dc generator may be of the order **50W.**
47. If the no load voltage of a certain generator is 220V and the rated load voltage is 200V, then the voltage regulation is **10%.**
48. In a duplex winding for a 4-pole machine, the number of parallel paths will be **8.**
49. In dc generator **External characteristics = magnetization characteristics-armature reaction-Ohmic drop.**
50. **Series generator** cannot start if there is no residual magnetism.
51. The direction of rotation of a shunt generator can be reversed by **interchanging the polarity of field winding.**
52. A shunt generator running in 600 rpm has an induced emf of 200 volts. If the speed increases to 750 rpm, the induced emf will be **250V.**
53. A sinusoidal voltage of frequency 1 Hz is applied to the field of a dc generator. The armature voltage will be **1 Hz sinusoidal.**
54. Equalizer rings in lap wound dc generators are used to avoid **unequal distribution of current at the brushes thereby helping to get sparkles commutation.**
55. Hysteresis loss in a dc shunt generator varies as **1.6 power flux density.**
56. The critical resistance of the dc generator refers to the **resistance of field.**
57. In a dc generator if field winding attains the critical resistances the voltage generated will be **zero.**
58. In a 4-pole dc machine alternate poles are **north and south.**
59. If A be the commercial efficiency, *B* be the electrical efficiency and C be the mechanical efficiency of a dc generator then **A=BxC** relation is valid.

60. Overall efficiency of a well-designed generator may be expected to be around **90 to 95%.**
61. The condition for maximum efficiency in case of dc generator is **Variable loss= Constant loss.**
62. A dc generator running at fixed speed and with fixed shunt field resistance has **short circuit current is less than the maximum load current** that it can feed.
63. In a dc machine, the angle between the stator and rotor field is **90º.**
64. A dc shunt generator delivers 395 A at 250 V and the resistance of the shunt field and armature 50Ω and 0.05Ω respectively. The generated emf will be **270V.**
65. In a level compound generator, the terminal voltage at half full load is **more than no load voltage.**
66. In a generator, the **windage loss is proportional to square of armature speed.**
67. When field resistance of a dc shunt generator is increased beyond its critical value the generator **will not build up.**
68. The number of armature parallel paths in a two-pole dc generator provided with duplex lap winding will be **4.**
69. When two shunt generators are operating in parallel, the easiest way to shift load from one generator to the other is to adjust their **field rheostats.**
70. The number of armature parallel paths is 12 pole dc generator provided with triplex lap winding will be **36.**
71. In a dc generator the brushes are always placed along **Magnetic neutral axis (MNA).**
72. If two generators are running in parallel and field of one of the generators is weakened too much, then it will run **as a motor in same direction.**
73. In dc generators, the **brushes remain in contact with conductors** which lie in the interpolar gaps.
74. Among the series and shunt generators, **shunt generator has the better regulation.**
75. The armature reaction of an unsaturated dc machine is **cross-magnetizing.**
76. A generator is said to be flat compounded when the **voltage remains constant irrespective of the load on the generator.**
77. Iron losses in dc machine take place in **armature rotor.**
78. Eddy current loss in a dc shunt generator occurs in **magnetic as well as non-magnetic conductor material.**

79. A dc shunt generator remained inoperative for long time as a result of which residual magnetism was lost. The residual magnetism can be restored by **connecting the shunt field to the battery.**
80. The change in speed of a dc generator due to increased loads is corrected by **increasing input power of the prime mover.**
81. The polarity of a dc generator can be reversed by **reversing the field current.**
82. In a dc generator sparking between brushes and commutator surface may be due to a **over commutation, under commutation or too rapid reversal of current.**
83. In a dc generator rapid brush wear may be due to **rough commutator surface, severe sparking or imperfect contact with commutator.**
84. A dc shunt generator has full-load voltage regulation of 5% at rated speed of 400 rpm. The generator is new driven at 500 rpm. Its voltage regulation now will be **more than 5 percent.**
85. **1 ohm** is closest to the armature circuit resistance of a dc generator.
86. The voltage at the terminals of a dc series generator running at a rated rpm and no load will be **a very small voltage.**
87. A cumulatively compounded dc generator is supplying 20A at 200 V. now if the series field winding is short circuited, the terminal voltage will **shoot upto a very high value.**
88. DC machines are generally designed for maximum efficiency **around full load.**
89. A dc machines is fitted with both interpole winding and a compensating winding. These two windings with respect to the armature circuit will be **in series.**
90. Over and under compounded of dc generator is obtained by **shunting more or less current from the series field.**
91. The magnetic field which initially induces armature current in a self-excited generator is caused by **residual magnetism.**
92. Equalizer connections are required when **paralleling two compound generators.**
93. In order to ascertain whether a generator is lap or wave wound, on the basis of visual observation of the armature, one should observe **the direction of the end connections.**
94. When the shunt field of a compound generator is connected across both the series field and the armature. Such a connection is known as a **long shunt.**

95. A self-excited shunt generator fails to excite because the residual magnetism has destroyed. In order to revive the machine, one should **excite the field for a few minutes with a battery.**
96. Two generator having series excitation are connected in parallel. If equalizer bar is not used one of the generators may **start reversed.**
97. If two compound interpole dc generators are worked in parallel the equalizing bar must be connected to function of **series and interpole fields.**
98. A dc over-compound generator is supplying power to an infinite bus. If the prime mover is accidentally cut off, the dc machine will **stop running.**
99. The type of dc generator used for arc welding purposes is **a differentially compound generator.**
100.

1. A generator may lose residual due to **heating.**
2. **Level compound generator with interpoles** is not a cross field machine.
3. In case of cross field machine, the amplification ration may be of the order of **10,000.**
4. The major application of cross field machines is in **control system.**
5. Compensating winding in amplidyne is provided to **reduce magnetizing effect of armature reaction on the control winding flux.**
6. For a 6-pole wave wound dc generator the number of brushes will be **2**.
7. Dummy coil in a dc generator is provided to **reduce mechanical unbalance.**
8. Drop in speed of a dc generator due to increase in load can be compensated by **increasing input to the prime mover.**
9. When P is the number of poles in a lap wound dc generator, the number of brushes will **be P.**
10. In case of a 4-pole lap wound 32 coils dc generator the pole pitch will be **16.**
11. Two dc shunt generators are operating in parallel. The easiest way to shift load from one generator to the other is by **adjusting field rheostats.**
12. For a generator if constant losses are equal to variable losses, the efficiency of the generator will **be maximum.**
13. Electromagnetic torque and speed are in opposite directions in case of **shunt generators.**
14. The generated emf and current are in the same direction in case of **dc generators.**

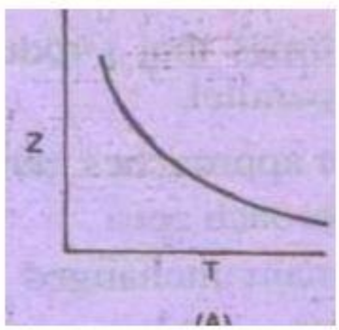
15. Hysteresis losses in a dc machine are given by $B^{1.6}fV.$ *where* V stands for **volume of iron part.**

Chapter # 18 DC Motors

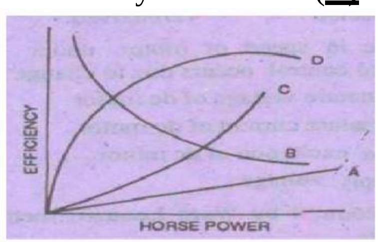
1. The fully load current of a 20HP 500V Dc motor will be closer to **35A**
2. The speed of a dc motor may be varied by varying **(a)field current (b)applied voltage (c)resistance in series with armature(d) any of above**
3. In dc motor, the conditions for maximum power is **Back emf=1/2(supply voltage)**
4. If conditions for maximum power for a dc motor are established, the efficiency of motor will be **less than 50%**
5. A 200 V dc machine has an armature resistance of 0.5 ohm. If the full Armature current is 30A, the induced emf when machine acts as
   a) generator (b) motor will be **120V,210V**
6. The speed of a dc motor is **directly proportional to back emf.**
7. The ratio of starting torque to fully load torque is least in case of **shunt motors**
8. Which of the following is not necessarily the advantage of dc motors over ac motors **Low Cost**
9. Which motor will have least percentage increase of input current for the same percentage increase in torque **series motor.**
10. The mechanical power developed by a dc motor is maximum when the ratio of back emf/applied voltage is **0.5**
11. The speed of a series-wound dc motor **increases as flux decreases**
12. Following controls play significant role in the speed control of dc motors
    a) Control of flux (b) armature resistance control (c)supply voltage control
13. The speed regulation of a dc motor is (**No load speed-full load speed)/Full load speed**
14. A dc motor having full load speed of 800 and speed regulation of 8% will have no load speed of **864 rpm.**
15. For a series motor if Ta be the torque and Ia the armature current, then

which relation is valid for the conditions before saturation Ta $\propto$ **I_a^2**.

16. In the dc series motor, shaft torque is less than the armature torque due to **Stray losses.**
17. Dc motor with self-loading properties is **differentially compound motor.**
18. The current drawn by a 120V dc motor of armature resistance 0.4 ohm and back emf 112V is **20A.**
19. If the load current and flux of a dc motor are held constant and voltage applied across its armature is increased by 5 percent, the speed of motor will be **increase by about 5%**
20. A dc motor develops a torque of 140N-m at 1400 rpm. If the motor now runs at 1000rpm, the torque developed will be **140 N-m**
21. Which of the following curves represents speed torque characteristics of a dc series motor **A**



22. The type of dc motor control preferred for applications where unusually wide and very sensitive speed control is required will be **ward- Leonard control.**
23. Which curve represents the efficiency of dc motor (**D)**



24. When two dc motors operate in series **torque is four time that produced by motors when in parallel.**
25. If the flux of dc motor approaches zero **the motor will tend to run at**

infinite speed.

26. The duty cycle of a motor is

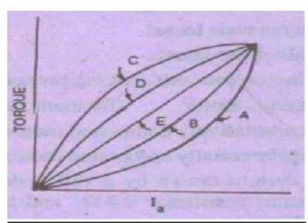
Load	**Duration**	
20KW	120SEC	
10KW	120SECSTOPPED	280SEC

The continuous rating of motor suitable for above application would be **14.14KW.**

27. If the applied voltage of dc shunt motor is halved with load torque doubled, the armature current will be **doubled.**
28. Change in speed of motor, under ward-Leonard control occurs due to change in **armature voltage of dc motor.**
29. Speed control by ward-Leonard method is available **in one direction only.**

30. For which application a dc motor is preferred over a ac motor **Variable speed operation.**

31. In a dc shunt motor if the supply voltage is reduced by 10% which of the following will increase **Full Load speed.**
32. Which curve represents the characteristics for a series motor? **E**



33. Which curve represents the characteristics for a shunt motor? **D**
34. Which curve represents the characteristics of a differentially compound motor? **C**
35. Which curve represents the characteristics of a cumulatively compound motor? **B**
36. The maximum speed ratio obtainable in a ward-Leonard control, the dc motor is **25:1**
37. In ward-Leonard control, the dc motor is **separately excited motor.**

38. In ward-Leonard control, the lower limit of speed is imposed by the **residual magnetism of the generator .**
39. The starting resistance of a dc motor is usually **low**
40. A dc shunt motor is running at light load. What will happen if the field windings get opened **motor will pick up high speed.**
41. In base of dc shunt motors as the load is increased the speed of motor **reduces slightly**
42. Regenerative braking on shunt motors is used when **the load has overhauling characteristics.**
43. In hemostatic braking for dc series motors **motor is run as a generator.**
44. In Hopkinson's test for dc motors **both machines are mechanically coupled**
45. A 230V dc motor is connected to 230V ac supply then **it will run with less efficiency and high spark**
46. A dc series motor **should always started on load.**
47. Which figure represents the speed-torque characteristics of a dc shunt motor is
48. Which dc motor has approximately constant speed **shunt motor**
49. The armature current of a dc motor is given by **Ia=(**V–Eb)/Ra
50. Which motor will have highest percentage increase of input current for the same percentage increase in torque **Shunt motor**
51. Which of the following method is most effective in finding out the no losses in a large dc shunt motor **Swinburne's test**
52. The retardation test in case of shunt motors and generator is use to determine **stray losses.**
53. A dc series motor develops a torque of 20N-m at 3A of load current is increased to 6A, the torque developed will be **80N-m .**
54. The back emf of a dc motor depends on **field flux**
55. A series motor never started without some mechanical load on it because **at no load series motor develops infinite speed.**
56. A conductor 10cm long lies across a magnetic field of 0.8 weber/sqm.

The force acting on the conductor when a current of 20A passes through it will be **1.6 N**.

57. The armature of a shunt motor contains 0.8-ohm resistance. The motor is to run on a 120V circuit. If the motor is suddenly thrown on the circuit while the armature is standing still (back emf in normal running being 110V) the current drawn by the motor will be **600A .**
58. The airgap b/w stator and armature of an electric motor is kept small in order to **provide stronger magnetic field .**
59. Small dc motor up to 50HP usually have **2 POLES.**
60. A dc generator can be termed as **Rotating amplifier.**
61. A dc shunt motor has rated rpm of 480. Certain industrial application requires this motor to run at 540rpm for some time. Which speed control will be desirable **Field resistance control.**
62. A dc shunt motor has rated rpm of 480. Certain industrial application requires this motor to run at 600rpm for some time. Which type of control should be selected **Field resistance control.**
63. The supply terminals for a dc shunt motor are reversed. What will be the effect on motor? **It will run in reverse direction.**
64. A dc motor develops a torque of 100N-m at 400rpm. At 300rpm the motor will develop a torque of **100N-m.**
65. What will happen when back emf of a dc motor suddenly vanishes **motor will burn.**
66. Which test can be used to determine the no load losses of a shunt motor? **Swinburne's test**
67. Which test can be used to determine the no stray losses? **Running down test.**
68. Which of the following tests on dc machines need minimum two machines? **Back to back set**.
69. A brake test is usually restricted **to small horse power motor.**
70. In Swinburne's test the no load power input to the armature supplies which of the following

a) Iron losses in core (b)friction and windage losses (c) armature copper losses

71. Which of the following is assumption in Swinburne's test **decrease in flux due to increase in shunt resistance by heating is negligible.**

72. Hopkinson's test is conducted at **Full load.**

73. Which of the following test can be conducted on all types of dc machines
brake test.

74. Which of the following test can be conducted on other than shunt machines?
Field tests.

75. In case of shunt motor if the supply voltage is increased by 20%, which of the following will decrease? **Full load current.**

76. A 230V dc motor takes a no-load current of 2A and runs at 1200rpm. In case of full load current is 40A, the speed at full load will be **1150rpm.**

77. A 200V dc motor will be subjected to a high voltage test at **1400V**.

78. In a dc motor which of the following can sustain the maximum temperature rise? **Field windings.**

79. In class B dc motor, the maximum permissible temperature rise in armature windings is **75C.**
80. A 230V dc motor has an armature circuit resistance of 0.6ohm. If the full load armature current is 30A and no-load armature current is 4A, the change in back emf no load to full load will be **15.6V.**
81. A dc shunt motor has external resistance R1 in the field circuit and R2 in the armature circuit. The starting armature current for the motor will be minimum when **R1 is minimum and R2 is maximum.**
82. In a dc motor, speed control by varying the armature circuit resistance provides a **constant torque drive** .
83. A dc shunt motor draws an armature current of 40A under normal rated conditions. If the field flux and the armature terminal voltage are reduced to half, then for constant power output, the armature current will be **80A.**

84. A differentially compounded dc motor runs at a full load speed of

480rpm. Now if the series field of the motor is short circuited, then full load speed will be **less than 480rpm.**

85. A cumulatively compounded dc motor runs at a full load speed of 480rpm. Now if the series field of the motor is short circuited, then full load speed will **be more than 480rpm.**
86. In a dc shunt motor, speed control by the variation of the field flux will be **constant power drive**
87. A dc shunt motor is started on no load and runs at 400rpm. The motor is made to run on no load for ten hours. The speed of motor after ten hours will be **more than 400rpm.**
88. Which of the following is likely to be the shunt field winding resistance for a 5KW shunt motor 200 **ohms.**
89. Two dc series motors are coupled. One motor is run as generator and other run as motor. The friction losses of the two machines will be equal when **both have same speed,**
90. Two series motors are coupled. One motor is run as generator and other run as motor. The iron and friction losses of the two machines will be identical when **their speeds and excitations are identical.**

91. In series parallel control method, when two dc series motors are connected in series, the speed of combined set is **one fourth of the speed of the motors when connected in parallel.**

92. A dc motor is provided with interpoles. Which of the following represents the correct sequence of poles? (capital letter indicates main pole and small letter indicate interpole) **N-n-S-s-N-n-S-s**

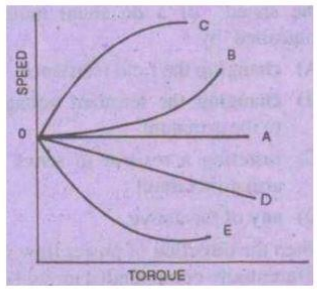
93. In series-parallel control of dc series motors, the torque in series arrangement is **four times the torque in parallel arrangement.**
94. Speed control of a cumulatively compounded dc motor can be affected through

a) **change of armature resistance (b)change of armature voltage (c) change of field resistance**

95. The starter for a dc motor also provides protection to the motor against damage **(a) due to short circuit in the equipment (b)from long term overloads** from excessive starting current

96. The brush voltage drop in dc motor is usually of the order of 2**V.**

97. The characteristics of a cumulatively compounded dc motor is represented by the curve **OE**



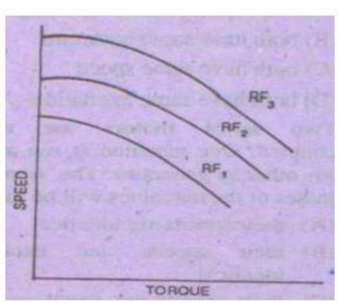
98. The characteristics of a differentially compounded dc motor is represented by the curve **OB.**

99. In case starting resistance of a series motor is short-circuited, the motor will **run at very high rpm**.

101. The speed of a dc motor can be controlled by
a) changing the field resistance (b)changing the terminal voltage applied to the armature (c)inserting a resistor in series with armature circuit

102. When the direction of power flow reverses, a differentially compounded motor becomes **a cumulatively compounded motor**.

103. Speed torque characteristics of a dc shunt motor are shown in figure, RF is field resistance. It can be concluded that **RF3>RF2>RF1**



104. In a permanent magnet dc motor which method of speed control cannot be used? **Varying the field current.**

105. When the direction of power flow reverses a cumulatively compounded motor becomes **a differentially compounded generator**

uestion #106-108 refers to data given below:

duplex lap-wound armature is used in six-pole dc machine with six brush sets, each spanning two commutator segments. There are 72 coils on armature, each containing 12 turns. The flux per pole in machine is 0.039wb and the machine spins at 400rpm.

106. The number of current paths in machine is **12**

107. The number of conductors in the machine is **1728.**

108. The induced emf is **224.6V**

109. The relation b/t electrical angle in degrees Øe, mechanical angle in dgress Øm when the number of poles is P, is given by **2Øe=PØm.**

110. Frog –leg winding is **combined lap and wave winding on a single rotor.**

111. The function of a field regulator for a compound motor is to **control the flux.**

uestion 112 to 115 refer to the data given below:

12-pole dc generator has a simplex wave wound generator containing 144 coils of 10 turns each. The resistance of each turn is 0.011ohm. Its flux per pole is 0.05wb and it is turning at a speed of 200rpm.

112. The number of current paths is **2.**

113. The induced armature voltage is **2880V.**

114. The effective armature resistance of this machine is **7.92ohm.**

115. If a 1Kohm resistor is connected to the terminals of this generator what is the resulting induced counter-torque on the shaft of the machine **396N-m.**

116. The electromagnetic torque and speed are in same direction in case of **dc motors.**

117. The generated emf and the current are in the opposite direction in the case of **dc motors**.

118. Eddy current losses in dc machines are given by $B^3f^2t^2V$ where V stands for **volume of**

iron part.

119. The starting resistor is connected in **series with the armature.**

120. In case of compound motor is started with an open series field **the motor will not start.**

121. Which test can be used for estimating no load losses in large dc shunt motor? **Swinburne test.**

122. Which losses can be determined by performing the retardation test? **Stray losses.**

123. The function for a starter for a dc motor is **to limit the starting current.**

124. If the speed of a shunt motor is to be controlled b/w zero and normal running speed N, the most practical way to achieve this would be to inserting a resistance of suitable value in **series with armature.**

125. During the normal operation of series motor, if the field circuit suddenly opens the motor **speed will decrease.**

126. The direction of rotation of a compound dc motor can be effectively reversed by **interchanging armature connections.**

127. A dc motor can be easily identified by **commuator.**

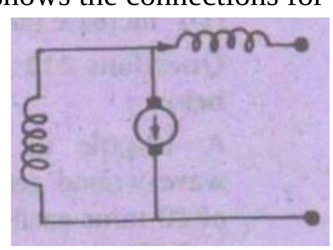
128. In a compound dc motor, the shunt field winding as compared to series field winding will have **more turns and a smaller cross-section of wire**

129. A large shunt motor should be started preferably using **a compensator.**

130. The factor connected to a dc motor are: a) armature current (b)flux per pole (c)speed

he torque developed by a dc motor is dependent upon **(a) and (b)**

131. Connections for dc compound motors are shown in figure below. Which figure shows the connections for differentially compound motor?



differentially compound motor

132. Which of the following loss of motor decreases with increase in load (a)core loss (b)friction and windage loss (C)brush contact loss **(d) none of above**

133. A 230V series motor in which the total field and armature resistance is 0.1ohm is working with unsaturated field, taking 100A and running at 800rpm. The speed at which the motor will run developing half the torque, is **1147rpm.**

134. The amount of flux leakage will depend on the **flux density employed in core and teeth, length of airgap and shape of magnetic core**

135. The usual value of flux leakage co-efficient is **1.1 to 1.3**.

137. The direction of rotation of cumulatively compound dc motor can be reversed by reversing the connections to the **armature.**

138. In which of the following test only one motor is required? **Brake test.**

Chapter # 19 Transformers

1. Laminating the core of the transformer is minimized by the **Eddy current loss**
2. The function of breather in a transformer is **to arrest flow of moisture when outside air enter the transformer**
3. Iron loss in a transformer occurs **in Core**
4. Under no load condition **Copper loss** is negligible
5. Open circuit test of a transformer gives **sum of hysteresis and eddy current loss.**
6. Copper loss in a transformer occurs in **Winding.**
7. **Back to back test** of a transformer provides information about regulation, efficiency and heading under load condition
8. For a transformer the condition for maximum efficiency is when **Copper loss is equal to the iron loss**
9. Eddy current losses in a transformer core can be reduced by **reducing the thickness of laminations**.
10. In a transformer the magnetic coupling between the primary and secondary circuit can be increased by **using the magnetic core of low reluctance.**
11. If flux density in the core of a transformer then the **size of the transformer can be reduced**
12. **Copper loss** in a transformer varies significantly with load
13. Voltage remain constant if the frequency is increased **eddy current loss will remain unchanged.**
14. The power factor in a transformer **depend on the power factor of the load.**
15. At no load the current taken by the **transformer lag behind the applies voltage by 80**
16. The efficiency of a transformer does not depends on **power factor**
17. If the secondary of a 1:10 step up transformer is connected to the primary of a 1:5 step up transformer then the total transformer ratio will be **50**

18. **10 KVA , 100 Hz** transformer will be smallest in size.
19. A short circuit test on a transformer gives **copper losses at full load.**
20. Leakage flux in a transformer may be minimized by **sectionalizing and interleaving the primary and secondary windings.**
21. Essential condition for the parallel operation of a transformer **is they must operate at the same frequency**
22. **1 KVA , 25 Hz** transformer will be largest in size.
23. A step up transformer **increased voltage**
24. In a step down transformer the **secondary turns are less than the primary turns.**
25. Power transformer are usually designed to have maximum efficiency**near full load.**
26. Distribution transformer are usually designed to have maximum efficiency **near 50% of full load.**
27. Iron loss of a transformer can be approximately calculated if the **weight of core and yoke is known.**
28. In high frequency transformer **ferrite cores are used.**
29. Open circuit test on a transformer **yields core losses.**
30. The leakage flux in a transformer depends upon **load current.**
31. **Radio interference test** is not a routine test on transformer.
32. A transformer will have the highest efficiency near **93% of rated load**.
33. A 1KVA transformer at full load will have transformer
34. The sum of all losses in a 1 KVA transformer at full load will be order of **50W**
35. In a transformer the peak voltage is fed to primary **the iron losses will be less**
36. The phase difference between the primary and secondary voltage of a transformer is **180**
37. In a transformer the copper loss at half load as compared to that at full load will be **one fourth**.
38. The path of the magnetic flux in transformer should be **high reluctance**
39. The desirable properties of transformer core material **are high permeability and low hysteresis.**
40. Core losses in a transformer **vary from 1% to 3% between no load and full load.**
41. The function of transformer oil in a transformer is **to provide insulation and cooling.**
42. Full load copper loss in a transformer is 1600W. At half load the loss will **be 400W.**

43. A transformer has full load copper loss of 800Wand core loss of 600W. Total losses at no load will be approximately **600W**
44. Buchholz relay is used on **Oil cooled transformer.**
45. Buchholz relay is generally not provided on transformer below **500KVA**
46. Operating time of Buchholz relay is of the order **of 0.1 second**
47. In a distribution transformer **normally core losses are less than copper losses**
48. A buchholz relay will operate in a transformer whenever there **is large internal fault.**
49. **Buchholz relay protection** is normally not provided on small distribution transformer
50. In a transformer**open circuit test is conducted on low voltage side and short circuit test on high voltage side.**
51. For a transformer operating at constant load current maximum efficiency will occurs at **Unity power factor.**
52. The function of breather in a transformer is **to arrest flow of moisture into the tank**
53. A good voltage regulation of a transformer means **output voltage fluctuation from no load to full load is least.**
54. A transformer can have zero voltage regulation at **leading power factor.**
55. The color of dry silica gel is **pale pink**
56. The color of moist silica gel is **blue**
57. The essential condition for parallel operating of two single phase transformer is that they should have the **same polarity.**
58. In transformer the resistance between the primary and secondary must be **infinite.**
59. The secondary of a current transformer is always short circuited under operating conditions because **it avoid core saturation and high voltage regulation**
60. The main advantage of an auto transformer over two windings transformer is that **only one winding is used as result there is saving in material**
61. Auto transformer is used **when the transformer ratio is small**
62. In an auto transformer effective saving on copper and core losses will occur when the transformer ratio **is near to 1**
63. An auto transformer has **only one winding**
64. **Percentage impedance, polarities and voltage rating** should same for parallel operation of the transformer

65. If the transformer core is made of copper then the **eddy current losses will be same**
66. If the ohmic resistance of windings of a transformer is zero then **the copper copper loss will be zero**
67. The efficiency of two identical transformers under load condition can be determined **by back to back test**
68. Three to three phase transformer connection possible for parallel operation is **delta-Y to delta-Y**
69. Three to three phase transformer connection nor feasible for parallel operation is **Y-delta to delta-delta**
70. When a Three to three phase transformer connection possible for parallel operation is delta-Y to delta-Y operates under no load condition the current **will lag the applied voltage by about 75**
71. If a transformer core is made of copper and coils are made up of steel wire then **copper losses in the windings will be more.**
72. **Friction loss** in a transformer is zero even at full load
73. In a step up transformer the emf per turns on primary windings is **the same as the emf per turns of winding on secondary windings**
74. 1 Tesla is the same as **1 weber/m^2**
75. As a general rule the KVA rating ratio of transformer operating in parallel should be within **3:1**
76. **Maximum value** of flux in involved in the emf equation of the transformer
77. Harmonic current in a transformer cause **increased I^2R losses and core losses and magnetic interference with protective relay**
78. **Core saturation** is most likely sources of harmonics in a transformer
79. In Scott connection the main transformer has center tap **on both primary and secondary windings.**
80. In Scott connections the teaser transformer operates on 0.8666 of its **rated voltage**
81. A tap changer is used on a transformer for **adjustments in secondary voltage**
82. Over currents in a transformer affects **insulation life, temperature rise and mechanical stress**
83. In a transformer the tapings are usually provided on **high voltage side**

84. A current transformer used the instruments like **ammeter, Wattmeter and Watt hour meter**
85. Voltage transformer of **0.1 class** of accuracy is used
86. **Three transformer each of the single phase type** sets will be costly
87. **Commutator** is not fitting on the transformer
88. The reactance of a transformer depends on the **leakage flux**
89. If the frequency of the supply voltage is double **eddy current loss** will increase
90. No load current in a transformer as a percentage of full load current is **1% to 3%**
91. In a transformer maximum voltage regulation occurs when the power factor of the load is l**agging**
92. The regulation of a good transformer should be near **1%**
93. In a step up transformer the **f2/f1** has value one
94. In a transformer minimum voltage regulation occurs when the power factor of the load is **leading**
95. Scott connections are used to **three phase to three phase and three phase to two phase transformation**
96. In Scott connections the neutral point divides the teaser winding in the ratio **1:2**
97. In a large capacity transformer 5% of the turns at the ends of high voltage winding are provided with extra insulation **to provide protection due to surges occurring during switching operations**
98. The permittivity of Bakelite is **approximately 4.4**
99. The permittivity of transformer oil is about **2.2**
100. Buchholz relay is used in **transformer protection**
101. Maximum regulation of a transformer occurs at **lagging power factor**
102. Impedance matching transformer are used for **measuring low voltages and low currents**
103. In a transformer on no load the input voltage **leads the magnetizing current by 90**
104. In a transformer the voltage induced in the secondary windings **lags the flux by 90**

105. The maximum load that a power transformer can carry is limited by its **voltage ratio**
106. The constant power losses of a transformer loss **are eddy current and hysteresis losses**
107. **Transformer size** can be reduced when the flux density in a transformer core is increased
108. When the transformer core is made up of core then the **eddy current loss** will be more
109. Porcelain bushings on transformer are normally not used beyond **11KV**
110. The secondary of a current transformer under operating condition is **short circuited to avoid core saturation and high voltage induction**
111. **Back to back** is used to determine the efficiency of two identical transformer at full load
112. The inductance of a transformer depends on **leakage flux**
113. **Horn gap** is used to prevent the damage of a transformer due to lighting and switching
114. The voltage regulation of a transformer can be zero when the power factor is **leading**
115. The value of useful flux least depends on **load**
116. In an **auto transforme**r the primary winding is same as the secondary winding
117. The characteristics of a voltage transformer are **voltage remain constant, current varies with load**
118. The magnetizing current of a transformer usually small because it had **small airgap**
119. In a dry type transformer accumulation of dust on the winding and core is likely to cause **reduction in heat dissipation**
120. **Delta primary, star secondary** of transformer will give the highest secondary voltage
121. In a transformer no load current **lags the applied voltage by somewhat less than 90**
122. A transformer has maximum efficiency when **core loss and copper loss 1**

123. Two transformers are connected in parallel and share loads in the ratio of their KVA ratings when their ohmic impedances **inverse ratio of their ratings**
124. Power input to a transformer at no load and rated voltage consists of **core loss**
125. A Scott connected transformer cannot be paralleled with a **Y-delta transformer**
126. Open circuit test on a transformer is done to determine the **core loss**
127. When 400Hz transformer is operated at 50Hz its KVA rating is **reduce to 1/8**

Chapter # 20 Synchronous Generator

1) In an alternator, voltage drops occur in armature resistance, leakage reactance and armature reaction.
2) The magnitude of various voltage drops that occur in an alternator, depends on load current.
3) In an alternator, at lagging power factor, the generated voltage per phase, as compared to that at unity power factor must be more than the terminal voltage
4) The power factor of an alternator depends on Load.
5) Which kind of rotor is most suitable for turbo alternators which are designed to run at high speed ? Non-salient pole type
6) Salient poles are generally used on low and medium speed prime movers.
7) The frequency of voltage generated in an alternator depends on number of poles and rotative speed.
8) The frequency of voltage generated by an alternator having 8 poles and rotating at 250 rpm is 16 2/3 Hz.
9) An alternator is generating power at 210 V per phase while running at 1500 rpm. If the need of the alternator drops to 1000 rpm, the generated voltage per phase will be 140 V.
10) A 10 pole AC generator rotates at 1200 rpm. The frequency of AC voltage in cycles per second will be 100
11) The number of electrical degrees passed through in one revolution of a six pole synchronous alternator is 1080
12) Fleming's left hand rule may be applied to an electric generator to find out direction of induced emf
13) If the input to the prime mover of an alternator is kept constant but the excitation is changed, then the reactive component of the output is changed
14) An alternator is said to be over excited when it is operating at lagging power factor
15) When an alternator is running on no load the power supplied by the prime mover is mainly consumed to meet all no load losses
16) As the speed of an alternator increases the frequency increases

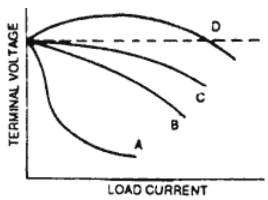
17) For an alternator when the power factor of the load is unity the armature flux will be cross-magnetising

18) The driving power from the prime mover driving the alternator is lost but the alternator remains connected to the supply network and the field supply also remains on. The alternator will behave as a synchronous motor and will rotate in the same direction

19) If the input of the prime mover of an alternator is kept constant but the excitation is changed, then the reactive component of the output is changed

20) For 50 Hz system the maximum speed of an alternator can be 3000 rpm.

21) Voltage characteristic of an alternator is shown in figure. Which curve represents the characteristics for leading power factor? D



22) In the above figure, the characteristic for unity power factor is represented by the curve maked – C

Questions 23 to 26 refer to the following data:

In a 50 kVA, star connected 440 V, 4-phase 50 Hz alternator, the effective armature resistance is 0.25 ohm per phase. The synchronous reactance is 3.2 ohm per phase and leakage reactance is 0.5 ohm per phase.

23) Full load output current at unity power factor will be- 65.6 A

24) Full load line voltage will be- 471 V

25) No load line voltage will be- 592V

26) Percentage regulation of the alternator is approximately-25%.

27) In order that two alternators be put in parallel, which of the following factors should be identical for both

(A) Voltage

(B) Frequency

(C) Phase sequence

28) When two alternators are running in parallel, their RKVA load share is changed by changing their excitation while their kW load share is changed by changing their driving torque
29) Two-alternators are running in parallel. If the driving force of both the alternators is changed, this will result in change is frequency
30) A three phase alternator has a phase sequence of RYB for its three output voltages. In case the field current is reversed, the phase sequence will become RYB
31) The armature reaction of an alternator influences generated voltage per phase
32) For the same power rating, a lower voltage alternator will be larger in size
33) An alternator is supplying 10A to an inductive load at 220 V, while running at 1000 rpm. Now if the speed of the alternator is reduced to 750 rpm but the field current remains unchanged, the load current will become 10 A
34) Dampers in a large generator increase stability
35) An alternator is rated for 75 kW at 0.8 power factor. It means that alternator can supply 75 kW at 0.8 power factor
36) The regulation of an alternator is the increase in terminal voltage when load is thrown off
37) A magnetization curve represents the relationship between exciting currents and terminal voltage
38) In an alternator if the armature reaction produces demagnetization of the main field, the power factor should be Zero, lagging load
39) In an alternator if the armature reaction produces magnetization of the main field the power factor should be Zero, lagging load
40) When an alternator is supplying unity power factor load, the armature reaction will produce demagnetization of the main field
41) An alternator has full load regulation of 4% when the power factor of the load is 0.8 lagging while alternator runs at 1500 rpm. The full load regulation of 1400 rpm for 0.8 pf lagging load will be 4 percent
42) The Potier's triangle separates the armature leakage reactance and armature reaction mmf.
43) In the Potier's triangle, the Potier’s reactance drop per phase is 22 volts per phase at 88 amperes per phase. The Potier's reactance per phase is 0.25

44) Two alternators are running in parallel. The excitation of one of the alternator is increased. The result will be wattless component will change.

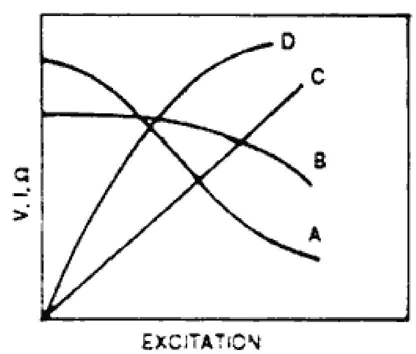
45) The power output of an alternators is 100 kW. In order that the tangent of pf angle may be 0.8 lagging, the KVAR rating must be -80 KVAR.

46) The power output of an alternator is 40 kW and KVAR component is - 25. What will be the value of tanφ (φ being the power factor angle) ? 0.625 leading

47) When short pitch coils of 160 are used in an alternator, which harmonic component will not be present in the output emf? ninth.

48) A 120 MW turbo alternator is supplying power to 80 MW load at p.f. lagging. Suddenly the steam supply to the turbine is cut off and the alternator remains connected to the supply network and the field supply also remains on. What will happen to the alternator? The alternator will continue to run as a synchronous motor rotating in the same direction

49) The figure shows the characteristics of an alternator. Which curve represents synchronous impedance? curve A



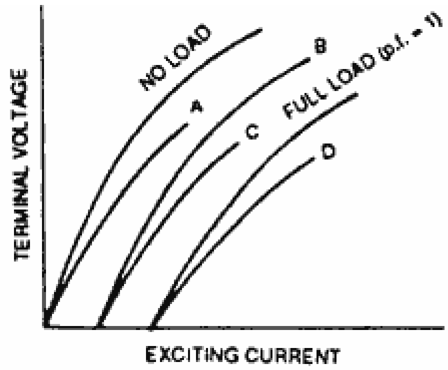
50) In the above figure (Figure of Question 49) which curve represents short circuit? curve C

51) In the above figure which curve represents open circuit voltage? curve D.

52) For a peripheral speed of 314 m/s, a 2 pole cylindrical machine will have maximum diameter of 200 cm

53) The rotor of the salient pole alternator has 24 poles. The number of cycles of emf in one revolution would be 12

54) Two alternators A and B are sharing an inductive load equally. If the excitation of alternator A is increased alternator B will deliver less current and alternator A will deliver more current
55) Desirable feature for the parallel operation of two alternators is both should have less of resistance as compared to synchronous reactance
56) Alternators used in aircraft systems usually have frequency of 400 Hz.
57) High frequency on aircraft alternators is selected in order to reduce the bulk.
58) A 20 pole ac generator rotates at 600 rpm. The periodic time of current in seconds per cycle is 0.01
59) What kind of rotor is most suitable for turbo alternators? non-salient pole type
60) The synchronizing power developed in one of the alternators, when two alternators are running in parallel, will load the same alternator in which it is developed and reduce its speed (A) True
61) If the input to the prime mover of an alternator is kept constant but the excitation is changed then the (reactive component of the output is changed
62) If two machines are running in synchronism and the voltage of one machine is suddenly increased synchronising torque will be produced to restore further synchronism.
63) In an alternator, at 0.8 lagging power factor, the generated voltage per phase is 240 V to give a rated terminated voltage ' V '. If the power factor of load increases to unity, the generated voltage per phase must be 225 V.
64) The advantage of salient poles in an alternator is adoptability to low and medium speed operation
65) Magnetisation curves for no load and full load unity power factor are shown in figure below. Which is the magnetisation curve for full load 0.8 power factor ?



(D) curve D.

66) At a particular instant a turbo alternator is generating 80 MW at 0.8 power factor lagging. Now if the steam supply valve to the steam turbine is further opened and the excitation is not changed the speed of the alternator will remain unchanged but it can meet more kW demand

67) Two alternators A and B are sharing a resistive load (p.f. = 1) equally. Now if the excitation of alternator A is increased alternator A will become lagging and alternator B will become leading

68) The advantage of providing damper winding in alternators is

(A) elimination of harmonic effects

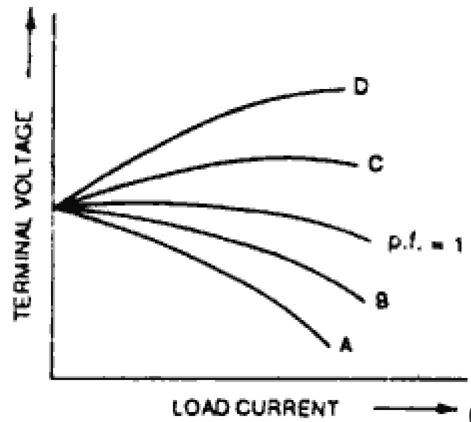
(B) provide a low resistance path for the currents due to unbalancing of voltage

(C) oscillations are provided when two alternators operate in parallel

(D) all of the above.

69) When two alternators are running in exactly synchronism, the synchronising power wil be (zero

70) Load characteristic curves for an alternator are shown. The curves are drawn for 0.8 pf lagging, 0.8 p.f. leading, 0.7 p.f. leading and 0.9 p.f. lagging. Which curve represents



the characteristics for 0.8 p.f. leading ? (C) curve C

71) Which curve represents the data for 0.8 p.f. lagging ? (A) curve A

72) Which curve represents the data for 0.9 p.f. lagging ? (B) curve B

73) The balanced short circuit current of a three phase alternator is 25 amperes at 1500 rpm. For the same field current, the balanced short current at 1400 rpm will be 20 A

74) A three phase alternator has a phase sequence of RYB for its three output voltages, for clockwise rotation. Now if the alternator is rotated anticlockwise, the phase sequence will be RBY

75) In a synchronous machine, if the field flux axis is ahead of the armature field axis, in the direction of rotation, the machine working as synchronous generator.

76) In synchronous alternator, which of the following coils will have emf closer to sine waveform? distributed winding in short pitch coils.

77) An alternator has rated field current of 4 A. The alternator develops 180 V while drawing a field current of 2 A at 750 rpm. If the field current is made 4 A at 750 rpm generated voltage could be 330 V.

78) The armature reaction of an alternator will be completely magnetizing in case the load power factor is zero loading.

79) Which of the following is not an integral part of synchronous generator system? distribution transformer

80) For turbo generators the range of excitation voltage is 100 to 800 V

81) In case of low speed hydrogenators, the short circuit ratio is usually 1.0 to 1.5.

82) The permissible duration for which a generator of rated frequency 50 Hz can run at 46 Hz is one second

83) The permissible duration in supply frequency is ± 2 %

84) The regulation of an alternator is likely to be negative in case of) leading power factor of the load.

85) A phase, 50 Hz, 6600 V, alternator is rated at 6600 kW at 0.8 power factor and a full load efficiency of 90%.

86) ---kVA is rating of the alternator is 7500 kVA

87) ---The current rating of the alternator is 6563 A

88) ---The input to the alternator is 6666 kW

89) --Which of the following method is likely to give the voltage regulation more than the actual value Synchronous reactance method

90) The effect of cross magnetization in an alternator field is to make the output non-sinusoidal

91) In order to reduce the harmonics in the emf generated in an alternator slots are skewed

(B) salient pole tips are chamfered

(C) winding is well distributed

(D) all of the above.

92) The maximum power in a synchronous machine is obtained when the load angle is 120°

93) The emf generated due to nth harmonic component of flux in an alternator will be less than the value of fundamental emf.

94) Synchronizing torque comes into operation under all of the following cases EXCEPT reduction in exciting current in one of the alternators.

95) Unbalanced 3-phase stator currents cause (A) double frequency currents in the rotor(B) healing of rotor(C) vibrations(D) all of the above.

96) In large generators protection provided against external faults is (A) biased differential protection

(B) sensitive earth fault protection

(C) inter-turn fault protection

(D) all of the above.

97) Pitch factor is the ratio of the emfs of short pitch coil to full pitch coil

98) In an alternator if the winding is short pitched by 50 electrical degrees, its pitch factor will be 0.866

99) The Potier's triangle separates armature leakage reactance and armature reaction mm

100) If a single phase alternator has 8 slots per pole uniformly speed, but the winding is arranged with the middle two left empty, the breadth coefficient will be 0.53

101) Two alternators are running in parallel. If the field of one of the alternator is adjusted, it will change its power factor

102) A generator is operating by itself supplying the system loads. The reactive power supplied by the generator will depend on the amount demanded by the load

103) Which of the following part plays important role in over speed protection of a generator ? Governor

104) Which type of protection is provided on a generator to protect against stator insulation failure Differential protection

105) Which relays comes into operation in the event of the failure of prime mover connected to ihe generator Reverse power relay

106) In alternators, the distribution factor is defined as the ratio of emfs of distributed winding to connected winding

107) One of the advantages of distributing the winding in alternator is to improve voltage waveform

108) In case of a uniformly distributed winding, the value of distribution factor is 0.995

109) The advantage of a short pitch winding is suppression of harmonics

110) Two alternators are connected in parallel. Their kVA and kW load share can be changed by changing respectively their excitation and driving torque

111) In case of alternators, the dark and bright lamp method is used for synchronizing

112) The advantage of using short pitched windings in an alternator is that it reduces the total voltage around the armature coils

113) For the same power rating, an alternator operating at lower voltage will be larger in size

114) Which of the following is the common synchronous speed in rpm between 60 Hz and 50 Hz alternators? 600

115) All of the following losses for a synchronous machine are fixed EXCEPT Copper loss

116) Salient pole type rotors as compared to cylindrical pole type are larger in diameter and smaller in axial length

117) In a synchronous machine, the field flux axis is ahead of the armature field axis in the direction of rotation, the machine is working as synchronous alternator.

118) Which of the following is not a common synchronous speed in rpm between a 50 Hz and 25 Hz alternator ? 200

119) The effective voltage in one phase of an alternator having 240 turns per phase, frequency of 60 Hz and flux per pole of 2.08 x 10^6 lines will be 1330 V

120) The maximum current that can be supplied by an alternator depends on strength of the magnetic field

121) The windings for an alternator are

I. 36 slots, four poles, span 1 to 8

II. 72 slots, six poles, span 1 to 10

III. 96 slots, six poles, span 1 to 12.

The windings having pitch factors of more than 0.9 are

(A) I and II only

Questions 122 to 124 refer to data given below:

A 500 kVA ,2300-volt three phase star connected alternator has a full load armature-resistance drop per phase of 50 volts and a combined armature reactance plus armature-reaction drop of 500 volts per phase

122) The percent regulation of the alternator at unity power factor is) 10.5

123) The percent regulation of the alternator at 0.866 power factor lagging is) 26.3

124) The percent regulation of the alternator at 0.8 power factor leading is - 13.2.

125) The imaginary or fictitious part of synchronous reactance takes care of armature reaction

126) In an alternator, the use of short pitch coils of 160° will indicate the absence of) ninth harmonic

127) When a generator designed for operation at 60 Hz is operated at 50 Hz operating voltage must be derated to (50/60) of its original value

128) Overheating of generator's winding reduces life of the machine

129) Rotor shaft of 500 MW alternator is supported in journal bearings.

130) The voltage of field system for an alternator is usually less than 200 V

131) Maximum electric power output of a synchronous generator is V_tE_f / X_s

132) The electrical angle between the field axis and axis of armature reaction of a loaded synchronous generator with armature current lagging behind the excitation emf by ψ is ψ + 90

133) Two synchronous generators G_1 and G_2 are equally sharing the KVAR of the load while operating in parallel. Keeping the terminal voltage fixed in order to shift part of the KVAR load from G_2 to G_1 The field current of G_1 is raised and of G_2 lowered

134) A synchronous generator is operating with excitation adjusted for unity power factor current at constant load. When on increasing the excitation the power factor will lag

135) On changing the speed of an alternator from 4000 rpm to 2000 rpm, the generated emf phase will become ½

136) Zero power factor method of an alternator is used to find its voltage regulation.

137) The power factor of an alternator is obtained from its load

138) For parallel operation, alternators must have same voltage rating

139) For alternation having fractional pitch of 5/6 the coil span is 150°

140) Fractional pitch to eliminate 7th harmonic from alternator emf is 6/7

141) Consider the following statements about a three-phase synchronous generator synchronized to an infinite bus when its mechanical input is increased gradually with field current held constant:

1. The power factor of the current supplied becomes more lagging.

2. The power factor of the current supplied improves.

3. The power factor remains unity.

4. The load angle is increased.

Of these statements

(B) 2 alone is correct

142) A 3-phase synchronous generator, with its armature resistance and the leakage reactance being neglected, is synchronized to an infinite bus and its field excitation is kept constant thereafter. Now the machine is loaded by Supplying mechanical input to the shaft so that the load-angle δ reaches a value of 60° Under this condition, the operating power-factor would be 0.866 lagging

143) A round rotor synchronous generator has a leakage reactance of 10%, armature reaction reactance of 90% and negligible armature resistance. With the machine initially running at rated speed and terminal voltage of 1.0 p.u., a 3-phase short-circuit is applied. The sustained armature current will be 1.11 p.u

144) Following a sudden short-circuit at the terminals of a 3-phase unloaded synchronous generator, the initial effect of the pole-face damper windings, is to allow only partial linkage of the armature flux with the main field winding

145) In a synchronous generator operating at zero pf lagging, the effect of armature reaction is demagnetizing

146) which of the following limit the reactive power output of a synchronous generator ?

1. Armature current

2. Field current

3. Load angle

4. Prime mover input.

Select the correct answer using the codes given below:

(B) 2 and 3

147) The steady-state stability limit of a synchronous generator can be increased by an increase in the excitation of the machine

Synchronous Generator: Fill in the blanks with appropriate words:

1. When a turbine drives an alternator it is termed as Turbo ***alternator***

2. A two pole alternator running at 1500 rpm will generate emf at 25 Hz.

3. The stator winding of a three poles alternator is always Star connected.

4. The rotor of an alternator has Two slip rings for DC supply.

5. In an alternator, with the fall in leading power factor, its voltage. ***RISES*** from no load to full load.

6. In large alternators damper winding is used to improve Stability

7. The rating of an alternator is expressed in terms of ***KVA or MVA***

8. A six pole alternator running at 1200 rpm will generate voltage at the frequency of ***60*** Hz.

9. In case of an alternator having negative regulation, the terminal voltage will rise kW output of the alternators ***Increases***

10. A synchronous generator's ability to produce electric power is primarily limited by ***Heating within the machine***

11. When a generator is connected to infinite bus-bars, its ***Frequency*** and ***Voltage*** are fixed.

12. A generator has two different windings, ***Armature field*** and winding.

13. The maximum allowable heating in the armature winding sets the maximum ***KVA*** allowable from the machine.

14. A generator with a service factor of 1.15 can actually be operated at 115 percent of the rated load I***ndefinitely*** without harm.

15. High capacity generators are usually ***Hydrgen*** cooled.

16. In a synchronous generator, the ***Armature*** is always a stationary member, and the ***Field structure*** moving member.

17. In a fractional-pitch winding the coil span is less than***180*** electrical degrees.

18. Salient-pole synchronous generators normally operate at ***Lower*** speeds.

19. Fields of synchronous generators have high Inductance

inductance

20. Aircraft alternators generate High frequency voltage.

high

21. The synchronous reaction is made up of .... and .... reactances.

magnetization

22. In order to get sinusoidal wave output the airgap under the salient pole machine should be proportional to ....

1 / cosθ

23. For unity power factor load, the effect of armature reaction in alternator will be ....

cross magnetising

24. In alternators .... is stationary.

armature

25. The .... winding tends to maintain balanced 3φ voltages under unbalanced load conditions.

damper

26. Armature windings in alternators are .... from those used in DC machines.

different

27. In .... connections, third harmonic, components are additive round the mesh.

delta connection

28. In alternators .... of the load has a considerable effect on armature reaction.

power factor

29. In case of leading load p.f. regulation is ....

negative

30. For proper synchronization of alternator, speed of incoming machine must be such that its frequency .... bus-bar frequency.

equal

31. Infinite bus-bars are constant .... and constant .... bus-bars.

frequency, voltage

32. Synchronous generators have a .... voltage regulation.

large

33. Synchronous .... of a synchronous generator is not constant over entire operating range.

impedance

34. A synchronous generator could be build by replacing the ***Commutator*** in a DC machine by slip rings.

commutator

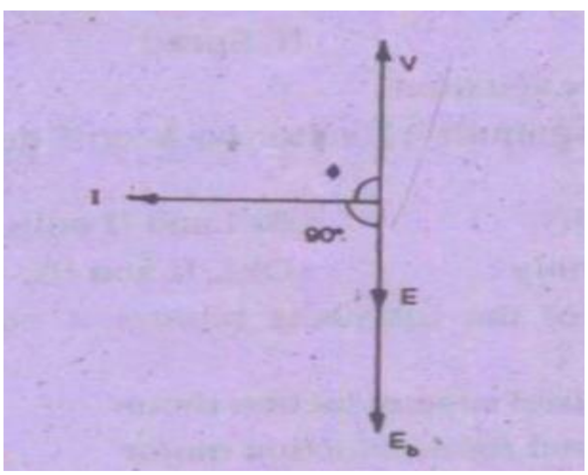
35. The factor by which the EMF of a distributed winding must be multiplied to give the total generated EMF is called ***Distribution factor*** for the winding.

distribution factor

Chapter # 21 Synchronous Motors

1. Synchronous motor can operate at **Lagging, leading and unity power factor only**
2. An unexcited single-phase synchronous motor is **reluctance motor**
3. The maximum power developed in the synchronous motor will depend on **rotor excitation supply voltage and maximum value of coupling angle**
4. In case the field of a synchronous motor is under excited, the power factor will be **lagging**
5. A synchronous motor is switched on to supply with its field windings shorted on themselves. It will **start as an induction motor then run as synchronous motor**
6. When the excitation of an unloaded salient pole synchronous motor gets disconnected **the motor will stop**
7. The damping winding in a synchronous motor is generally used **to prevent hunting and provide the starting torque**
8. The back emf set up in the stator of a synchronous motor will depend on **rotor excitation only**
9. A synchronous motor is a useful industrial machine on account of which of the following reasons
    - **It improves the power factor of complete installation**
    - **Its speed is constant at all loads, provided mains frequency remains constant**
    - **It can always be adjusted to operate at unity power factor for optimum efficiency and economy.**
10. Which of the following is an unexcited single-phase synchronous motor **reluctance motor**
11. An over excited synchronous motor always draws current at **leading power factor**
12. With the increase in the excitation current of synchronous motor the power factor of the motor will **improve**
13. The armature current of a synchronous motor has large values for **both low and high excitation**
14. A synchronous motor is switched on to supply with its field winding shorted on themselves. It will **start as induction motor and then run as a synchronous motor**
15. If the field of a synchronous motor is under excited, the power factor will be **lagging**

16. When the excitation of an unloaded salient pole synchronous motor suddenly gets disconnected **the motor will stop**
17. The armature current of a synchronous motor has large values for **both low and high excitation**
18. What is the ratio of no load speed to full load speed of a 200 kVA, 12 pole, 2200 V, 3 phase 60 Hz synchronous motor **1** (reason: the ratio of no load speed to full load speed is always 1.00, since 3 phase synchronous motor do not have slip.)
19. If a synchronous motor drops too far behind the power it takes from the supply also increases too much, and the armature tries to get accelerated, until it is in the correct position. Sometimes, some motor overshoots the marks and then acceleration-retardation continues. This phenomenon is known as **hunting**
20. The maximum value of torque that a synchronous motor can develop without losing its synchronism, is known as **synchronizing torque**
21. In a synchronous motor if the back emf generated in the armature at no load is approximately equal to applied voltage then **excitation is said to be 100%**
22. A synchronous motor is connected to supply voltage V and drawing current I, Resultant of V and back emf E_b is represented by E in the below figure

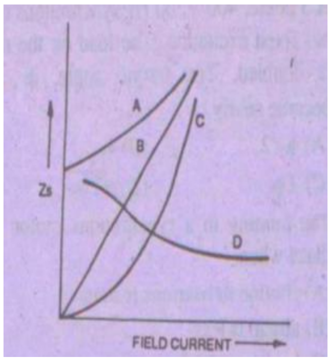


It is concluded that the resultant V and E_b is consumed by synchronous impedance

23. A 3 phase, 400 V, 50 Hz salient pole synchronous motor is fed from an infinite bus and is running at no load, now if the field current of the motor is reduced to zero **the motor will run at synchronous speed**

24. The purpose of embedding the damper winding in the pole face is to **eliminate hunting and provide adequate starting torque**
25. Please see no. 14
26. In case of a synchronous motor, the magnitude of stator back emf depends on DC **excitation**
27. Which of the following is non-self-starting **Synchronous motor**
28. The back emf in the stator of a synchronous motor depends on **rotor excitation**
29. Which motor can conveniently operate on lagging as well as leading power factor **Synchronous motor**
30. A synchronous motor working on leading power factor and not driving any machancial, is known **Synchronous condenser**
31. The constant speed of synchronous motor can be changed to new fixed value by **changing the frequency of supply**
32. A 3 phase 400 V 50 Hz synchronous motor is operating at zero power factor lagging with respect to the excitation voltage. The armature reaction mmf produced by the armature current will be **magnetizing**
33. In a synchronous motor, the torque angle is **a angle between the rotating stator flux and rotor poles**
34. A 3 phase 400 V, 50 Hz, 4 pole synchronous motor has a load angle of 10^o electrical. The equivalent mechanical degrees will be **5 degrees**
35. A 3 phase. 400 V, 50 Hz synchronous motor has fixed excitation. The load on the motor is doubled, the torque angle φ , will nearly become equal to $2\varphi_r$
36. The hunting in synchronous motor takes place when **load is variable**
37. V curves for synchronous motor represent relation between **armature current and field current**
38. The breakdown of torque of a synchronous motor varies as **applied voltage**
39. Hunting in synchronous motor cannot be due to **winding friction**
40. Please see no. 16
41. Which synchronous motor will be smallest in size **5 HP 375 rpm (**small HP and rpm**)**

42. A synchronous machine has its field winding on the stator and armature winding on the rotor, under steady running conditions, the air gap filed **remains stationary with respect to stator**
43. If the field of a synchronous motor is under-excited, the power factor will be **lagging**
44. The name plate of a induction motor reads 3 phase, 400 V, 50 Hz, 0.8 Hz of lagging, 1440 rpm. On similar lines the name plate of a synchronous motor should read **3 phase, 400 V, 50 Hz, 0.8 Hz of leading, 1500 rpm**
45. In which coil the emf generated will be more, for given flux distribution and number of turns **full pitch coil**
46. In synchronous motor which loss does not vary with load **windage losses**
47. In a 3 phase, 400 V, 50 Hz, salient pole synchronous motor, the maximum power is obtained when the load angle is **less than 90 degree**
48. A high starting torque synchronous motor has **simplex rotor, phase wound damper and five slip rings**
49. In a 3-phase synchronous motor the magnitude of filed flux **remains constant at all loads**
50. The parameter connected with the operation of synchronous motor are speed, power factor and armature current. When the excitation of the motor is varied, **power factor and armature current varied**
51. A 3 phase, 400 V, 50 Hz salient pole synchronous motor is running on no load. If there is a break in the excitation winding of the motor **the motor will stop**
52. In the below figure, variation of synchronous reactance for synchronous motor with field current is represented by **Curve D**

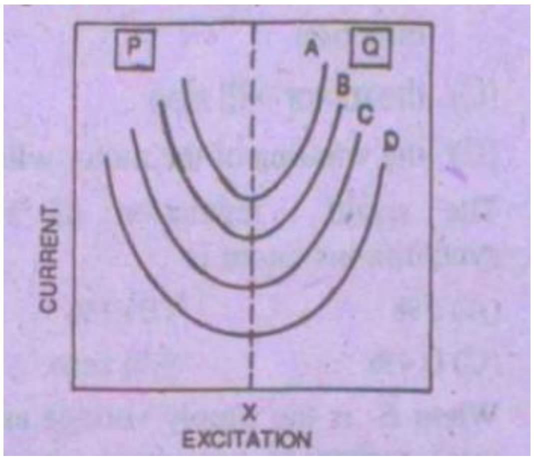


53. A synchronous motor is said to be floating when it operates **on no load and without losses**

54. The negative phase sequence in a three-phase synchronous motor exist when **unbalanced voltage is supplied**
55. The field winding of a synchronous motor is shorted. A variable voltage is now supplied to the stator. The result will be **motor will rotate at a speed which is less than the synchronous speed**
56. In a 3-phase synchronous motor, the poles **lead** φ_r
57. A 3-phase synchronous motor is running clockwise. In case the direction of its field current is reversed **the motor will continue to run in the same direction**
58. The speed regulation of a 3-phase synchronous motor is **zero**
59. When E is supplied voltage and R is the rotor resistance per phase, the mechanical power developed by synchronous motor per phase is given by $\mathbf{V^2 / 4R}$
60. In a synchronous motor, the synchronizing power comes into action when **rotor speed is either less or more than synchronous speed**
61. The size of synchronous motor decreases with the increase in **flux density**
62. The flux density used in synchronous motor is around **0.5 to 0.6** $\mathbf{wb/m^2}$
63. In a synchronous motor if the saturation is neglected, then the short circuit ration (SCR) will be related to synchronous reactance (xd) as **SCR = 1 / xd**
64. In synchronous motor out of the following losses which one will have the highest proportion **iron losses**
65. Which of the following losses is not dissipated by the stator core surface in a synchronous motor **windage losses**
66. The speed of synchronous motor **always remains constant**
67. Which of the following devices can be used as a phase advance **synchronous motor working at leading power factor**
68. When synchronous motor is connected to infinite bus, while operating on leading power factor **the excitation voltage will be more than the supply voltage**
69. In a synchronous motor **total number of rotor slots is less than the total number of stator slots**
70. In a synchronous motor during hunting if the rotor speed becomes more than the synchronous speed **dumpe bars develop induction generator torque**

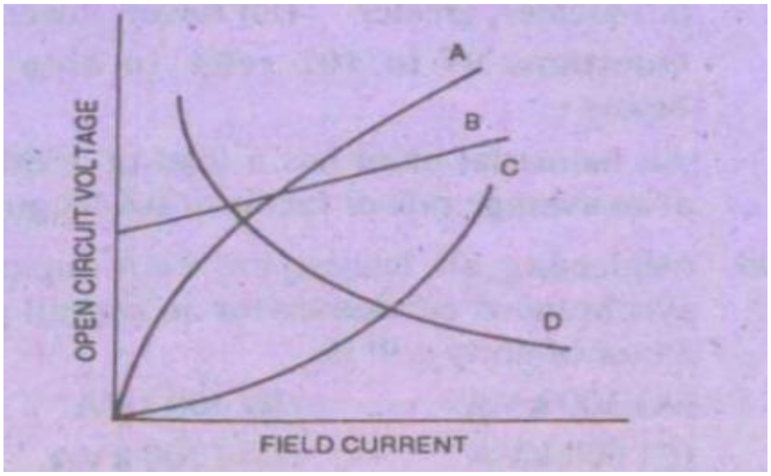
71. If a synchronous motor fails to pull into synchronism after applying dc field current the probable cause may be **low field current**
72. In case of 3 phase synchronous motor, maximum speed variation is **zero**
73. The synchronous motors are not self-starting because **the direction of instantaneous torque on the rotor reverse after half cycle**

For Question no. 74, 75, and 76 consider below diagram



74. In the above figure curve for leading power factors are **on the right of line XY**
75. In the curves represent characteristics for 0, 10, 20 and 30 kW, not necessarily in that order, then curve for 0 kW is expected to be **D**
76. The curve for 20 kW is expected to be **A**
77. In a synchronous motor hunting can be minimised **by using dampers, flywheel and by designing the motor for adequate synchronizing power**
78. A 3 phase 400 V, 50 Hz synchronous motor is working at 50 percent load. In case an increase in the field current of the motor causes a reduction in the armature current, it can be concluded that **the motor is absorbing reactive power to the mains**
79. Inverted V-curves for a synchronous motor shows **variation of power factor with dc field current when load on the motor remains constant.**
80. The armature current of the synchronous motor has large values for **both low and high excitation**
81. In which range the cost of a synchronous motor can be comparable to the cost of a induction motor **High HP low speed**

82. Insulation resistance test on synchronous motor can be conducted to measure **stator winding to earthed frame, rotor winding to earthed shaft and phase to phase winding resistance**
83. Which of the following represent open circuit characteristics of a synchronous motor?



Curve A

84. During short circuit test which of the following is short circuited **armature terminals**
85. The duration of sudden short circuit test on a synchronous motor is usually **about one second**
86. The maximum torque which a synchronous motor will develop at rest for any angular positions of the rotor at rated stator supply voltage and frequency is known as **locked rotor torque**
87. The maximum constant load torque under which a synchronous motor will pull into synchronism at rated rotor supply voltage and frequency is known as **pull in torque**
88. The maximum sustained torque which a synchronous motor will develop at synchronous speed for 1 mm with rated frequency and rated field current is known as **pull out torque**
89. The total steady state to drive synchronous motor and the load at synchronous speed is known as **synchronous torque**
90. The space angle between the axis of the stator revolving magnetic field and the rotor pole axis both locked and running at synchronous speed is known as **power angle**
91. In synchronous machine in case the axis of field flux is in line with the armature flux, then **the machine is said to be floating**

92. If other factors remains constant, the speed of a synchronous motor in its operating (and load) range is correctly described by **the speed depends on the frequency of the supply voltage and the number of its poles**
93. The induced emf in a synchronous motor working on leading pf will be **more than the supply voltage.**
94. A synchronous machine with low value of short circuit ratio has **low stability limit**
95. While starting a synchronous motor by induction motor action, very high emf is induced in the insulation of the field winding and of the slip rings. The insulation damga can be prevented by **short circuit the field winding by field discharge resistance or splitting the field winding into several sections**
96. Synchronous motors are generally of **salient pole type machines**
97. In which of the following motor the stator and rotor of magnetic fields rotate at the same speed **synchronous motor**
98. Higher the applied voltage **greater** will be the stator flux and **greater** will be the pull in torque

Consider the below data for Q 99 to 101

An industrial plant had a load of 1500 kVA at an average power factor of 0.6 lagging.

99. Neglecting all losses, the kVA input to a synchronous condenser for an overall power factor of unity will be **1200kVA**
100. A 750 kVA synchronous condenser is used to correct the lagging power factor of the plant. The total kVA of the plant is **10006**
101. The overall power factor is **0.895 lagging**
102. As the load is applied on a synchronous motor its speed does not fall. The load is now supplied by rotor **taking new angular position slightly back of its no load position.**
103. The maximum power developed in synchronous motor depends on all **supply voltage, rotor excitation and maximum value of coupling angle and <u>does not depend upon direction of rotation</u>**
104. In a synchronous motor on a fixed excitation when the load is doubled the torque angle ψ_r will be **$2\psi_r$**
105. In a synchronous motor the armature current has the highest value when excitation is **high and low**

106. For a synchronous motor the ratio of starting torque / running torque is **0**

107. Synchronous motors for power factor correction operate at **no load and greatly over-excited fields**

108. The construction of synchronous motor resembles which of the following machines **DC shunt generator**

109. The construction of synchronous motor resembles which of the following machines **an alternator**

110. In a synchronous motor hunting may be due to variation in **load, supply voltage, frequency <u>but not due to winding friction</u>**

111. A synchronous motor is switched on to supply with its field winding short circuited the motor will **start as induction motor and run as synchronous motor**

112. In synchronous motor at no load the armature current is **leading the applied voltage by 90^{o}**

113. In a synchronous motor during hunting when the rotor speed exceeds the synchronous speed **damper bars develop induction generator torque**

114. For a synchronous motor when V is the supply voltage the breakdown torque will be proportional to **V^2**

115. When the field winding of an unloaded salient pole synchronous motor is open circuited the motor will **stop**

116. In case one of the 3 phase of synchronous motor is short circuited the motor wil **get overheated**

117. The fact that a synchronous motor with salient pole will operate even if the field current is reduced to zero can be explained by **magnetization of rotor poles by stator magnetic field**

118. The negative phase sequence in a 3-phase synchronous motor exist when the motor is **supplied with unbalanced voltage**

119. The regulation of synchronous motor is **0%**

120. In a synchronous motor the angle between the rotor poles and stator poles is known as **torque angle**

121. In a synchronous motor, under running conditions the angle between the induced voltage and supply voltage will be **more than 180^0**

122. The rotor of a synchronous motor can only run at synchronous speed of the rotor magnetic field due to **interlocking action between stator and rotor fields**
123. An inverted V curve of synchronous motor is the variation of **field current and power factor at constant load**
124. Damper windings are provided on **poles faces**
125. Hunting of synchronous motor may be due to **pulsation of power supply, reciprocating type of load and pulsating torque of driven equipment**
126. The V curves of a synchronous motor show relationship between **dc field current and ac armature current**
127. In a synchronous motor with field under excited the power factor will be **lagging**
128. In a synchronous motor maximum value of torque angle is **90^o electrical**
129. In synchronous motor net armature voltage is **vector difference** of E_b and V
130. Increasing load in a normally excited synchronous motor the power factor **becomes increasing lagging**
131. Synchronous motor speed is controlled by varying **supply voltage and frequency both**
132. Maximum electrical power input of synchronous motor is **V_tE_f / X_z**
133. In a synchronous motor armature reaction at rated voltage and zero power factor leading is **demagnetizing**
134. A synchronous motor is operating with excitation adjusted for unity power factor current at constant load, on increasing the excitation power factor **will lead**
135. A synchronous motor is operated from a bus voltage of 1.0 pu at 1.0 pu pf leading current. The synchronous reactance is 0.5 p.u. The excitation emf of the motor is **1.5**
136. A 3-phase synchronous motor connected to an infinite bus is operating at half full load with normal excitation. When the load on the synchronous motor is suddenly increased **its speed will remain unchanged**
137. A synchronous motor operating at rated voltage draw 1.0 pu current at 1.0 pu power factor. The machine parameters are: synchronous reactance 1.0 pu, armature resistance negligible. Apart from supplying this rated power, if the motor has to supply ad additional leading reactive power of 0.8 pu then the field current has to be increased by **46%**

Chapter # 22 Induction Motors

1) The difference between synchronous speed and actual speed of induction motor is known as **Slip**.
2) In an induction motor, if P is the power delivered to a rotor and s is the slip, then the power lost in rotor as copper loss, will be **sP.**
3) Copper loss in rotor of an induction motor is **appears as heat.**
4) Slip rings for induction motors are made of **Phosphor Bronze.**
5) For an induction motor, the power factor on short circuit can be determined by **Blocked Rotor Test.**
6) As the load on an induction motor increases, **its power factor goes on increasing up to full load then it falls again.**
7) The phenomenon of crawling occurs in induction motors due to **Harmonics developed in the motor.**
8) Starting torque of an induction motor is proportional to $(\textbf{Supply Voltage})^2$
9) The data required for drawing complete circle diagram of induction motor is **No Load Test, Blocked Rotor test and State Resistance test Data.**
10) A 3-phase slip ring induction motor has **wound rotor.**
11) The slip in actual induction motor is generally **3% to 5%.**
12) The maximum speed of an induction motor cannot be **3000rpm.**
13) In a squirrel cage induction motor, the starting current is **5 to 7 times the rated current.**
14) In a squirrel cage induction motor, the rotor slots are usually given a slight skew in order to **reduce the magnetic hum and locking tendency of the rotor.**
15) When 'N1' is the synchronous speed, and 'N2' is the actual speed of rotor, the slip is given by $(\mathbf{1} - \frac{N2}{N1})$
16) When 'f' is the supply frequency, and 's' is the slip, the frequency of rotor current is given by **f.s**
17) When a motor is switched on, the rotor frequency **is same as supply frequency.**
18) In an induction motor the rotor reactance per phase is proportional to **slip.**
19) A 7.5HP, 3 Phase, 400V, induction motor will draw a full load current of **11A.**
20) An induction motor is **Self-starting with small torque as compared to rated torque.**

21) The power output of an induction motor will be minimum when **the equivalent resistance is equal to the stand leakage impedance of the motor.**
22) The 'injected e.m.f' in the rotor of induction motor **must have same frequency as the slip frequency.**
23) The running speed of a three-phase induction motor is **synchronous speed * (1-slip).**
24) Commonly used ac motor for industrial applications is **3-phaseinduction motor.**
25) Abrasive, dust and dirt is best removed from an induction motor by **Vacuum suction.**
26) When the rotor of an induction motor is standstill, the value of slip is **1.0**
27) In a squirrel cage induction motor, **rotor induced e.m.f at standstill varies as stator flux.**
28) A wound rotor induction motor can be distinguished from squirrel cage induction motor **by presence of slip rings.**
29) Motors for fans and pumps are selected in the rpm range **1440 to 2880.**
30) The class of insulation generally not provided on electric motor is **Class F.**
31) An induction motor is said to be crawling when **it runs at 10 to 15 percent of rated speed.**
32) Direct on-line starting current as compared with star delta starting current is approximately **3 times.**
33) The efficiency of induction motor is expected to be in the range **80 to 90 percent.**
34) The value of flux density in the air gap is usually in the range of **0.35 to 0.6 Wb/m2**
35) The speed load characteristics of an induction motor resembles which of the following motor **DC Shunt Motor.**
36) In an induction motor, if the flux density of rotor is reduced to half of its normal value, the torque will be **reduced to half.**
37) Negative sequence currents are set up in an induction motor when **unbalanced 3-phase supply is given.**
38) Unbalanced 3-phasevoltage supply to an induction motor results in excessive heating of **rotor.**
39) The torque of a three-phase induction motor is proportional to **square of applied voltage.**
40) Which of the following will improve in case air gap length of a three-phase induction motor is reduced **power factor.**
41) Which of the following is likely to be the full load power factor of a three-phase induction motor? **0.8 lagging.**
42) No load power factor of a three-phase induction motor is expected to be closer to **0.2 Lagging.**

43) Full load current of an induction motor is 20A. The no load current is expected to be **6A to 10A.**
44) In terms of slip S, the ratio (Rotor Copper Loss / Rotor Output) = **(S / (1-S))**
45) Which of the following methods can be used for the speed control of an induction motor? **Pole Changing, Change of frequency and Cascade control.**
46) In case the supply voltage and frequency of a 3-phase induction motor are reduced to half, **the maximum torque will remain unchanged.**
47) In order to run an induction motor on synchronous speed, **e.m.f must be injected in the rotor in phase with rotor e.m.f.**
48) The stator of 5 H.P induction motor is provided with **semi-closed slots with parallel teeth.**
49) For a 60HP motor, which type of rotor will be preferred? **Wound rotor**
50) Two slip ring induction motors having number of poles as P1 and P2 respectively are connected in cascade. If the supply frequency is f, the speed of the main motor will be $\frac{120f}{P1+P2}$
51) A 3-phase induction motor is running on balanced supply. Suddenly one phase fuse blows off and the motor continues to operate. Such an operation of motor is known as **single phasing.**
52) If a squirrel cage induction motors runs too hot, the probable reason could be **Uneven Air gap, low voltage, clogged ventilating ducts.**
53) If a squirrel cage motor fails to start which of the following could not be the reason for the same? **Uneven air gap.**
54) If a 3-phasesquirrel cage motor runs slow, which could not be the reason for the same? **High frequency.**
55) Jogging of an induction motor is **energizing a motor once or repeatedly to obtain small movements for mechanism.**
56) Under which method of starting an induction motor is expected to take largest starting current **direct On-Line starting.**
57) An induction motor will develop maximum torque when the phase difference between stator and rotor current is **60 Degree Electrical.**
58) The condition for maximum torque of the rotor of an induction motor is **slip should be such that rotor reactance per phase is equal to resistance per phase.**
59) As the load on induction motor goes on increasing **power factor goes on increasing up to rated load and then it starts falling.**

60) Which motor has the highest power to weight ratio? **Universal motor**
61) In terms of slip S, the ratio (Rotor Copper Loss / Rotor Input) **= S**
62) If the air gap of an induction motor is increased, **more ampere turns will be needed to produce same flux density in the air gap.**
63) In the rheostatic speed control method for induction motors, as the speed increases, **torque decreases.**
64) As the load on a squirrel cage induction motor is increased, **slip increases.**
65) Which of the following could not be the value of power factor of an induction motor under no load conditions **0.2 lagging.**
66) A 3-phaseinduction motor while running on 25% of rated load, has one of its fuses removed. The line current **in two phases will increase to compensate for the dead phase.**
67) In a 3-phaseinduction motor, iron loss **in rotor is negligible as compared to that in stator.**
68) When a 3-phaseinduction motor is subjected to blocked rotor test, the power factor of the full load short circuit current as compared to that at no load is **high.**
69) For identical ratings, which of the following machines takes more lagging current? **Single phase Induction motor.**
70) An induction motor operates at maximum power factor when operating on **Full load.**
71) A three-phase induction motor takes A amperes on full load at a power factor cosθ the component responsible for producing magnetism is **Asinθ.**
72) The direction of rotation of a 3-phaseinduction motor can be reversed by **interchanging any two phases.**
73) Two induction motors A and B have efficiencies of 80% and 90% respectively. It can be concluded that **Motor A will be smaller in size as compared to motor B.**
74) If a 3-phaseinduction motor needs frequent starting and operation in forward and reverse directions, which type of starter will be preferred? **Direct Online.**
75) A wound rotor induction motor is usually not selected when **cost is the main consideration.**
76) A squirrel cage induction motor is not selected when **higher starting torque is the main consideration.**
77) The starting torque of a three-phase induction motor can be increased by **increasing the rotor resistance.**

78) The essential condition for the injected e.m.f in the rotor of induction motor is, **it should have the same frequency as the main supply voltage frequency.**
79) If two machines are running in synchronism and the voltage of one machine is suddenly increased, **synchronizing torque will be produced to restore further synchronism.**
80) An induction motor when started on load, does not accelerate up to full speed but runs at $1/7^{th}$ normal full speed, the motor is said to be **crawling.**
81) Which of the following features of induction motor helps in preventing cogging of motor **skewed slots.**
82) If the slip of the rotor of an induction motor is halved, the value of rotor reactance **doubled.**
83) In terms of slip S, the ratio (Rotor Output / Rotor Input) = **(1 - S)**
84) In a slip ring induction motor, resistance is connected in rotor phases **to limit starting current and increase starting torque.**
85) In case of slip ring induction motors, the starting torque can be increased **by adding external resistance to rotor.**
86) In an induction motor, if the relative speed between the rotating flux of the stator and the rotor is zero, the motor **will not run.**
87) In cogging, the motor **refuses to start at No load.**
88) In a double cage induction motor the under cage has **Low R and high X.**
89) If a squirrel cage induction motor runs hot the possible cause could be **overload, low supply frequency and uneven air gap.**
90) If a squirrel cage induction motor runs slow, the probable cause could be **open stator coils, Low voltage, one phase Open.**
91) If there is an open circuit in the rotor of a squirrel cage induction motor, **motor will not start.**
92) Which one of the following tests can be used to determine the transformation ratio of an induction motor **Short Circuit Test.**
93) An induction motor will run at synchronous speed if it is run **with injected e.m.f.**
94) In case the air gap in an induction motor is increased, the **magnetizing current of the rotor will decrease.**
95) The number of slip rings on a squirrel cage induction motor is **none.**
96) In case of a three-phase induction motor, the resultant flux **remains constant.**

97) When the supply to an induction motor is switched on, in the beginning the induced e.m.f in the rotor will be **maximum.**
98) A slip ring induction motor is preferred to a squirrel cage induction motor when **high starting current is desired.**
99) In induction motor, the rotor slots are skewed to reduce **magnetizing current.**
100) In a 3-phaseinduction motor which of the following are the symptoms of rotor open circuit, **reduced starting torque and slowing down of rotor under load.**
101) For an induction motor the ratio of direct on line starting current to full load current is in the range **4 to 9.**
102) A three-phase delta connected induction motor is continued to run under single phasing. It is likely to result in **burning of one phase winding.**
103) Two of the power supply terminals to a 3-phaseinduction motor are inter-changed during the maintenance. The motor will **continue to work normally but in the reverse direction.**
104) Among Various method for starting a 3-phaseinduction motor, which method will require six stator terminals? **Star-Delta**
105) Synchronous wattage of induction motor means **Rotor input in watts.**
106) Induction motors provided with open slots have **more breakdown torque.**
107) If an induction motor hums during starting up, the probable cause could be **unequal phase resistance, open circuit and inter-turn short circuit on rotor.**
108) The slip of a slip ring induction motor can be changed by **inserting resistance in rotor circuit, cascade connection and injecting e.m.f in the rotor circuit.**
109) A charge motor has three windings **two windings in rotor and one winding in stator.**
110) Which motor will not be suitable for constant speed variable load operation? **Repulsion Type**
111) Cogging in induction motor occurs when **No. of stator teeth – No. of rotor teeth = 0**
112) Which of the following methods of speed control is not affected through stator side? **Change of rotor resistance.**
113) The possible number of different speeds that can be obtained by connecting two motors in cascade is **4.**
114) The usual slip of a three-phase induction motor is about **4 percent.**

115) The starting torque of a 3-phasesquirrel cage induction motor is **1.5 times the full load torque.**

116) For a squirrel cage induction motor running on no load **Rotor induced e.m.f is very small.**

117) The full load power factor of a 3-phasesquirrel cage induction motor is 0.8 lagging. The motor can run on power factor between unity and 0.8 when **motor is loaded beyond full load.**

118) The incorrect statement about squirrel cage induction motor is, **it can operate on lagging as well as leading power factors.**

119) If single phasing occurs in delta connected motor, **one phase will be seriously overloaded and two others will be slightly overloaded.**

120) The number of slip rings for delta connected rotor of a 3-phaseinduction motor is **3.**

121) Which of the following is not the usual rated voltage for 3-phaseinduction motor **13.2 kV.**

122) Induction motors of 500KW are usually run on **6.6 KV.**

123) The maximum KW rating of induction motors that can be run on 440V usually restricted to **250 KW.**

124) The range of slip of induction motors is normally **0% to 5%.**

125) For a three-phase induction motor, if the supply frequency is increased, which of the following will also increase? **Synchronous Speed.**

126) If the supply frequency for an induction motor is increased by 5%, the synchronous speed will **increase by 5%.**

127) If the supply frequency for an induction motor is reduced by 5%, which of the following will also decrease? **Full load Speed.**

128) If f is the frequency of supply voltage, then starting torque for induction motor varies as **(1/f^2).**

129) When supply frequency of an induction motor is increased which of the following will decrease? **Starting current, Full Load current and maximum running torque.**

130) When supply frequency of an induction motor is reduced, which of the following will also increase? **Starting Torque, Maximum running Torque and Starting current.**

131) Which of the following parameters of an induction motor varies inversely as the supply frequency? **Starting current.**

132) Which of the following parameters for an induction motor varies as square of the supply voltage? **Maximum running Torque**

133) If the supply voltage for an induction motor is increased by 10%, which of the following will also increase? **Starting current**

134) If the supply voltage for an induction motor is increased by 10%, the maximum running torque will increase by about **20%.**

135) If the supply voltage for an induction motor is increased by 10%, which of the following will also decrease? **Temperature rise on full load.**

136) If the supply voltage for an induction motor is reduced, which of the following will increase **% Slip, Full Load current and max. Temperature rise on full load.**

137) If the supply voltage for an induction motor is reduced by 10%, the maximum running torque will nearly **decrease by 20%.**

138) When the supply voltage for an induction motor is reduced by 10%, which of the following will not decrease **Percentage slip.**

139) Unbalanced supply voltage for an induction motor will cause **negative sequence component in the rotating magnetic field.**

140) If an induction motor is to be run on unbalanced supply, then it should be **run at lower loads.**

141) During running, if single phasing occurs, the motor should not be loaded beyond **50% of rated load.**

142) If a motor shows symptom of loss of torque with excessive vibrations, it can be concluded that **there is short circuit in the rotor winding.**

143) The rotor of an induction motor runs in the same direction as the rotating stator magnetic flux. This is in accordance with **Lenz's Law.**

144) The shaft of an induction motor may be unbalanced due to **uneven air gap.**

145) In case of induction motors the leakage flux is more as compared to a transformer because **motor has air gap.**

146) The number of stator slots in an induction motor is not an exact multiple of the number of rotor slots **to avoid magnetic locking up of the two.**

147) Any decrease in air gap length of an induction motor is likely to result in **improvement in power factor.**

148) In an induction motor, if air gap is more, **power factor will be low.**

149) When a three-phase induction motor is loaded, **induced e.m.f in the rotor increases and its frequency falls.**

150) In case the rotor terminals of 3-phaseslip ring induction motor are not short-circuited and the supply voltage is given to stator, the motor will **not start.**

151) The single phasing of delta connected induction motor is likely to result in **burning of one phase winding.**

152) The frequency of the induced e.m.f in the rotor circuit is maximum **at stand still.**

153) A 3-phasesquirrel cage induction motor cannot be started with **stator-rotor starter.**

154) The speed variation of a squirrel cage induction motor is closely resembles that of a **dc shunt motor.**

155) A 3-phaseslip ring induction motor can be started with which of the following starter **stator-rotor starter.**

156) A three-phase induction motor connected to 2 phase supply **may burn.**

157) Most induction motor windings are fractional pitch type because **leakage reactance is reduced, windings is stiffer and axial length of the machine is reduced.**

158) Out of the following motors, the most complicated speed control arrangement is of **3-phasesquirrel cage induction motor.**

159) An induction motor may get overheated due to **low supply voltage, over loading and loss of ventilation.**

160) In an induction motor, the torque in Nm is given as $\frac{3I_2^2R_2}{wS}$, where wS is the synchronous speed in mechanical radians.

161) The maximum torque in an induction motor neglecting stator impedance occurs at R_2/X_2

162) In a circle diagram of an induction motor, the diameter is $V/(X_1 + X_2^1)$

163) During short circuit test on a slip ring induction motor, **Rotor is short circuited but is blocked from rotation.**

164) Where the resistance is added in the rotor circuit of a slip ring induction motor, **the starting current is reduced but starting torque increases.**

165) On decreasing the applied rated voltage/phase by one half, the starting torque of an induction motor becomes time of starting torque with full voltage **¼.**

166) Pull out torque in an induction motor occurs when power factor becomes **0.707.**

167) In a circle diagram for a 3-phaseinduction motor, the diameter of circle is determined by **Stator current.**

168) Fractional slip of an induction motor is equal to **(rotor copper loss / rotor input).**

169) Percentage slip S of an induction motor is defined as $\boldsymbol{S = ({(N_s - N)}/{N_S})*100}$

170) For rotor stand still resistance R2 of an induction motor, the equivalent load resistance of slip is $\boldsymbol{{(R_2(1 - S))}/{S}}$

171) In an induction motor, the torque T is related to supply voltage V as below **T α V^2**

172) Maximum power factor in an induction motor is given by $\frac{1-\sigma}{1+\sigma}$

173) The starting torque of an induction motor is maximum when **rotor resistance equals rotor reactance.**

174) Crawling of a motor results from **Harmonics developed in the motor currents.**

Chapter # 23 Single Phase Motors

1. A capacitor start single-phase induction motor will usually have a power factor of 0.6 lagging
2. A capacitor start, capacitor run single-phase induction motor is basically a two-phase induction motor
3. The starting torque of a capacitor start motor is low
4. The torque developed by a split phase motor is proportional to Sine of angle between l_m and l_s
5. A capacitor start single-phase induction motor is switched on the supply with its capacitor replaced by an inductor of equivalent reactance value. It will not start
6. The starting capacitor of a single-phase motor is

   Electrolytic capacitor
7. Which of the following is the most economical method of starting a single-phase motor? Capacitance start method
8. The number of turns in the starting winding of a capacitor start motor as compared to that for split phase motor is more
9. In a split phase motor, the ratio of number of turns for starting winding to that for running winding is less than one
10. A single-phase motor generally used for small air compressor is capacitor start capacitor run motor
11. Out of the following motors, which will give the highest starting torque? capacitor start motor
12. Which single-phase ac motor will you select for record players and tape recorders? Hysteresis motor
13. A universal motor is one which can operate on ac as well as dc voltage
14. Under normal operating conditions which motor can run at 5000 rpm? universal motor
15. The motor used in household refrigerators is single-phase induction motor
16. Single-phase motors are commercially manufactured up to 2 H.P.

17. The direction of rotation of universal motor can be reversed by interchanging the brush leads.
18. A universal motor operates on approximately constant speed and load.
19. Which of the following single-phase motors will operate at high power factor? capacitor run motor.
20. A motor suitable for signaling device is reluctance motor
21. Which capacitor is preferred in case of single-phase motor electrolytic capacitor
22. The motor used for driving the record player deck is hysteresis motor.
23. When a motor speed of 5000 rpm is required, which motor will you select? Universal motor.
24. As compared to other single-phase ac motors a universal motor has high horse power/kg ratio
25. When a universal motor is operated on no load, its speed is limited by windage and friction
26. Which of the following applications make use of a universal motor? Portable tools
27. In portable tools the speed of the driven shaft is reduced by gearing
28. For ceiling fans generally, the single-phase motor used is permanent capacitor type.
29. In case of split phase motors, the phase shift is usually limited to 3 degrees
30. The capacitance of a small single-phase motor will be of the order of micro or pico farads
31. The type of starting relay used on single-phase hermetic motor is current coil relay
32. Reluctance motors are singly excited
33. Electric motors are generally designed to have maximum efficiency at near full load
34. Which of the following is non-reversible motor? Resistance start split phase motor
35. Which motor is generally used for electric shavers? Universal motor.
36. The motor useful for signaling and timing device is reluctance motor
37. A motor generally used in toys is shaded pole motor

38. Single-phase motors generally get over heated due to short windings, overloading and bearing problems.

39. Which of the following is a reversible motor? universal motor and capacitor start split phase motor.

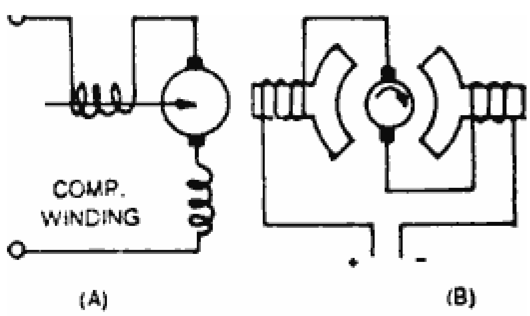
40. The starting torque of a single-phase induction motor is zero

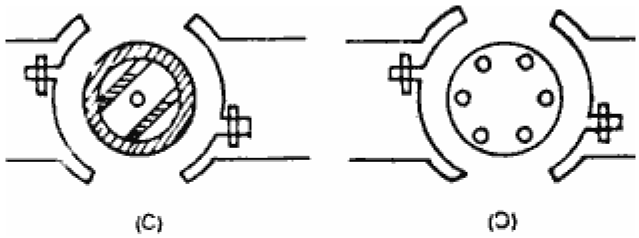
41. Which of the following motors will operate at high power factor? capacitor run motor
42. Which of the following statements about reluctance motor is not true? it can operate on AC as well as DC
43. The rotor for a hysteresis motor is made up of chrome steel, has high retentivity and has high hysteresis loss
44. The speed of a universal motor can be controlled by introducing a variable resistance in series with the motor, tapping the field at various points and centrifugal mechanisms.
45. What could be the smallest size of a universal motor? 1/200 HP.
46. The short coming of repulsion motor are variation of speed with load, low power factor and tendency to spark at brushes.
47. The disadvantage of shaded pole motor are low starting torque, low efficiency and very little overload capacity.
48. The efficiency of shaded pole motor is in the range 5 to 35 percentage.
49. For domestic sewing machine the size of the motor required will be 100-150 watts
50. A ceiling fan of 1400 mm sweep will have motor rating of 120-180 watts
51. Which of the following applications would need the smallest size of motor? electric clock
52. All single-phase ac motors are designed to operate usually on 220 ± 10% volts.
53. All single-phase ac motors are designed usually to operate on the frequency 50. ± 5 Hz.

54. When a dc series motor is connected to ac supply, it will spark excessively, give poor efficiency and run on poor power factor

55. The torque-speed characteristic of a repulsion motor resembles that of which of the following dc motor? compound motor.
56. In a single-phase capacitor motor the direction of rotation will be in the opposite direction to the original when capacitor is replaced by an inductor.
57. In a hysteresis motor, the position of shaded pole with respect to main pole determines direction of rotation
58. In a shaded pole motor, the direction of rotation is from main pole to shaded pole
59. Which motor is generally used in tape recorders? Hysteresis motor.
60. In a shaded pole motor, shading coils are used to produce rotating magnetic field
61. In a shaded pole motor, the locked rotor current is slightly more than the full load current
62. Shaded pole motors are not provided with capacitor, commutator and centrifugal switch
63. In a universal motor, normally the ratio of width of brush to the width of commutator segments is 2: 1
64. For a given output and speed, a universal motor as compared to 220 V, 50 Hz supply will require less voltage at low frequency

Questions 65 to 69 refer to the Figure given below. Single-phase configurations are shown in the Figure.





65. Which figure represents a shaded pole motor? figure D.

66. Which figure represents a capacitor start motor? none of the figures.

67. Which figure represents a universal motor? figure B

68. Figure A represents AC series motor

69. A hysteresis motor is represented by figure C

70. A capacitor motor of 1/4 HP needs a condenser of 8 μ F. A similar motor of 3/4 HP will need a condenser of 20 μF

71. The rotor of which motor does not have winding on it? Hysteresis motor

72. Which motor has unsymmetrical rotor? Reluctance motor.

73. If a single-phase motor runs slow, the probable case may be overload, low frequency and low voltage.

74. A single-phase capacitor start motor will take starting current nearly twice the full load current

75. Which motor will make least noise? Hysteresis motor.

76. If a single-phase motor runs hot the probable cause cannot be blown fuses.

77. A single-phase capacitor run motor will have starting torque as 1 1/2 times full load torque

78. Which of the following single-phase motors will be cheapest? Capacitor start motor

79. Noise in an electric motor may be due to colling air, bearings and magnetic effects.

80. For a system involving sound recording and reproduction which motor would you select? Hysteresis motor

81. Cranes and hoists offer which type of load? reversing, heavy start.

82. If a single-phase motor runs hot, the probable cause may be overload, low voltage and high voltage.

83. Which motor is relatively free from mechanical and magnetic vibrations? Hysteresis motor

84. Reluctance motors are single excited

85. Which of the following motors does not have constant speed characteristics? Universal motor

86. For the same rating which motor has the highest starting torque? Universal motor

87. A capacitor selected for capacitor-run motor should be rated for peak voltage

88. If a single-phase motor fails to start, the probable cause may be open in auxiliary winding, open in main winding and blown fuses.

89. The reluctance torque in a motor is present when the reluctance seen by when rotor mmf varies

90. Which single-phase motor has relatively high-power factor? Universal motor

91. Which motor would you select for vacuum cleaners? universal motor

92. If the ceiling fan, when switched on, runs at slow speed in the reverse direction, it can be concluded that capacitor is ineffective

93. For how many poles is a split-phase motor wound if it operates at 1750 rpm at full load from a 60 Hz source? 4 poles

94. Which of the following capacitor-start split phase motor will have the largest value of capacitance? 3/4 HP, 1140 rpm.

95. The speed of a split phase induction motor can be reversed by reversing the leads of either auxiliary winding or main winding.

96. A capacitor start type single-phase induction motor has its capacitor replaced by an inductor of equivalent reluctance value. If the motor is now switched on to the supply, it will not run

97. In ac series motor the purpose of providing compensating winding is to reduce sparking at brushes

98. The approximate value of capacitance to be used on 50 Hz, capacitor start split phase 1725 rpm motor will be 350 micro F

99. Which of the following is used on single-phase hermetic motors? Voltage coil

100. Normally, the auxiliary winding in a single-phase induction motor is cut off when the motor reaches a certain speed except in case of capacitor start, capacitor run motor

101. In case of a reluctance motor, when the. load is increased so that it can't maintain synchronous speed the motor will run as induction motor

102. Most important characteristics of a single-phase motor is that it is not self-starting

103. In a capacitor start induction motor, the stalling torque is directly related to angle a between the 2 winding currents by sin α

104. n a capacitor start motor, the capacitor is connected in series with starting winding

105. The capacitor used for running purpose in a two-capacitor motor is Paper spaced oil-filled type

106. In split phase motor, main winding has low resistance and high reactance

107. A single-phase motor has Zero starting torque

108. In a single-phase motor, phase splitting can be done with an auxiliary winding of high resistance

109. A single-phase self-starting motor has two stator windings which are placed at 90^0 and fed out of phase

110. In a single-phase hysteresis motor, starting torque is caused by Eddy current

111. A two value capacitor motor when compared to a capacitor start has Same starting torque and improved running power factor

112. Single-phase induction motor can be made self starting by adding series combination of a capacitor and auxiliary winding in parallel with the main winding

113. The following motor is popularly used in driving a refrigerator universal motor

114. Motor used in driving a tape recorder is hysteresis motor

115. Speed of a repulsion motor at no load is dangerously high

116. Operation of a hysteresis motor can be explained on the basis of intermittently revolving magnetic flux.

117. The main drawback of a shaded pole motor are Very little overload capacity , low efficiency and low starting torque.

118. Consider the following single-phase motors :

I. Capacitor start motor

II. Capacitor start and run motor

III. Permanent split capacitor motor

IV. Shaded pole motor. The correct sequence of increasing order of cost is

IV, III, II, I

119. A universal motor runs at same speed with both ac and dc supplies

120. The main reason of using a hysteresis motor, for high quality tape recorders and record players is that its speed is constant (synchronous)

121. A fluctuating voltage supply is detrimental to a refrigerator motor, but not to a ceiling fan motor, although both are single-phase induction motors because, the refrigerator motor is enclosed in a sealed unit while the fan motor is open to the environment

Chapter # 24 Generation of Electric Power

1.**Nuclear energy** is not an unconventional source of energy?

2.Pulverized coal is **broken into fine particles.**

3. Heating value of coal is approximately **5000-6500 kcal / kg**

4. Water gas is a mixture of **CO, N_2 and H_2**

5. Coal used in power plant is also known as **steam coal**

6. **Bituminous coal** is considered as superior quality of coal?

7. In a power plant, coal is carried from storage place to boilers generally by means of **V-belts.**

8. Live storage of coal in a power plant means **storage of coal sufficient to meet 24-hour demand of the plant.**

9. Pressure of steam in condenser is **much less than atmospheric pressure.**

10. Equipment used for pulverizing the coal is known as **Ball mill**

11. Power plants using coal work closely on **Rankine cycle.**

12. Critical pressure of water is**213.8 kg / cm^2.**

13. The efficiency of a thermal power plant improves with use of **high steam pressure.**

14. **All of the below three process** contributes to the improvement of efficiency of Rankine cycle in a thermal power plant.

- Reheating of steam at intermediate stage
- Regeneration use of steam for heating boiler feed water
- Use of high pressures

15. Steam pressures usually used in thermal power plants are **110kg/cm^2 to 170 kg / cm^2**

16. When pulverized fuel is not used, the equipment used for supplying coal to the boiler is '**Stoker**'.

17. Burning of low-grade fuel can be improved by

(A) Blending with better quality

(B) Oil assisted ignition

(C) Pulverizing

- '**Any of the above.'**

18. As steam expands in turbine '**its specific volume increases'.**

19. Water is supplied to the boiler '**at more than the steam pressure on the boiler.'**

20. the following enters the super heater of a boiler '**Wet steam'**.

21. Super-heated steam is always '**at a temperature higher than the saturation temperature corresponding to a steam pressure'.**

22. The equipment installed in power plants to reduce air pollution due to smoke is '**Electrostatic precipitators'.**

23. Permissible pH value of water for boilers is '**slightly more than 7'**

24. A condenser in a thermal power plant condenses steam combing out of '**Turbine**.'

25. the following, is not a high-pressure boiler '**Lancashire boiler'**.

26. the maximum size of steam turbine usually being installed, for thermal power plants '**500 MW'**.

27. Overall thermal efficiency of a steam power station is in the range '**18-24%'.**

28. following is not the voltage at which power is usually transmitted '**20 kv'**

29. Most of the generators in thermal power plants run at '**3000 rpm'**

30. In regenerative cycle, bled steam is '**used to beat feed water for boiler'.**

31. Standard frequency usually for electric supply is **50 Hz**

32. In power station practice "spinning reserve" is a **reserve generating capacity that is connected to bus and ready to take the load**

33. Bagasse is **fibrous portion of sugarcane left after extracting the juice.**

34. Low grade fuels has **low calorific value.**

35.Lignitecoal has lowest calorific value?

36. In a steam locomotive the engine is **Non-condensing.**

37. The boilers using lignite as fuel do not use **under feed seeker**.

38. In a steam turbine cycle, the lowest pressure occurs in **condenser**.

39. Steam pressure in modem thermal plants of 100 MW and above capacity may be exacted to be **more than 100 kg/cm^2.**

40. The overall efficiency of a boiler in a thermal power plant is of the order of **70 to 80%.**

41. Chemical composition of coal is given by **Ultimate analysis.**

42.Lignite coal will have highest ash content?

43. Ash content of most of the Indian coals is around **20%.**

44. Ash content of coal can be reduced by **washing.**

45. A 100 MW thermal power-plant will consume nearly **50**tonnes of coal in one hour.

46. The steam consumption per kWh of electricity generated in a modem power plant is of the order of '**5-7 kgs'**.

47. For low head and high discharge, the hydraulic turbine used is '**Kaplan turbine**'.

48. Soot is virtually nothing but '**carbon'**.

49. In pumped storage '**Downstream water is pumped up-stream during off load periods.**'

50. If the air standard efficiency of. a thermodynamic cycle is given as

$\eta = 1 - (k (r-1)) / (r^k-1)$

where r = compression ratio, $k = C_p / C_v$ Than the cycle is '**Lenoir cycle**'

51. A graphical representation between discharge and time is known as '**Hydrograph'**.

52. Cost of operation of '**Hydroelectric'** plant is least.

53. In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as '**Penstock**'.

54. A Pelton wheel is **'Axial flow impulse turbine'.**

55. Running away speed of a Pelton wheel is '**No load speed when governor mechanism fails'.**

56. Spouting velocity is '**Ideal velocity of jet'.**

57. Outward radial flow turbines '**may be impulse or reaction turbines**'.

58. A Francis turbine is '**Inward flow reaction turbine'.**

59. A Kaplan turbine is '**low head axial flow turbine.'**

60. In turbulent flow '**shear stresses are generally larger than in laminar flow.'**

61. An impulse turbin '**operates by initial complete conversion to kinetic energy**'.

62. In an impulse turbine '**the pressure in the driving fluid as it moves over the vane, is atmospheric.'**

63. In binary vapor cycle '**two fluids are used.'**

64. Steam engine used in locomotive is '**double acting, non-condensing type'.**

65. In a thermal power plant cooling towers are used to '**cool water used in condenser for condensing steam'.**

66. Major constituent of methane gas is '**Methane'.**

67. Caking is '**in boiler furnace some coals become plastic and form lumps or masses of coal.'**

68. 1 atomic mass unit is equal to '**1.66×10^{-27} kg'.**

69. Particles having the same atomic number but different mass numbers arc called '**Isotopes'.**

70. Any of the below material can be used as a moderator.

(A) Graphite

(B) Heavy water

(C) Beryllium

71. In closed cooling system '**hot water is re circulated after cooling.'**

72. A gas turbine works on '**Brayton cycle.'**

73. Maximum efficiency of an open cycle gas turbine is nearly '**30%'.**

74. Compressor used in gas turbines is '**multistage axial flow compressor.'**

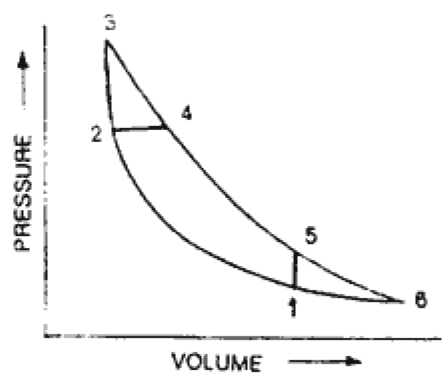
75. '**Compressor'** of gas turbine consumes most of the power.

76. Gas turbine is widely used in '**Aircraft'.**

77. In aircraft using gas turbine, the cycle used is '**Simple'.**

78. Overall efficiency of gas turbine is '**less than Diesel cycle efficiency.'**

79. In the figure, constant volume cycle is represented by '**1235'**.



80. The cycle 1236 represents '**Atkinson cycle.'**

81. Diesel cycle is represented by '**1245'**.

82. '**Brayton cycle'** cannot be represented in the given figure.

83. The horse power of a Diesel locomotive is of the order of '**2000 to 2500'.**

84. A Diesel engine consumes Diesel oil nearly at the rate of '**180 to 200 gm/BHP hr'.**

85. The compression ratio in case of diesel engines is '**14 to 22**'.

86. The firing order of a four-cylinder engine is **'1-2-4-3'.**

87. The performance of engines of different HP, RPM and sizes can be compared on the basis of '**specific fuel consumption**'

88. All of the below are Advantage of hydro-electric power station

- **low operating cost**
- **free from pollution problems**
- **no fuel transportation problems**

89. '**Carnot cycle'** engine will have highest efficiency, between given temperature limits.

90. All of the below is a non-petroleum fuel.

(A) Benzol

(B) Methyl alcohol

(C) Ethyl alcohol.

91. Heating value of diesel oil is the range '**9500-11000 kcal/kg.**'

92. Following relation is correct.

- **Weight of oxygen = 0.32 weight of air**

93. '**15 kg'**of air are required for the combustion of one kg of diesel fuel?

94. Due to burning of 1 kg of pure carbon with a minimum quantity of air required, the percentage of carbon dioxide in the exhaust gas would be **'29%**'.

95. Diesel engine fuels are rated by '**Cetane number'.**

96. The formula for Cetane is '$C_{16}H_{34}$'.

97. Cetane number of high-speed diesel available in market is **'45 to 55.'**

98. If a engine has spark plug, it can be safely concluded that the engine is '**not a diesel engine**'

99. Air standard efficiency of a diesel engine depends on '**compression ratio'.**

100. A diesel engine of a bus is started by '**Self-starter**'

101. In a diesel engine fuel is injected at a pressure of '**90 - 130 kg/cm^2'.**

102. Diesel engines for power plants are usually '**supercharged'**

103. A two stroke engine may be identified by '**absence of valves**'.

104. Piston rings for engines are made of '**cast iron'**

105. In a piston the maximum temperature occurs at **'top center'**.

106. The temperature at which a lubricating oil will give off sufficient vapors to form combustible mixture with air, is known as '**Flash point**'.

107. '**Pour point'** temperature for a lubricating oil will be lowest

108. Specific gravity of diesel oil is **'0.84'**

109. Rank of coal is based oil '**fixed carbon and healing value**'.

110. The function of piston rings in an internal combustion engine is

- to prevent lubrication oil from entering the combustion space
- to prevent leakage of combustion chamber products past piston
- to transfer heat from piston to cylinder walls

'all of the above.'

111. '**Gas turbine**' engine has the highest air fuel ratio.

112. '**Large quantity of excess air'** will not assist in getting high power output from a compression ignition engine.

113. The purpose of super-charging an engine is'**to increase the power output of the engine**'.

114. Most of the heat generated in internal combustion engine is lost by '**exhaust gases'.**

115. In case of diesel engines thermal efficiency is of the order of '**30 to 40 percent'**.

116. A mixture containing 60% Cetane and 40% Iso-octane will have '**octane number 40**'.

117. For supercharging of diesel engines, the air is supplied through '**centrifugal blower'**.

118. The compression ratio in case of gas turbine is of the order of '**5to 7'.**

119. A regenerator in a gas turbine '**improves thermal efficiency'.**

120. Out of the following diesel engines, the minimum air consumption per BHP will be in

'**4 stroke, mechanical injection'**

121. For the same maximum pressure and heat input the most efficiency cycle is '**Brayton cycle**'.

122. For the same temperature limits and heat input, the most efficient cycle is '**Carnot cycle'**.

123. An air filter is used in '**diesel engine power plant'.**

124. '**Penstock'** is not a part of diesel engine power plant.

125. Of the total heat supplied to a diesel engine plant, '**Useful output'** has the highest proportion.

126. Supercharging of a diesel engine means '**supplying pressurized air during suction**.'

127. '**Diesel engine power plant'** cannot have single units of 100 MW capacity.

128. In a thermal power plant, heat from the flue gases is recovered in '**economizer**.'

129. Following is not a fire tube boiler

'**Babcock and Wilcox boiler.**'

130. In a super-heater '**pressure remains constant and temperature rises'.**

131. Bagasse is '**fibrous portion of sugarcane left after extracting the juice'.**

132. '**Condenser'** is not an accessory for a boile.

133. A compound pressure gauge indicates '**pressures above and below atmospheric pressure.'**

134. For the same cylinder size and rpm '**Super-charged engine'** will produce more power.

135. The internal combustion engines never work on '**Rankine cycle'.**

136. A Joule cycle consists of '**two adiabatic and two constant pressure processes'.**

137. In ideal diesel cycle the working substance is '**air'.**

138. The efficiency of an Otto cycle will approach that of Carnot cycle when '**constant volume processes are replaced by isothermal processes.**

139. Power plant normally operates at high speeds is '**Steam turbine plant'**

140. Instrument can be used to measure the flow of a liquid through a pipe is '**Venturi meter**.'

141. A pitot tube is used to measure '**pressure of liquid**'.

142. A Rota meter is used to measure '**discharge of fluids.'**

143. Vacuum can be measured by '**U tube manometer'**

144. A binary vapor cycle '**uses two different vapors as working fluid'.**

145. In a steam power plant water is used for cooling purposes in '**condenser'**.

146. Which steam will have least enthalpy '**wet steam at 10 kg/cm^2'**

147. The part of the steam power plant where the pressure of steam is less than the atmospheric pressure is '**Condenser**.'

148. In a thermal power plant a cooling tower cools '**water from condenser'.**

149. Within the boiler, the temperature of steam is highest in '**super heater**.'

150. In a steam power plant the pipe line section which is invariably lagged is '**pipes carrying steam from boiler to turbine'.**

151. Following is generally not a constituent of coal '**Chromium'.**

152. Coal is generally considered to be of '**vegetable origin'**

153. When coal analysis gives fixed carbon, volatile combustible matter, ash and moisture the analysis is termed as '**proximate analysis'.**

154. API degree are used to measure '**specific gravity of oils**'.

155. Sulphur content of liquid fuels assumes importance from the point of view of '**corrosion'**.

156. Fire and flash points of oils assume importance from the point of view of '**ignition and storage hazards.'**

157. Coking is '**heating of coal in absence of air, driving out CO_2 and leaving behind the residue and carbon'.**

158. The air standard efficiency of a diesel engine depends on '**compression ratio'.**

159. The efficiency of steam generators is first a function of design. Beyond that, efficiency depends upon the loading and manner of operation. Good operation consists in

- control and limiting of air
- minimizing combustibles in refuse and flue gas
- maintaining clean heat transfer surfaces
- **all of the above.**

160. Generally the major constituent of exhaust gases from a thermal power plant is '**nitrogen'**

161. The compression ratio for diesel engines is generally in the range '**10 to 14'.**

162. Binary vapor cycles are not finding favor with designers because '**initial cost of such plants is high'.**

163. Thermal efficiency of a gas turbine cycle improves as a result of all of the following EXCEPT '**heating of air before compression'.**

164. Even with best possible arrangements, the thermal efficiency of a gas turbine cycle is always below '**40%.**'

165. The scavenging efficiency of a 4-stroke diesel engine is usually in the range from '**95% to 100%**.'

166. Spot the odd one out '**Freon gas'.**

167. The cooking gas used in our homes is a byproduct of '**petroleum refineries**'.

168. In power plants cooling towers are used to '**cool condenser outlet water.'**

169. Electrostatic precipitator is installed between '**boiler furnace and chimney'.**

170. An equipment that is installed to minimize pollution of surroundings is '**Electrostatic precipitators.'**

171. Fly ash: Non-combustible particle: Cinders: **‘fog**.’

172. The path followed by the gases discharged from chimney called the 'plume', depends on

- thermal properties of gases
- dynamic properties of gases
- wind direction

‘**all of the above.’**

173. In diesel engines, the injection pressure is of the order of ‘**100 kg/cm^{2}’.**

174. In a turbine blades acts as

- moving blades in impulse turbine stages
- moving lades in reaction turbine stages
- Reversing blades in velocity stages of impulse turbines
- ‘**any of the above.’**

175. Topping turbines are ‘**high pressure non-condensing units installed in existing plants to exhaust into existing low-pressure turbines’.**

176. In case of non-condensing turbines the back pressure is ‘**above atmospheric pressure’.**

177. In all of the following turbines the back pressure will be above the atmospheric pressure EXCEPT ‘**Condensing turbine’.**

178. In bleeder turbines, part of the steam is extracted for ‘**fed water heating’.**

179. As compared to steam at entry to the turbine, ‘**Specific-volume’** will be larger at exit.

180. Pelton wheels are installed on ‘**high head plants.**’

181. Suspended solids can be removed from water by

- Settling
- coagulation

- filtration
- '**any of the above.**'

182. Dissolved solids in water can be removed/reduced by

- distillation
- demineralization
- softening
- '**any of the above.**'

183. Small domestic electric power generators are usually of capacity around '**1kVA**.'

184. Producer gas is a by-product from '**Steel plant'.**

185. Sour crude

- is corrosive when heated
- evolves significant amounts of hydrogen sulphide on distillation
- produces light fractions which require sweetening
- '**all of the above.'**

186. Dam: Hydro plant :: '**Reactor: Nuclear plant'.**

187. Bulb turbines are '**Low head turbines.'**

188. A frauds turbine is '**Inward flow reaction turbine'.**

189. In hydro power plants '**Initial cost is high and operating cost is low.'**

190. The power plant in which availability of power is least reliable '**Wind energy'**

191. Geothermal energy is

- a renewable energy resource
- alternative energy source
- Inexhaustible energy source

- **‘any of the above.’**

192. The disadvantage of renewable sources of energy is

(A) lack of decidability

(B) availability in low energy densities

(C) intermittency

‘all of the above.’

193. In the Geysers steam is continuously vented through fissures in the ground. These vents are called ‘**fumaroles’**

194. Geologists believe that below the earth's crust, the molten mass exists in the form of ‘**magma’**.

195. In hydrothermal source of geothermal energy ‘**hot water or steam is available’.**

196. In axial flow turbines ‘**it is possible that the wheel may run full’.**

197. In hydrothermal systems when steam, water and dissolved solids are available as source of energy, the entrained solids are removed by ‘**centrifugal separators**’.

198. Presence of sand in geopressurized water is likely to cause problems of ‘**erosion**.’

199. Presence of non-condensable gases in geopressurized water causes

- corrosion of parts
- pollution
- flow problems
- **‘all of the above.’**

200. When geothermal energy is available in the form of saline water, power is developed using

- flashed-steam system
- binary-cycle system
- total flow system

- ‘**any of the above**.’

201. Petro thermal systems are composed of hot dry rock with ‘**no underground water’.**

202. In petro thermal systems of geothermal energy there is hot dry rock but no underground water. In such systems energy is obtained by ‘**pumping water’.**

203. Reflecting mirrors used for exploiting solar energy are called ‘**heliostat**’.

204. The area which is preferred for solar thermal electric plants is ‘**hot arid zones’.**

205. In solar thermal conversion systems the solar heat is transferred to

- water-steam
- liquid metals
- molten salts
- ‘**any of the above.’**

206. Photovoltaic solar energy conversion system makes use of ‘**solar cell’.**

207. Solar cells are made of ‘**silicon**’.

208. The voltage of a single solar cell is **‘0.5 v’.**

209. The output of a solar cell is of the order of **‘1 W’**.

210. A module is a ‘**series parallel arrangement of solar cells’**

211. The major disadvantage, with solar cells for power generation is ‘**high cost’.**

212. The maximum theoretical efficiencies of solar sales could be around **‘48%**’.

213. The source of energy for satellite is ‘**solar cell’.**

214. Winds caused by greater solar heating of the earth's surface near the equator than near the northern or southern poles, are known as ‘**planetary winds’.**

215. Local winds are caused by

- differential heating of land and water

- differential heating of plains and mountains
- **‘any of the above’.**

216. The total power of a wind stream is proportional to **‘(velocity of stream)^{3}’.**

217. Tidal energy mainly makes use of ‘**potential energy of water**’.

218. Which of the following is a reaction turbine

(A) Banki turbine

(B) Jonval turbine

(C) Girard turbine

- ‘**None of the above**.’

219. All of the following are electrical mechanical storage systems EXCEPT ‘**super-conducting coils’.**

220. Thermal storage of energy is possible in the form of

(A) sensible heat

(B) latent heat

(C) chemical reaction

- ‘**any of the above.’**

221. Turn around efficiency of pump hydro-schemes seldom exceeds’**65%**’.

222. Batteries used for electrical energy storage are ‘**Lead acid cells’.**

223. Turn around efficiency of battery energy storage system is around’**75%**’.

224. Sodium Sulphur batteries use electrolyte consisting of ‘**solid aluminium oxide’.**

225. Certain metals become super-conducting when cooled below ‘**transition temperature’.**

226. power plant which is free from environmental pollution problems is ‘**Hydro-power plant**’.

227. Chemical representation for heavy water is ‘**D_3O**.’

228. The presence of CO_2 and H_2O in the atmosphere results in absorption of '**long wave infrared radiations'.**

229. Return to earth of the oxides of Sulphur and nitrogen occurs in the form of

(A) acid rain

(B) acid snow

(C) acid fog

- **'any of the above.'**

230. The average pH of normal rainfall is usually '**slightly acidic'.**

231. Earth coal '**lignite'**

232. Ebb current is '**the movement of the tidal current away from shore or down a tidal stream'.**

233. Ekman spiral is an idealized mathematical description of '**wind distribution in the planetary boundary layer'.**

234. Device that converts electrical energy to radiant heat is '**Incandescent lamp.'**

235. Device that converts thermal energy to kinetic energy is '**Rocket'**.

236. Beneficiation process is mainly used for '**coal'**.

237. Betz law finds application in '**wind mills.'**

238. Cleat is '**main joint in a coal seam along which it breaks most easily'**

239. Coal broken into angular fragments is known as '**coal breccia'**.

240. Coal rank classifies coal according to its '**degree of metamorphism'.**

241. Baryon is one of the class of heavy elementary particles that includes

(A) hyperons

(B) neutrons

(C) protons

- **‘all of the above’.**

242. Isotopes of uranium

(A) U_{235}

(B) U_{234}

(C) U_{238}

- **‘all of the above.’**

243. Baume scale measures ‘**specific gravity of liquids’.**

244. Beaufort scale is used to measure ‘**with speed’**

245. Beaufort scale is graded from 0 to **‘12’.**

246. API gravity is expressed in terms of ‘Degrees’**.**

247. Argillaceous rocks have ‘**high clay content’.**

248. ASTM coal classification is based on ‘**proximate analysis’.**

249. Barn **‘a unit of area’**.

250. One barrel is nearly **‘0.16 cubic meter’.**

251. Activated carbon is used for ‘**absorption of gases’.**

252. The phenomenon of physical adhesion of molecules to the surfaces of solids without chemical reaction is known as ‘**adsorption’**.

253. Solid or liquid panicles of microscopic size which are suspended in air or another gas form what is known as ‘**aerosol’**.

254. Air curtains find applications in ‘**air-conditioned spaces’.**

255. The percentage of carbon in anthracites is generally ‘**more than 90%’**

256. In a 2-stroke engine there is one power stroke in ‘**360^c of crank rotation’**

257. A fast breeder reactor ‘**operates with fast neutrons and produces more fissionable material than it consumes.’**

258. Fluidized bed combustion helps to reduce

(A) boiler size

(B) pollution

- **'both (A) and (B)'**

259. Fly ash generally results from '**pulverized coal boilers'.**

260. In a boiler, the carry-over of slugs of water into the piping due to dirty water is termed as' **foaming'.**

261. If a engine has a spark plug, it is concluded that the engine is a '**Joute engine'.**

262. In geothermal power plants waste water is '**discharged back to earth'.**

263. Grade of the coal is the same as '**rank'**.

264. API gravity of water is taken as **'10'**.

265. Liquids lighter than water (such as petroleum oils) have APT gravities numerically '**greater than 10'.**

266. All of the following arc hard coals Except '**Bituminous'**

267. All of the following are heavy metals except '**sodium'**.

268. following is heavy oil '**Bunker oil.'**

269. Deuterium oxide is used in nuclear reactors as '**moderator'**.

270. Heli chemical process is the process by which '**solar energy is utilized through photosynthesis'.**

271. Fixed carbon in case of bituminous coals is less than **'70%**'

272. Humacite is the name associated with '**Bitumines'.**

273. In case of humic coals, hydrogen percentage varies from '**4 to 6 percent'**

274. Hyperon has mass '**greater than that of a proton and less than that of a deutron'**

275. The charge of a two-stroke diesel engine consists of '**air only'.**

276. Integrated demand is '**the demand averaged over a specific period**'.

277. following is not needed in magneto hydrodynamic power plants '**Steam-turbine'.**

278. Marsh gas is '**same as methane'.**

279. Naphtha is a volatile colourless product obtained from '**petroleum**'.

280. Natural gas is obtained '**from earth's surface usually along with crude**'.

281. Osmotic energy conversion involves energy production from '**salt water'.**

282. Parr's-classification of coal is based on '**proximate analysis'.**

283. Peat coal is '**anthracite coal, small in size'.**

284. Perlite is '**an insulation material'.**

285. PF number refers to '**energy with which water is held in the soil'.**

286. A photovoltaic cell converts '**solar energy into electrical energy'.**

287. Producer gas mainly contains '**carbon monoxide and nitrogen'.**

288. Pyrheliometer measures '**intensity of direct solar radiations'.**

289. Quad is a measure of '**energy**.

290. For the same heat input and the same maximum pressure, the most efficient cycle is '**Brayton cycle'.**

291. Sweet gas is free of '**hydrogen sulphide.'.**

292. Therm is a unit of **'heating value'.**

293. Thermal neutrons are '**slow neutrons.'**

294. No moving parts are required in '**Thermionic conversion'.**

295. TNT stands for '**trinitrotoluene**.

296. A sodium graphite reactor uses '**sodium as coolant and graphite as moderator'.**

297. Solvent refined coal has low percentage of

(A) ash

(B) Sulphur

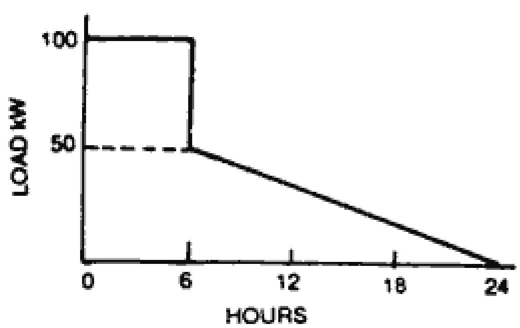
(C) impurities

- **'all of the above.'**

Chapter # 25 Economics of Power Generation

1. A load curve is a plot of **Load versus time.**
2. For economy in power generation **plant utilization factor should be high.**
3. **A continuous process plant** provides highest load factor.
4. The load of a consumer is generally measured in terms of **KW.**
5. The normal connected load of a domestic consumer is usually **up to 10 kW.**
6. Load factor during a period is **Average Load / Maximum Load.**
7. **Arc furnace** provides peaked load.
8. Demand factor is the **Maximum Demand / Connected Load.**
9. During summer months the increased load is due to **increased use of fans and air conditioners.**
10. In a system if the base load is the same as the maximum demand, the load factor will be **1.**
11. A system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW will have a load factor of **50%.**
12. Load due to one-ton air conditioner is nearly **1 kW to 2 kW.**
13. Load due to ceiling fans is nearly **100 to 200 W.**
14. **Electric iron** has highest power rating.
15. A stereo with two 10-watt loudspeakers will provide electrical load of **less than 6 W.**

Questions 16 to 18 refer to the figure below



16. The load factor of the system is **0.438.**
17. Load factor for the 0-6-hour period alone is **1.0.**
18. Load factor for the period 6-24 hours period is **0.5**
19. **Peak load plant** never has 100% load factor.

20. **kWh meter** is installed at the premises of a consumer for recovery of charges of electrical energy
21. For certain industrial applications the energy requirement is 500 kWh. If the heat losses are 20 percent, the total energy to be made available will be **6000 kWh.**
22. A consumer finds that after running 10 kVA equipment on full load for six hours his energy consumption was 48 kW. It can be concluded that **power factor of the equipment was 0.8.**
23. **Welding transformer** provides fluctuating load.
24. A power plant supplying energy to a city will usually experience peak demand **6 PM to 12 PM.**
25. The ratio, maximum demand of the installation / sum of individual maximum demands is known as **Diversity factor.**
26. In a power plant a reserve generating capacity which is in operation but not in services known as **Hot reserve.**
27. Five consumers having peak demands of A, B, C, D, and E have individual load factors of 0.5. It can be concluded that **their combined power consumption in a day will be 12 (A + B + C + D + E).**
28. In an interconnected system consisting of a nuclear power stations, steam station and diesel generating station, **Nuclear power station** can be used as base load plant.
29. Fuel transportation cost is least in **Nuclear powers plants.**
30. Capital cost per MWh is highest in case of **nuclear power plants.**
31. A steam power station will run with maximum efficiency when it is run **near full load.**
32. **Varying loads** is likely to result in lower efficiency of a power station.

Questions 33 to 36 refer to the following information.

The following factors are associated with power plant operation

I. High efficiency

II. High availability

III. Quick starting

IV. Low capital cost.

33. **Quick starting** is least important for base load plants.
34. **I and II only** two factors are of significant requirement for base load plant.
35. **III and IV only** two factors are of importance for peak load plant.
36. **I, II. Ill and IV** factors are favorable to a diesel power plant as compared to a steam power plant.
37. In a 440 V system, to obtain the minimum cost and maximum benefits, the capacitor should be installed **at the load.**
38. In case of medium sized induction motor, the power factor will be maximum at **Full load.**
39. A coaxial line is filled with a dielectric of relative permittivity 9. If C denotes the velocity of propagation in free space, the velocity of propagation in the line will be **C / 3.**
40. A direct voltage is applied to a peak diode voltmeter in which scale is calibrated to read rms voltage of a sine wave. If the meter reading is 36 V rms, the value of the applied direct voltage is **51 V.**
41. A power station has annual load factor of 50% and capacity factor of 40%. If the maximum demand is 15 MW, the reserve capacity of the plant is **3750 kw.**
42. **Replacement of fluorescent lamps with incandescent lamps** will not contribute to low power-factor.
43. **Improved illumination from lighting** may not be the effect of low plant operating power factor.
44. **kVA x kW = power factor** is the incorrect relation.
45. The power factor of a system on a 460 V, 3 phase, 60 Hz, in which the ammeter indicates 100 amp and the watt meter reads 62 kW will be **0.78.**
46. The simple subtraction of kilowatts from total kVA equals the kVAR when the power factor is **unity.**

Questions 47 to 50 refer to the data given below

The annual peak load on a 30 MW power station is 25 MW. The power station supplies loads having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 45%.

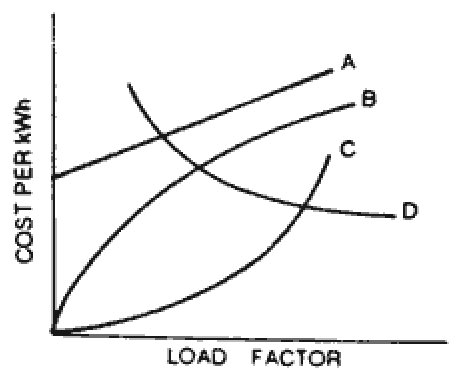
47. The average load is **1125 kW.**

48. Total energy supplied in a year is **9,875,000 kWh.**

49. Diversity factor is **1.12.**

50. Demand factor is **0.83.**

51. In the figure shown below which curve represents the variation of cost of generation per kWh with the load factor, for a thermal power plant **curve D.**



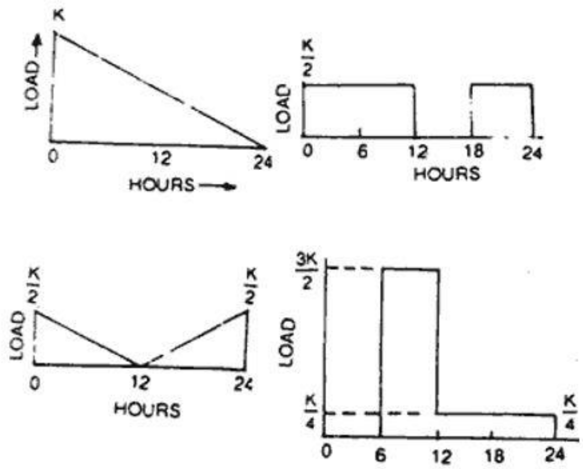
52. Connected load is **the rating in kw of the installed electrical load of the consumer.**

53. **Hot plate** appliance will offer the maximum load.

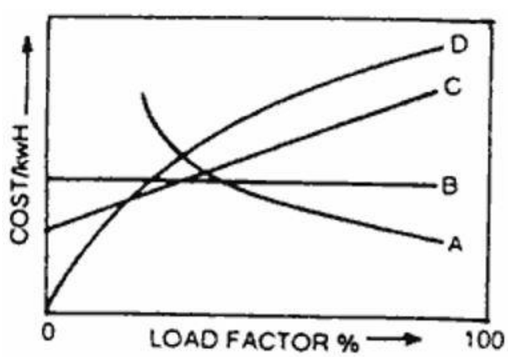
54. **Aluminium** industry will consume maximum power per tonne of product.

Questions 55 to 61 refer to the figure given below

Four different loads connected to a power Plant are shown in the figure.



55. **Load C** has the least value of average load.
56. **Load D** has the highest value of average load.
57. **Load D** has the least load factor.
58. **Load B** has the highest load factor.
59. If all the loads are connected to single source of power, the maximum load on the station will be **3k.**
60. The maximum load on the station will occur at **6 hr.**
61. In the above case load factor of the station will be **0.56.**
62. The highest point on a load curve represents **Peak demand.**
63. In the figure shown below **curve A** represents the variation of cost of power generation per kWh in a plant, with load factor.



64. **Cost of fuel** in thermal power plant, which is not the fixed cost.

65. Depreciation cost of a plant is calculated by **Straight line**, **diminishing value, Sinking fund method.**

66. **Diminishing value method** of depreciation charge estimation gives the heaviest charges during early years of plant life.

    Questions 67 to 69 refer to the following data

67. Power generation equipment in a thermal power plant costs $15,75,000 and has a useful life of 25 years. If the salvage value of the plant be $ 75,000 and the rate of annual compound interest be 5% the amount of annual installment by straight line method will be **$. 60,000.**

68. The amount to be saved annually for replacement of equipment after the end of 25 years, by sinking fund method is **$ 31,400.**

69. The installment for diminishing value method **$ 96,000**.

70. A diesel power plant is best suited as **stand-by plant.**
71. A gas turbine power plant usually suits for **peak load operation.**
72. **Diesel power plant** cannot have single unit of 100 MW.
73. Diesel engine power plants usually run on **Light diesel oil.**

74. **Wood, Furnace oil and any Gas** can be used as fuel for closed cycle gas turbine plant.

75. Capacity factor of a power station is **average demand of station / maximum installed capacity of station.**

76. **Hydroelectric plant** is expected to have the longest expected life.

77. The life of underground cables is taken as **40 years.**
78. For a hydro-electric plant, the life of a RCC dam is taken as **100 years**.

79. A 500 kW plant costs $ 1000 per kW installed. Fixed charges are estimated at 14% and operating cost is 13 cents per kWh. The plant averages 200 kW for 5000 hours of the year, 450 kW for 1200 hrs and 80 kW for the remaining period. The average cost of production of electricity per kWh will be close to **17 cents.**

80. Two tariffs are offered **Tariff P will give lower charges for consumption of more than 800 units.**

81. Two steam turbines each of 20,000 kW capacity drive a total load of 30,000 kW. The steam rates in kilogram per hour are $\mathbf{TP_1 = 2000 + 10\ P_1 - 0.0001\ P_1^2}$

82. Anything having some heat value can be used as fuel in case of **closed cycle gas turbines.**

83. **Publicity** for a power plant the expenditure on which of the following item is expected to be negligible.

84. At breakeven point **total sales = total expenses.**

85. If the average interest rate is 12% and depreciation is to be accounted for be straight line method at 10% **Initial cost $. 7000 Annual disbursements $. 2500** will be most economical.

86. A 120 MW generator is usually **hydrogen cooled.**

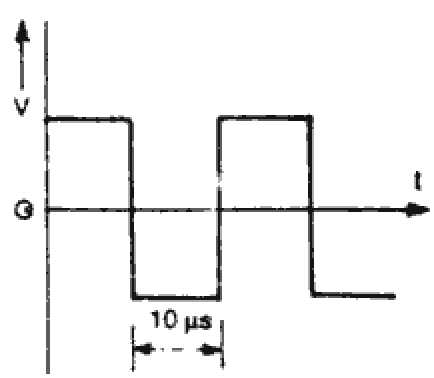
87. Hydrogen is used for cooling of large size generators, because **it has high thermal conductivity, it is light, it offers reduced fire risk.**

88. Maximum span in case of wooden poles is usually restricted to **50 meters**

89. The depreciation on the plant is charged by **Straight line method, sinking fund method, Diminishing value method.**

90. A nuclear power plant is invariably used as a **base load plant.**

91. The frequency of the wave shown in the figure below is **50 kHz**.

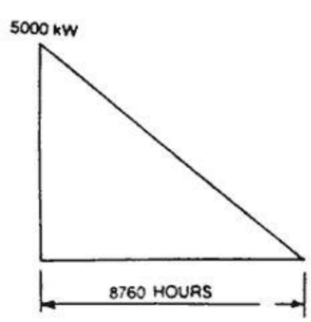


92. Air will not be the working substance in a **Closed cycle gas turbine.**

93. Major share of power produced is through **thermal power plants.**
94. Essential requirement of peak load plant **it should be capable of standing quickly**
95. **Nuclear power plant** is almost inevitably used as base load plant.
96. A thermal power station was designed to burn coal containing 12% ash. When the plant started operating coal having 22% ash was made available. **Ash handling unit** of the plant will need major modifications.
97. Efficiency is secondary consideration in case of **peak load plants**
98. **Gas turbine plant** will take least time in starting from cold conditions to full load operation.
99. During load shedding **some loads are switched off.**
100. For the same plant size, initial cost of **Nuclear power plant** is the highest.
101. A consumer takes a steady load of 200 kW at a power factor of 0.85 lagging for 8 hours per day and 315 days per annum. The annual payment under the tariff of $80 per annum per kA plus 10 cents per kWh will be **$ 69,200.**

Questions 102 to 106 refer to the data given below

The estimated total annual operating cost and capital charges for two proposed power stations are given by the following expressions Annual cost of station A = $. (600,000 + 3.0 kW + 0.015 kW h) Annual cost of station B = $. (750,000 + 5.0 kW + 0.014 kWh) Where kW represents the capacity of the station and kWh represents the total annual output. Load duration curve of the plant is shown in the figure given below.



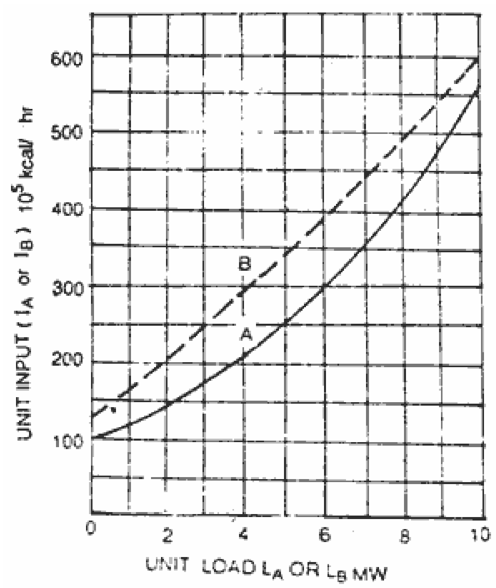
102. **Station B** may be selected for base load.
103. Base load plant should be operated annually for **2000hrs.**

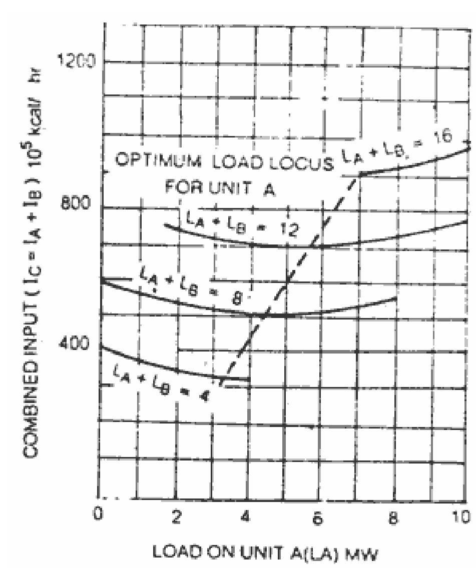
104. The capacity of the base load plant should not be less than **3860 kW.**

105. Total kWh supplied by the plant is **21.9 x 10^6**

106. Total kWh to be supplied by base plant must be **19.76 x 10^6**

Questions 107 to 110 refer to the figures given below





The input-output curves for two units with supply in parallel a common load is shown in the figure.

107. When a load of 10 MW is equally shared by the two generators, the combined input must be **600 x 10^5 kcal / hr.**

108. If the two generators have individual ratings of 10 MW each, a system load of 16 MW should be shared as **10 MW on A and 6 MW on B.**

109. Load shedding is done **Load shedding is done.**

110. If both generators have 2 MW load each then **Input to generator A is less than 75% of the input to generator B.**

Questions 111 and 112 refer to the data given below

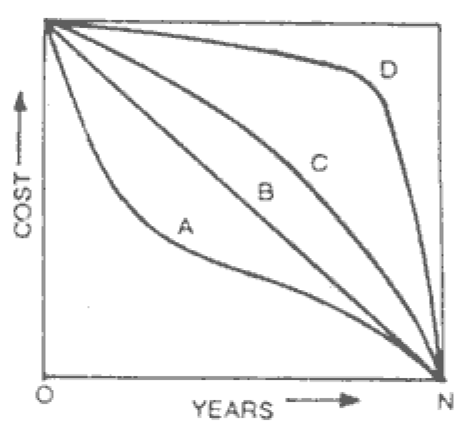
A bulk supply was taken by a large industrial consumer at the rate of $ 80 |per kW plus 2.5 cents per kWh.

111. The average charge per kWh when the load factor is 20%. will be **7 cents.**

112. The average charges per kWh will be least when the plant load factor is **100%.**

113. **The area of the curves divided by the number of hours gives load factor** about the daily load curve is valid.

Questions 114 and 115 refer to the given figure given below



114. In the figure shown **curve A** represents diminishing value method for depreciation.

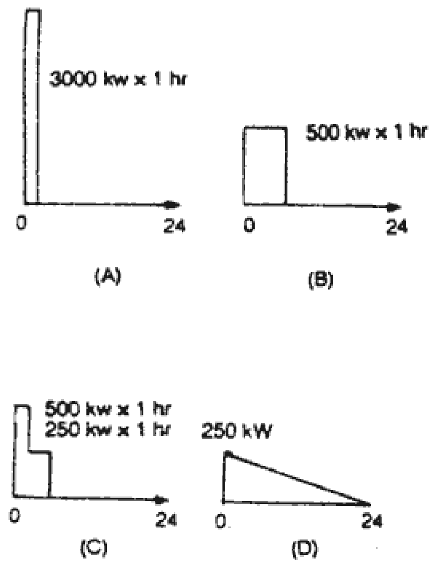
115. Sinking fund method is represented by **curve C.**

116. An equipment purchased for $ 10,000 two years ago has a market value of $ 12500 at present. It can be concluded that **the value has appreciated with the time.**

117. In a steam power plant, which component needs maximum maintenance attention **Boiler.**

Questions 118 to 122 refer to the following data

Four loads as shown in figure given below are connected to a power station. Abscisse is time from 0 to 24 hrs in all cases, Ordinate represents the load in kW.



118. **Load C** has the lowest average demand.
119. **A, B and D loads** offer the identical average load.
120. The peak load on the plant is **4250 kW.**
121. The load factor of the plant supplying power to these loads will be nearly **11%.**
122. The diversity factor of the plant supplying these loads will be **1.0.**

Questions 123 to 125 refer to the data given below

The input-output curve of a 0.5 MW generating stations is defined by

$$\mathbf{I = 30 + 0.8\ L + 0.5\ L^2}$$

Where I is in millions of Cal per hour and L is in megawatts.

123. The input when the plant was running on no load was **30×10^6 kcal**
124. Total input when the plant was generating 35 MW was **362.5×10^6 kcal/hr.**
125. When the load on the generator was 25 MW the heat rate in kcal / MW hr was nearly **16×10^6**

Questions 126 to 129 refer to the data given below

Manufacturer A offers his equipment costing $. 150,000 + 45 x kW. The equipment is guaranteed to give the following operating cost $. 18 + 0.007 kWh.

Manufacturer B offers his equipment costing $. 1,12000 + 50 x kW the operating cost is guaranteed as $. 16.50 + 0.0072 kWh

kW indicates machine rating and kWh indicates output.

126. **Machine supplied by manufacturer B** is cheaper to own in 5000 kW range.

127. **7600 kW** rating the initial cost of the two machines will be identical.

128. **75000 kWh** the two sets will be equally economical to operate.

129. Power factor is given by **active power / reactive power.**

130. For the same cylinder dimensions and speed, **Petrol engine** will produce least power.

131. For under water movement Submarines are powered by **batteries.**

132. Ships are generally powered by **diesel engines.**

133. **no blades** A turbojet aero plane has.

134. An interconnected system has the following plants

I. Run off the river plant

II. Nuclear power plant

III. Steam power plant

IV. Hydro-electric plant with storage

V. Diesel engine plant.

I and II plants can be exclusively used for base load.

135. **V** plant can be used exclusively for peak load.

136. Direct conversion of heat into electrical energy is possible through Magneto **hydrodynamic generators.**

137. In a fuel cell electricity is produced by **oxidation of fuel.**

138. A certain plant has fixed cost of $. 40,000 and a salvage value of $. 4000 at the end of a useful life of 20 years the depreciated value of the plant at the end of 10 years will be least (interest rate being 6% compounded annually) when calculated by **Diminishing value method.**

139. In the above problem the value will be highest when calculated by **Sinking fund method.**

140. Low power factor is usually not due to **incandescent lamp.**

141. **Hydro-electric plant** has the least running cost per kWh of energy generated.

142. Base load plants have **high capital cost, low operating cost and high load factor**

143. **Coupled to hydraulic turbine** alternator will have a greater number of poles.

144. **coupled to hydraulic turbine** alternator usually runs at slow speed as compared to others.

145. In a thermal power station of moderate size, the electrical power is generated at a voltage of **11KV.**

146. The resistance of the dry skin of human body, between the tip of the left-hand finger and right-hand finger, is of the order of **100,000 ohms.**

147. If the resistance of dry skin of human body is 100,000 ohms, the resistance of the wet body will be **5000 ohms.**

148. The effect of electric shock on human, body depends on **Voltage, Current, Duration of contact**

149. A current of 10 milliamperes through human body **will cause mild sensation.**

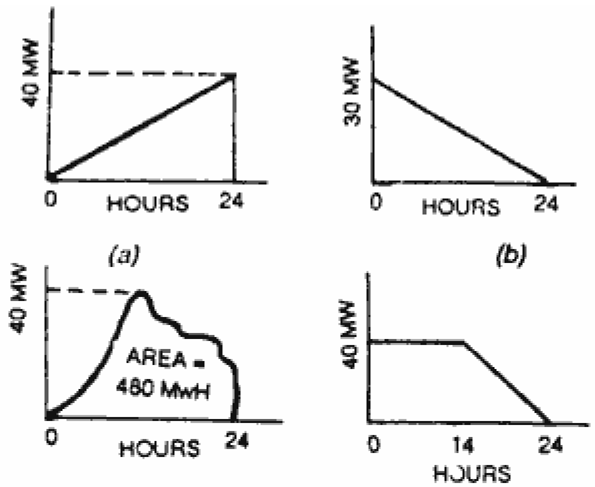
150. Death is almost certain when the current through human body is **100 milliamperes.**

151. For extinguishing electrical fires **Carbon tetrachloride fire extinguisher should be used.**

152. First aid for electric shock victim is **artificial respiration.**

153. HRC fuses provide best protection against **short circuits.**

154. load **curves C** shown in the following figure which load has the least value of load factor.



155. Sparking occurs when a load is switched off because the circuit has high **inductance.**

156. Zero sequence component always flows through **neutral wire.**

157. A mild steel bar over which a coil is wound, and a high frequency current is passed, will get heated up due to **induction heating.**

158. Domestic supply of 220 V 50 Hz signifies that peak value of voltage Waveform is **310 V.**

159. If two numbers X and Y with respective errors of 4% and 5% are multiplied, the relative error in the result would be **9%.**

160. **Thermocouple** is not a source of power.

161. The safest value of current which the human body can sustain for more than 3 seconds is **9mA.**

162. If a consumer is charge at $. x / kVA of maximum demand and the expenditure incurred on power factor correction equipment is $ y / kVAR per annum, then most economical power factor is given by cosφ √ **(1-(y / x)^2).**

163. **Direct stroke on line conductor** is most dangerous.

164. **Rod gaps, Surge absorbers and Horn gaps** are the protective device against lightening over voltages.

165. A disadvantage of synchronous condenser are **Continuous losses in Motor, High maintenance cost, Noisy.**

166. Gas turbine plants can have

I. Multistage compression

II. Heat exchangers

III. Reheating.

For maximum efficiency **I, II and III** features should be incorporated in a gas turbine power plant.

167. A coaxial line is filled with a dielectric of relative permittivity. If C denotes the velocity of propagation in free space, the velocity of propagation in the line will be **C / 3.**

168. When a power plant is not able to meet the demand of consumers it will resort to **load shedding.**

169. Load shedding is possible through voltage reduction **frequency reduction, switching off the loads.**

170. **Wind power plant, Tidal power plant, Solar power plant** can generate power at unpredictable or uncontrollable times.

171. Direct conversion of heat into electrical power is possible through **thermionic converter.**

172. In a fuel cell positive electrode is of **oxygen.**

173. Debentures Bonds are Sources of borrowing money EXCEPT **shares.**

174. Ideally depreciated value of the plant plus the accumulation in the depreciation fund should be equal to **original invested capital.**

175. In power plants insurance cover is provided for **equipment only,skilled workers only, unskilled workers only**

176. Debenture: Interest::**Shares: Dividend.**

177. Maximum demand tariff is generally not applied to domestic consumers because **their maximum demand is low.**

178. **$. 46.34**must be deposited at the end of each year in a sinking fund for 15 years to accumulate $. 1000 if interest is at 5 percent.

179. If $. 50 were deposited at the end of each year for 12 years in a sinking fund earning 6%, the total accumulation would be$. 843.50.

180. An advantage of static capacitor for power factor improvement is **Low losses, Little maintenance cost, Case in installation.**

181. The usual value of **diversity factor more than one and demand factor is less than is one.**

182. The amount repaid to a person at the end of 15 years, who invests $. 12,000 at 4 percent interest compounded annually, will be**$. 21,612.**

183. **$. 376.93** is the present worth of receiving $. 1000 twenty years from now if money can earn 5% interest compounded annually.

Questions 185 to 187 refer to data given below

$. 10,000 are invested for 20 years at 6 percent.

184. The amount accumulated when the interest is compounded annually will be**$. 32,070.**

185. The amount accumulated when the interest is compounded semi-annually will be**$, 32,620.**

186. The amount accumulated when the interest is compounded monthly will be**$. 33,100.**

187. As the load factor approaches unity, the shape of load duration curve will be nearly **rectangular.**

188. When maximum and average loads are equal, the load factor will be **1.0.**

189. Capacity factor and load factor become identical when **peak load is equal to the capacity of the plant.**

190. A low utilization factor for a plant indicates that plant is **used for stand by purpose only.**

Questions 191 to 193 refer to the following data

Power plants considered are

I. Diesel

II. Thermal

III. Hydro

IV. Nuclear.

191. Plants in ascending order of capital cost per MW are **I, II, III, IV.**

192. Plants in descending order of their expected useful life are **III, II, IV, I**

193. Plants in ascending order of their operating cost per MWH generated are **III, II, IV, I**

194. Sinking fund is **Initial value - Salvage value.**

195. Load curve helps in deciding **sizes of the generation units, total installed capacity of the plant, operating schedule of generating units.**

Chapter # 26 Transmission and Distribution

1. **264 kV** is not the transmission voltage in America.
2. **9.9 kV** is usually not the generating voltage.
3. Boosters are basically **transformers**.
4. **Single-phase -4 wire** is not the distribution system normally used.
5. Conductors for high voltage transmission lines are suspended from towers **to increase clearance from the ground**.
6. Transmission efficiency increases as **voltage and power factor both increase**.
7. With the same maximum voltage to earth, **three phase-four wire (neutral = outer)**, (with p.f. 0.8) will require more copper as compared to dc 2 wire system.
8. When an alternating current pass through a conductor, a **portion of the conductor near the surface carries more current as compared to the core**.
9. The fact that a conductor carries more current on the surface as compared to the core, is known as the **skin effect**.
10. The effective resistance of a conductor will be the same as ohmic resistance when **Current is uniformly distributed in the conductor cross-section**.
11. Skin effect results in **increased effective resistance but reduced effective internal reactance of the conductor**.
12. Skin effect depends on **all of the following**
    A) size of the conductor
    B) frequency of the current
    C) the resistivity of the conductor material
13. The skin effect of a conductor will reduce as the **resistivity of the conductor material increases**.
14. Skin effect is proportional to **(diameter of the conductor)^2**.
15. In overhead transmission lines, the effect of capacitance can be neglected when the length of the line is less than **80 km**.
16. For constant voltage transmission, the voltage drop is compensated by installing **synchronous motors**.

17. The disadvantage of constant voltage transmission is **short circuit current of the system is increased**.
18. The surge impedance for an overhead line is taken as **100-200 ohms**.
19. Pin insulators are normally used up to a voltage of about **25 kV**.
20. Strain type insulator arc used where the conductor's arc is **any of the following**

    A) dead ended

    B) at intermediate anchor towers
21. For 66 kV lines, the number of insulator discs used is**5**.
22. Ten discs usually suggest that the transmission line voltage is **132 kV**.
23. The effect of the corona is **increased energy loss**.
24. Corona usually occurs when the electrostatic stress in the air around the conductor succeeds **30 kV (maximum value)/cm**.
25. Corona effect can be detected by **all of the following**

    A) hissing sound

    B) the faint luminous flow of bluish color

    C) presence of ozone detected by odor
26. The current drawn by the line due to corona losses is **non-sinusoidal**.
27. The presence of ozone as a result of the corona is harmful because **it corrodes the material**.
28. Between two supports, due to sag, the conductor takes the form of **catenary**.
29. The inductance of a single phase two wire line is given by (D is the distance between conductors and 2v is the diameter of a conductor) **0.4 $\log_e$ (D/r) mH/km**.
30. The effect of ice deposition on a conductor is **increased weight**.
31. The effect of wind pressure is more predominant on **supporting towers**.
32. This statement is correct; **Wind pressure is taken to act in a direction at right angles to that for ice**.
33. This statement is incorrect; **Tension and sag in transmission lines are complementary to each other**.
34. Wooden poles for supporting transmission lines are used for voltages up to **22 kV**.

35. If K is the volume of cable conductor material required to transmit power, then for the transmission of the same power, the volume of cable conductor required for a single phase 2 wise AC system is **$2k/\cos^2 p$**.

36. The maximum permissible span for wooden poles is **60 meters**.

37. When transformers or switchgear are to be installed in a transmission line, the poles used are **H type**.

38. For improving life, steel poles are galvanized. Galvanizing is the process of applying a layer of **zinc**.

39. **All of the following** are the disadvantages of transmission lines as compared to cables

A) exposure to lightning.

B) exposure to atmospheric hazards like smoke, ice, etc.

C) inductive interference between power and communication circuits.

40. ACSR conductor implies, **Aluminum conductor steel reinforced**.

41. The surge resistance of transmission lines is about **500 ohms**.

42. During storms, the live conductor of the public electric supply breaks down and touches the earth. The consequences will be, **current will flow to earth**.

43. In the transmission system, a feeder feeds power to **distributors**.

44. For transmission lines, the standing wave ratio is the ratio of **maximum voltage to minimum voltage**.

45. In a transmission line following arc the distributed constants **resistance, inductance, capacitance, and short conductance**.

46. The bundling of conductors is done primarily to **reduce reactance**.

47. **2%** regulation is considered to be the best.

48. The characteristic impedance of a transmission line depends upon the **geometrical configuration of the conductors**.

49. For a distortion-less transmission line (G = shunt conductance between two wires), **R/L = G/C**.

50. Guard ring transmission line **reduces the earth capacitance of the lowest unit**.

51. When the power is to be transmitted over a distance of 500 km, the transmission voltage should be in the range **150kV - 220kV**.

52. A relay used on long transmission lines is **mho's relay**.

53. The total load transmitted through a 3-phase transmission line is 10,000 kW at 0.8 power factor lagging. The I^2R losses are 900 kW. The efficiency of the transmission line is **90%**.

54. Litz wires are used for intermediate frequencies to overcome **skin effect**.

55. In order to reduce skin effect at UHF **copper tubes with silver plating are used**.

56. Shunt capacitance is usually neglected in the analysis of **Short transmission lines**.

57. The chances of corona are maximum during **humid weather**.

58. The power transmitted will be maximum when**Sending end voltage is more**.

59. Neglecting losses in a transmission system, if the voltage is doubled, for the same power transmission, the weight of conductor material required will be **one-fourth**.

60. When two conductors each of radius r are at a distance D, the capacitance between the two is proportional to**$1/\log_e (D/r)$**.

61. In a transmission line having negligible resistance the surge impedance is**$(L/C)^{1/2}$**

62. A relay used on short transmission lines is the **Reactance relay**.

63. In case the characteristic impedance of the line is equal to the load impedance **all the energy sent will be absorbed by the load**.

64. For a properly terminated line **ZR =Z0 = 0**.

65. The dielectric strength of air at 25^0C and 76 cm/Hg is**30 kV/cm**.

66. The chances of corona are maximum in **transmission lines**.

67. Transmission lines link **generating station to receiving end station**.

68. In case of open circuit transmission lines, the reflection coefficient is **Zero**.

69. Impedance relay is used on **Medium transmission lines**.

70. **Disc type** insulators are used on 132 kV transmission lines.

71. String efficiency can be improved by **any of the following**

A) using Longer cross arm

B) grading the insulator

C) using a guard ring

72. Minimum horizontal clearance of a low voltage transmission line from residential buildings must be**4 feet**.

73. If a 66 kV lines passes over a residential building, the minimum vertical clearance from the roof of the building must be**13 feet**.

74. Alternating current power is transmitted at high voltage **to minimize transmission losses**.

75. Stranded conductors arc used for transmitting, power at high voltages because of **ease-in handling**.

76. For the same resistance of line, the ratio, weight of copper conductor/ weight of aluminium conductor, is **2.0**.

77. The function of steel wire in a ACSR conductor is **to provide additional mechanical strength**.

78. In high voltage transmission lines, the top most conductor is **Earth conductor**.

79. For 11 kV line the inductance per km per phase will be of the order of **1 mH**.

80. For 11 kV line the capacitance per km per phase will be of the order of **0.01 Farad**.

81. If 3000 kW power is to be transmitted over a distance of 30 km, the desirable transmission voltage will be **33 kV**.

82. The permissible voltage variation in transmission and distribution system is**±10%**.

83. The voltage of transmission can be regulated by **any of the following**

A) use of tap changing transformers

B) switching in shunt capacitors at the receiving end during heavy loads

C) use of series capacitors to neutralize the effect of series reactance

84. The most economic voltage for transmitting given power over a known distance by overhead transmission line is approximately **3.6 kV/km**.

85. String efficiency is given by **(voltage across the string) / ((numbers of discs on the string) x (voltage across disc nearest to the conductor))**.

86. For a 66 kV line having span of 200 meters between towers the approximate sag will be **2 m**.

87. In the above case if the span is doubled, the sag will be **8m**.

88. The reflection coefficient for a short circuit line is **- 1**.

89. In case the height of transmission tower is increased **the line capacitance will decrease but line inductance will remain unaltered**.

90. In a transmission line if booster transformers are to be used, preferred location will be**at the intermediate point**.

91. A 70/6 ACSR conduction is an aluminium conductor steel reinforced, having **70 aluminium conductors and 6 steel conductors**.

92. In aluminium conductors steel reinforced, the insulation between aluminium and steel conductors is **no insulation is required**.

93. Under no load conditions the current in a transmission line is due to **capacitance of the line**.

94. **Ring main system** distribution system is more reliable.

95. **Direct current system** of distribution offers the best economy.

96. **All of the following** are the advantages of dc transmission system over ac transmission system

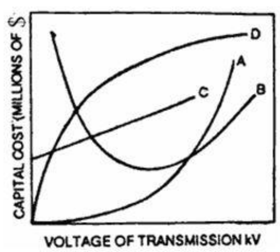
A) DC system is economical

B) There is no skin effect in dc system

C) Corona limits are highest for dc circuits as compared to ac circuits

97. The main advantage of ac. transmission system over DC transmission system is **Less losses in transmission over long distances**.

98. **Curve B** correctly represents the relation between capital cost and dc voltage of transmission.



99. Step-up substations are associated with **generating stations**.

Questions 100 to 102 refer to figure given below:

100. A section of a single bus scheme is shown in the figure. In this figure B represents **Current transformer**.

101. An isolator is represented by **A and D**.

102. C represents **circuit breaker**.

103. When an alternator is connected to the infinite bus bar and its excitation is gradually increased **the terminal voltage will remain unaltered**.

104. Consumers having low power factor equipment are advised to install **capacitor bank**.

105. A bus bar is rated by **current, voltage, frequency and short time current**.

106. Material generally used for bus bar is **aluminium**.

107. **Electrical resistivity** has got higher value for aluminium as compared to copper.

108. For carrying a 100 A (rms) current the cross-sectional area of aluminium bus bar should be at least**25 mm** ^{2}

109. Isolators are used to disconnect a circuit when **there is no current in the line**.

110. Tap changing transformers are used for **both stepping up and stepping down the voltage**.

111. **Circuit breaker** automatically interrupts the supply in the event of surges.

112. In a substation the equipment used to limit short circuit current level is **Series reactor**.

113. **Exciters** equipment is not installed in a substation.

114. **Single bus bar scheme** offers the lowest cost.

115. **Double bus bar double breaker** is the most expensive bus bar scheme.

116. Current rating is not necessary in case of **Isolators**.

117. **Open circuit breaker - open isolator - close earthing switch** represents the sequence of operations of isolator circuit breaker and earthing switch while opening a circuit.

118. **Ensure circuit breaker is open - close isolator - open earthing switch if any close circuit breaker** represents the sequence of operations of isolator circuit breaker and earthing switch while closing a circuit.

119. **All of the following** type tests are conducted on isolators

A) Temperature rise test

B) Impulse stage with stand test

C) Short time current test

120. In a balance 3 φ , 4 wire AC system, the phase sequence is RYB. If the voltage of R phase is. 230 < 0° V, then for Y phase**230 < 120° V**.

121. The relation between traveling voltage wave and current wave is**e = i (L/C)** ^{½}

122. Steepness of the traveling waves is attenuated by **resistance of the line**.

123. The protection against direct lightening strokes and high voltage steep waves is provided by **lightening arresters and ground wires**.

124. Voltages under Extra High Voltage are**330 kV and above**.

125. In outdoor substation, the lightening arrester is placed nearer to **the power transformer**.

126. Stability of a system is not affected by **Losses**.

127. A 10 MVA generator has power factor 0.866 lagging. The reactive power produced will be**5 MVA**.

128. In order to increase the limit of distance of transmission line **series capacitors and shunt reactors are used**.

129. A 30 km transmission line carrying power at 33 kV is known as **short transmission line**.

130. If K is the volume of conductor material required for 2 wire dc system with one conductor earthed, then the volume of cable conductor material required for transmission of same power in single phase 3 wire system is (A) K/3 cos φ**K/ 5 cos^{2}φ**.

131. The permissible voltage variable in voltage in distribution is**10%**.

132. Surge impedance of transmission line is given by**(L/C)$^{1/2}$**

133. 750 kV is termed as **Ultra high voltage**.

134. In case of transmission line conductors with the increase in atmospheric temperature **length increase but stress decreases**.

135. If the height of transmission towers is increased, **Capacitance** is likely to change.

136. For increasing the capacity of a transmission line to transmit power **Line inductance** must be decreased.

137. In terms of constants A, B, C and D for short transmission lines, **C=0** relation is valid.

138. **Power loss due to corona** is reduced due to the use of bundled conductors.

139. The ratio of capacitance from line to line and capacitance from line to neutral is nearly**1/4**.

140. Following effects are associated with transmission lines

I. Corona effect

II. Proximity effect

III. Skin effect.

The effect resistance of a conductor is increased by **II and III only**.

141. The sag of a transmission line is least affected by **current through conductor**.

142. The sag of the conductors of a transmission line is 1.5 m when the span is 100 m. Now if the height of supporting towers is increased by 20%, the sag will **remain unchanged**.

143. ACSR conductor having 7 steel stands surrounded by 25 aluminum conductor will be specified as**25/7**.

144. The networks associated with transmission lines are

I. T-network

II. π network

III. Tree net.

A two-terminal pair of network of a transmission line can be represented by **Either of I or II**.

145. **B = Z = C** is not valid for short transmission lines.

146. In order to improve the steady state stability of an overhead transmission lines, **any of the following** methods can be adopted

A) Reducing impedance between the stations

B) Adopting quick response excitation systems

C) Using series capacitors to make $X = (3\,R)^{1/2}$

147. Transient disturbances arc due to **any of the following**

A) Switching operations

B) Load variations

C) Faults

148. **Dead short circuit** is the most dangerous.

149. In case line to line fault occurs, the short circuit current of an alternator will depend on its **Synchronous reactance**.

150. Transient state stability is generally improved by, **using high speed governors on machines by**.

151. Aluminium is being favored as bus-bar material mainly because of **low cost**.

152. **Any of the following** section can lie used for bus bar

A) Bars

B) Rods

C) Tubes

153. A string efficiency of 100% implies that **potential across each disc is same**.

154. Steel poles for transmission lines need protection against **corrosion**.

155. **Hard drawn** type of copper wire will have highest tensile strength.

156. Guy wire is used to **Support the pole**.

157. **Underground cables** system is a leading power system.

158. **Rectifier** is a static exciter.

159. The service mains connect **distributor and consumer terminals**.

160. System grounding is done for **all of the following reasons**

A) so that the floating potential on the lower voltage winding for a transformer is brought down to an insignificant value

B) so that arcing faults to earth would not set up dangerously high voltage on healthy phases

C) so that inductive interference between power and communication circuits can be controlled

161. Hot template curves are plots of **conductor sage and span lengths**.

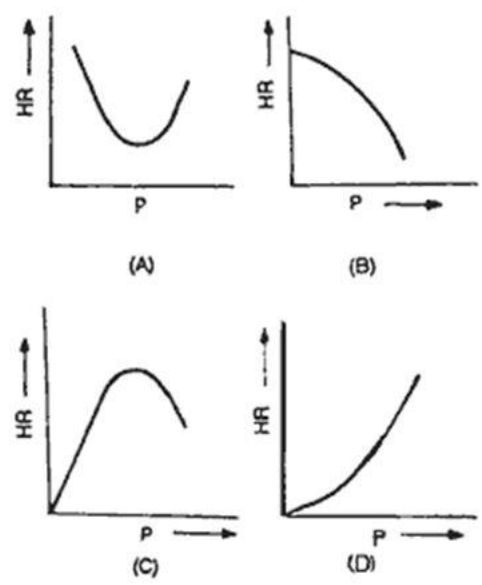
Questions 162 and 163 refer to data given below:

A 66 kV system has string insulator having five discs and the earth to disc capacitance ratio of 0.10.

162. The string efficiency will be**67%**.

163. The voltage shared by the individual discs will be **5.28 kV**.

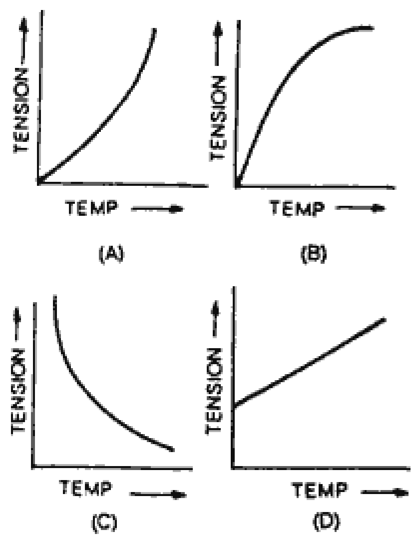
164. The shape of heat rate (HR) versus power (P) curve for a power station will be as shown in **figure C**.



165. The reflection coefficient for the voltage wave in case of overhead lines is given by **$(R_L - R_0)/(R_L + R_0)$**.

166. In a diesel engine the governor controls **fuel flow rate**.

167. For overhead transmission line when the conductors are supported between two supports, the variation of tension T with temperature is represented by **Curve C**.



168. If the voltage across the units in a two-unit suspension insulator is 60% and 40% respectively of the line voltage, the. ratio of capacitance of the insulator to that of its capacitance to earth will be **0.50**.

169. In the analysis of short transmission lines **Shunt admittance** is neglected.

170. In medium transmission lines the shunt capacitance is taken into account in **all of the following**

A) Tee method

B) Pie method

C) Steinmetz method

Questions 171 and 172 refer to data given below:

A transmission line has a capacitance of 0.01 micro F/km and an inductance of 2 mH/km and is connected to a cable having an inductance of 0.25 mH/km. When voltage surge having peak value of 100 kV travels along the cable towards the line, the resulting peak voltage at the junction of the cable and the line is 180 kV.

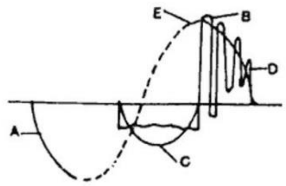
171. The surge impedance of the cable is **141.2 ohms**.

172. The capacitance of cable per km is **0.1 microFarad**.

Chapter # 27 Circuit Breakers

1. A circuit breaker is a **current interrupting device**.
2. The function of protective relay in a circuit breaker is **to close the contacts when the actuating quantity reaches a certain predetermined value**.
3. Low voltage circuit breakers have rated voltage of less than **1000 V.**
4. The fault clearing time of a circuit breaker is usually **few cycles of supply voltage**.
5. The medium employed for extinction of arc in air circuit breaker is **air**.
6. **SF6 oil circuit breakers** is preferred for EHT application.
7. For high voltage, ac circuit breakers, the rated short circuit current is passed for **3 seconds.**
8. **Vacuum** is not a type of the contactor for circuit breakers.
9. Interrupting medium in a contactor may **be air, oil, SF6 gas (any of the above).**
10. In air blast circuit breakers, the pressure of air is of the order of **20 to 30 kg/cm^2**
11. SF6 gas is **Sulphur hexafluoride.**
12. SF6 gas is **non-inflammable.**
13. SF6 gas has density 5 limes as compared to that of air.
14. The pressure of SF6 gas in circuit breakers is of the order of **3 to 5 kg/cm^2**
15. While selecting a gas for circuit breaker, the property of gas that should be considered is **high dielectric strength, on-inflammability, on-toxicity (all of the above.)**
16. **Air-break circuit breaker** has the lowest voltage range
17. **Air blast circuit breaker** can be installed on 400 kV line

18. In a vacuum circuit breaker, the vacuum is of the order of $\mathbf{10^{-9}}$**mmHg.**
19. In modern EHV circuit breakers, the operating time between instant of receiving trip signal and final contact separation is, of the order of **0.03 sec**.
20. In a HRC fuse the time between cut-off and final current zero, is known as **arcing time**
21. Fusing factor for a HRC fuse is **Minimum fusing current / Current rating**
22. **Bulk-oil circuit breaker** does not use pneumatic operating mechanism
23. The contact resistance of a circuit breaker is. of the order of 20 **micro ohms ± 10**
24. The insulation resistance of high voltage circuit breaker is **2000 Mega ohm.**
25. There is definite objection to use **water** medium for extinguishing the arc in case of a circuit breaker
26. In a circuit breaker if the insulation resistance between phase terminal and earthed frame is less than the specified limit, the probable cause could be **moisture, dirty insulation surface, carbon or copper particles sticking to the internal surface (any of the above).**
27. If a circuit breaker does not operate on electrical compound, the probable reason could **be spring defective, trip circuit open, trip latch defective (any of the above.**
28. The normal frequency rms voltage that appears across the breaker poles after final arc extinction has occurred, is **recovery voltage**
29. The transient voltage that appears across the contacts at the instant of arc extinction is called **re striking voltage.**
30. In a circuit breaker the active recovery voltage depends upon **power factor, armature reaction, circuit conditions (all of the above).**
31. The following figure shows the voltage waveform across the pole of a circuit breaker; In this voltage R represents **restriking voltage**



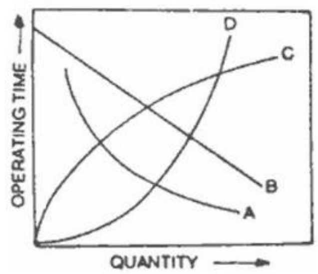
32. In the above figure, D represents **Recovery voltage**

33. Best protection is provided by HRC fuses in case of **Short circuits**

34. For motor circuit breakers, the time of closing the cycle is **0.003 sec.**

35. A relay used for protection of motors against overload is **Thermal relay**

36. **Curve A** in the figure represents inverse time characteristics



37. Fuse protection is used for current ratings up to **100 A**

38. The fuse current in amperes is related with fuse wire diameter D as I ∞ $\mathbf{D^{3/2}}$

39. The acting contacts for a circuit breakers are made of **Copper tungsten alloy**

40. Ionization in a circuit breaker is not facilitated by **material of contacts**

41. **Air break circuit breaker** is generally used in railway traction

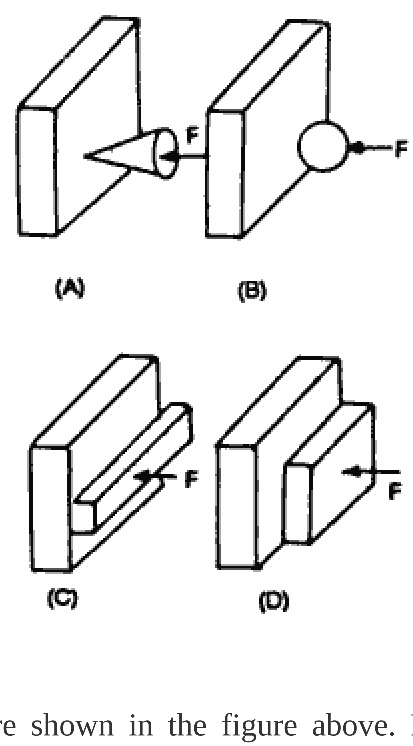
42. A fuse wire should have High **specific resistance and low melting point**

43. Fuse wire, protection, system is usually not used beyond **100A.**

44. **SF6 gas circuit breaker** is preferred for extra high voltage lines

45. The number of cycles in which a high-speed circuit breaker can complete its operation is **3 to 8**

46. When D is the diameter of fuse wire, the fusing current will be proportional to $D^{3/2}$
47. **Silver** is best suited for manufacturing of fuse wire is
48. In a circuit breaker the current which exists at the instant of contact separation is known as **breaking current**
49. A Merz-price protection is suitable for **alternators**
50. 'Kick fuse' has **inverse characteristics**.
51. Air blast circuit breakers for 400 kV. Power system are designed to operate in **50 milli seconds**
52. Breaking capacity of a circuit breaker is usually expressed in terms of **MVA**
53. Sulphur hexafluoride is a **Dielectric**
54. The contact resistance is least affected by **the ambient temperature.**
55. The arc voltage produced in ac circuit breaker is **in phase with the arc current**
56. Refer to the following figure.



Various forms of contacts are shown in the figure above. Point contact is (are) represented by **A and B only**

57. **C** contact surface provides line contact only

58. **C AND D** contact are widely used in switchgear particle

59. For the various types of contacts Shown, for the same force, F, the contact resistance will be least in case of **A**

60. As the force on contact is increased, the contact resistance will **decrease**

61. The heat produced at the contact point, due to passage of current, will least depend on **temperature of the surrounding medium**.

62. For the contact and their material, **Contact resistance** should have low value.

63. Minimum arcing voltage will be least in case of **silver**

64. Minimum arcing voltage for platinum is 16 V. It can be therefore concluded that when the voltage is below 16 V, **it will be possible to interrupt any value of current without arcing**

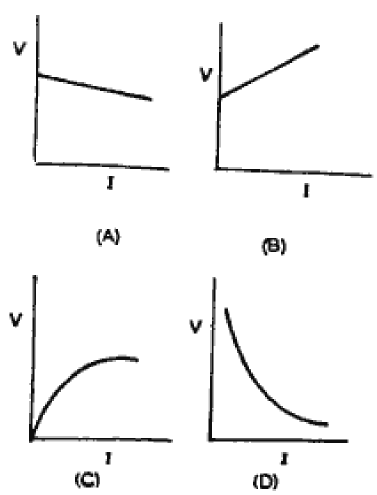
65. Oil immersion of contacts is the method of **arc dispersion**

66. **Use of rectifiers** is not the method of arc dispersion

67. **Tungsten** contact point metals has the highest melting point

68. The arc voltage produced in the circuit breaker is always **in phase with arc current**

69. Figure A represents the voltage-current characteristics of arc in a circuit breaker



70. Ionization process during arc is generally accompanied by emission of **light,**

heat, sound (all of the above).

71. Sparking between contacts can be reduced **by inserting a capacitor in parallel with the contacts.**
72. For magnetic blow out of arc the magnetic field is produced at **right angles to the axis of the arc**
73. Cool gases are solids brought into the arc stream assist in quenching the arc mainly by **De ionization**
74. Sparking occurs when a load is switched off because the circuit has **high inductance**
75. HRC fuses are **High rupturing capacity fuses**
76. **Tungsten, Molybdenum, Nickel** alloy metals does not amalgamate with mercury
77. For the same current, **24 SWG TIN-5 A** fuse wires will have the least fusing time
78. An automatic device that operates at present values is known as **relay**
79. The basic function of a circuit breaker is **to extinguish the arc**.
80. In a circuit breaker the arc is indicated by the process of **Thermal emission and Field emission**
81. The power factor of the arc in circuit breaker is **always unity**
82. Air blast circuit breakers are usually used for **repeated duty**
83. Flame proof switch gears are usually preferred **in mines**
84. **10-30 kg/cm^2** is Pressure of air in air blast circuit breakers
85. Air used in air blast circuit breaker **must be free from moisture**.

86. In a circuit breaker the time duration from the instant of fault to the instant of energizing of the trip coil is known as **protection time**
87. In a circuit breaker the time duration from the instant of the fault to the

extinction of arc is known as **total clearing time**

88. In a circuit breaker the time duration from the instant of fault to the instant of closing of contact is known as **Re closing time.**
89. For high speed circuit breakers, the total time is nearly **Half cycle**
90. For a high-speed circuit breaker, the total clearing time is nearly **1 to 2 cycles**
91. If the power factor is zero, the active recovery voltage will be **maximum**
92. **Conservator** is not a part of the circuit breaker
93. A circuit breaker will normally operate **Whenever fault in the line occurs.**
94. **Air blast circuit breaker** will produce the least arc energy
95. For a circuit breaker 'break time' is **opening time + arc duration + resistor current duration**
96. The breaking capacity of a circuit breaker in MVA (3 phase) is given by **$(3)^{1/2}$x rated service voltage x rated symmetrical current.**
97. **Translay relay** is used for feeders
98. **Buchholz relays** is used on transformers
99. MHO relay is used for transmission **lines**
100. Merz-price protection is used on **generators**
101.

Relay	**Operation**
(a) Static relay	No moving parts relay
(b) Over current relay	Responds to increase in current (ii)
(c) Differential relay	Responds to vector difference between two electrical quantities
(d) Instantaneous	Quick operation

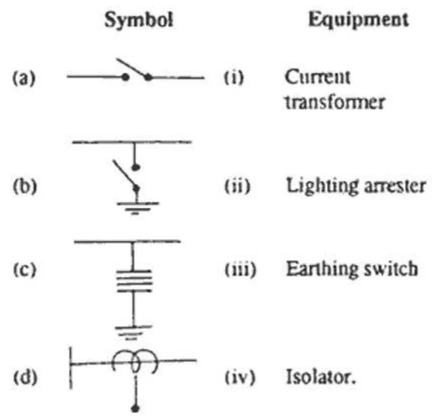
102. The values of fault current depend on **voltage at the faulty point and total impedance up to the fault**

103. The advantage of neutral earthing is simplified design of earth fault protection, over-voltages due to lightning can be discharged to the earth, freedom from persistent arcing grounds (all of the above)

104.

Material used in circuit breaker	Application
(a) Poly tetra	(i) Bearing surfaces fluoroethylene and sliding parts
(b) SF6 gas	(ii) Insulating medium
(c) Electrolytic	(iii) Main contacts copper
(d) Dielectric oil	(iv) Quenching medium

Match the following:



a - (iv), b - (iii), c - (ii), d - (i)

105. The over-voltage surges in power systems may be caused by
lightning, switching, resonance, (any of the above)

106. The protection against over-voltage due to lightening is provided by **use of surge diverters, low tower footing resistance, use of overhead ground wires,**

(any of the above).

107. **PLASMA** is a conducting medium for electric current

108. In circuit-breakers the contact space is ionized by **thermal ionization of gas, thermal emission from surface of contacts, field emission from the surface of contacts, (any of the above).**

109. These are air-break switching devices **Isolator, Limit switch, Earthing switch, (All of the above).**

110. **SF6 has dark yellow color** is an incorrect statement.

111. SF6 gas is transported in **liquid form in cylinders**

112. During arc extinction SF6 gas **decomposes into SF4and SF2**

113. Dielectric strength of SF6 is **less than that of oil used in OCB**

114. Demerit of SF6 circuit breakers are

- sealing problem of gas
- In flux of moisture in the gas system is dangerous
- Deterioration of quality of circuit breaker affects reliability of circuit breaker

115. Sphere gaps are used for

- measurement of high dc voltages
- measurement of high ac voltages
- measurement of impulse voltages

116. Flash point of dielectric is usually above is **140 degree centigrade**

117. A fuse is normally a **current limiting device**

118. Most of the fuses operate due to **heating effect of current**

119. Normally the fuse elements are in parts which are connected in the middle

by ten bridge. The melting point of tin bridge is **230°C**

120. The material used for bus bars should have

- low resistivity
- higher softening temperature
- low cost

121. Insulation resistance of HV circuit breaker is more than **100M ohms**

122. The isolator is interlocked with circuit breaker and earthing switch. While opening the circuit **........ circuit breaker**........... opens first, then the ...... **isolator** and only after this the........... **earthing switch ....** can close

123. The main factor in favour of the use of aluminium as bus bar material is **its low cost**

124. Over-current protection for motor is provided **by over-current relay**

125. Fuse in motor circuit **provides short-circuit protection**

127. In **Direct-on-line method** of starting a motor, the starting current is the maximum

128. For a Transformers 250 kVA, 11/0.415 kV percentage impedance 4.75%, the rated current for LV side fuse should be **348A** and rated current at HV side fuse should be **13.1A**

129. **Over-voltages, Surges, Transients** are the voltage waves of magnitude higher than the desirable value

130. Over-voltage transients may occur due to **lightning, switching, arcing grounds(any)**

131. Switching surges may be caused by **closing of unchanged line, load shedding at receiving end of line, switching of magnetizing current (any)**

132. Surge impedance of over-head transmission lines is of the order of **300 to 500 ohms**

133. The surge impedance of under-ground cables is of the order of **20 to 60 ohms**

134. **SF6 gas is nontoxic** is a correct statement

135. The surge impedance, of a transmission line is given by $\mathbf{(L/C)^{1/2}}$

136. Surge modifiers are used to **reduce the steepness of wave-front**

137. The steepness of the wave-front can be reduced by **connecting a capacitance between line and earth and connecting an inductor in series with the line**

138. In the circuit breaker, the arcing contacts are made of **copper tungsten alloy**

139. The disadvantage offered by ungrounded systems is **frequent arcing grounds, difficult earth fault relaying, voltage oscillations, (all of the above).**

140. Solid grounding is used for voltages **below 660V**

141. Resistance grounding is used for voltages **between 3.3 kV to 11 kV**

142. Switching over-voltages are more hazardous than lightning surges in case **of EHV and UHV systems.**

143. Current limiting reactors may be air cooled, air cored, oil immersed magnetically shielded, oil immersed non-magnetically shielded **(any of the above)**

144. Series reactors are installed at strategic locations of power systems to **bring down the fault level within the capacity of switchgear**

145. Fault diverters **divert the current to earth in the event of short-circuits**

146. In star connected system without neutral grounding, zero sequence currents are **zero 147.In Overhead lines** faults occur most frequently in transmission lines

148. Bulk-oil circuit breaker is suitable for voltages up to **36kV**

149. The ohmic value of impedance to be connected in the neutral to ground circuit of a 2000 kVA transformer with earth fault relay set to 40%, with respect to 400 V side will be **0.2 ohm**

150. For a 3-phase, 5000 kVA, 6.6 kV generator having 12% sub-transient reactance.

A 3- phase short-circuit occurs at its terminals, **the Fault MVA is 41.66 and fault current is 3640A**

151. The actuating quantity for the relays can be magnitude, phase angle, frequency**, (any of the above).**

152. Electro-magnetic relays may be operated by electro-magnetic attraction. electro- magnetic induction, thermal effect**, (any of the above).**

153. **Buchholz relay** is not a relay using electromagnetic force

154. Buchholz relay is operated by **Gas pressure**

155. Thermal relays are often used in **motor starters**

156. A bimetal strip consists of two metal strips have different **coefficient of expansion.**

157. Differential protection principle is used in the protection of
generators, transformers, feeders, (all of the above).

Chapter # 28 Transmission Lines and Cables

1. Cables can generally use up to **33KV**
2. Metallic shielding is provided on cables to **control the electrostatic voltage stress, reduce corona effect, decrease thermal resistance.**
3. The thickness on metallic shielding cables is usually **3 to 5 mm.**
4. The voltage of low-tension cable is **less than 1000V.**
5. In a three-core cable the colour of the neutral is **blue.**
6. Sheets are provided in cables for **preventing moisture from entering the cable.**
7. In cables, the charging current **leads the voltage by 90°.**
8. Breakdown in cables occurs due to **heating of cables when on load and cooling when not on load results in formation of voids which ultimately result in breakdown.**
9. A cable carrying alternating current has **hysteresis and leakage losses only.**
10. Which curve represents the variation of dielectric loss with temperature, for paper insulated cables **curve C.**
11. Inter-sheaths in cables are used **so that proper stress distribution could be provided.**
12. The span of transmission line between towers take the form of **parabola.**
13. Dielectric hysteresis loss in a cable varies as **(electrostatic stress) ^2.**
14. In paper insulated cables the conductor cross section is usually restricted to **6 sq cm.**
15. Cables for 220KV lines are invariably **compressed oil and compressed gas insulated.**
16. When compressed oil or gas is used for cables the section of conductor is **hollow tubular or other section.**
17. In compressed gas insulated cable SF6, the gas pressure is of the order of **3 to 5 kg/cm2**.
18. The advantage of cable on overhead lines is **can be used in congested areas.**
19. While laying 11KV cables, the minimum bending radius has to be (D= diameter) **12D.**
20. Inductance is introduced in cables to reduce distortion because **inductance of cables is too low.**

21. The inductance is introduced in cables in the form of **inductance bridge at the receiving end.**
22. Paper used as insulating material for cables is generally treated with oily compounds because **it gets electrostatically charged at high voltage.**
23. After impregnation with oily compounds, paper attains breakdown stress of about **200 KV/cm.**
24. Dielectric hysteresis loss in a cable varies as **(impressed voltage) ^2.**
25. The charging current in cables **leads the voltage by 90.**
26. Underground cables are laid at sufficient depth **to minimize effect of shocks and vibrations due to passing vehicles, etc.**
27. The insulation resistance of cable is specified by the manufacture at 250 Mohm per KM. the resistance of 200-meter length will be **50 M ohm.**
28. In a cable the voltage stress is maximum at **core of conductor.**
29. At bridge crossing and near the railway tracks ternary lead alloy cables are used because **it has low specific gravity.**
30. When the diameter of the core and cable is doubled, the value of capacitance **will be reduced to one fourth.**
31. Capacitor grading of cables implies **us of dielectric of different permeabilities.**
32. The surge resistance of cables is close to **25 ohms.**
33. Single core cables are usually not provided with **paper insulation.**
34. For locating the fault in a cable, the comparison of which parameter will be helpful **inductance.**
35. In a 3 phase 4 wire cable, the cross-sectional area of neutral conductor is **equal to the area of phase conductor.**
36. In the case of underground cables, the stress is maximum at **the interference of sheath and the conductor.**
37. If a cable is to be designed for use on 1000 KV, which insulation would you prefer **compressed sf6 gas.**
38. Sheaths are used in cables to **prevents the moisture from entering the cable.**
39.

40. If power cable and communication cable are to run parallel the minimum distance between the two, to avoid interference should be **50 cm.**
41. When a cable is to cross a road, it should **be laid in pipes or conducts.**
42. Which of the following conductor has the least electrical conductivity **lead**
43. Copper as conductor for cables is used as **annealed**
44. The size of conductor of power cables depends on **current**
45. Minimum bending radius for a 33KV cables should be **30 times the diameter**
46. The purpose of guard ring transmission lines is **to reduce the earth capacitance of the lowest unit.**
47. Cables with aluminum conductor can be joined by **compression**
48. Which of the following methods of jointing cables is not common between copper conductor and aluminum conductor cables **themist welding**
49. Electrical conductivity of aluminum Is nearly what percent of that of copper **60%**
50. Vulcanized rubber insulated cables are generally used for **wiring of buildings and factories**
51. Cables used in automobiles are usually **vulcanized rubber insulated**
52. Cables of arc welding sets are usually **vulcanized rubber insulated**
53. Insulation resistance of cables is usually measured in terms of **mega ohm**
54. When the service voltage of a cable is 250V, it should be checked after insulation for about 15 minutes, at a voltage of not less than **500 V**
55. When the service voltage of a cable is 11KV, it should be tested for short duration at a voltage of **20KV**
56. The breakdown voltage of cable depends on **all of the above(time of application of the voltage, working temperature, presence of moisture)**
57. Breakdown in a cable insulation may occur due to **any of above (puncture, thermal instability, tracking)**
58.
59.
60.
61. The insulating material for cable should have **all of the above (high resistivity, high dc electric strength, low permittivity)**

62. The insulating material for cable should have all of following except **high water absorption**
63. Natural rubber is obtained from **milky sap of tropical trees.**
64. Relative permittivity of rubber **between 2 and3**
65. The dielectric strength of rubber is **30 KV/mm**
66. The disadvantage with paper as insulating material is **it is hygroscopic**
67. The maximum safe temperature of paper insulated cable is around **90 C**
68. Extra high-tension cables are meant for operation up to **66KV**
69. The advantage of oil filled cables is **all of the above (smaller overall size, no ionization, oxidation and formation of voids, more perfects impregnation.**

Chapter # 29 High Voltage Engineering

1. Dielectric strength in case of mica can be expected to be more than **500 KV/MM.**
2. The relationship between the breakdown Voltage V and gap d is normally given as **V=Kd^n.**
3. CORONA effect can be identified by **faint violet glow.**
4. The phenomena of corona are generally accompanied by a **hissing sound.**
5. Van de Graaff generator is used for **very high voltage and low current application.**
6. In Van de Graaff generator output, voltage is controlled by **controlling the corona source voltage.**
7. A tesla coil is a **high frequency resonant transformer.**
8. Impulse testing of transformer is done to determine **the ability of insulation to withdraw transient voltages.**
9. Transformer contribute to radio interference due to **any of the above** (discharge in air, internal or partial discharge in insulation, sparking)
10. **Sulphur hexafluoride** has been used as insulating medium in electrical appliances.
11. Liquids are generally used as insulating material up to voltages stresses of about **50KV/cm.**
12. Electro-mechanical breakdown of solid insulating material occurs due to **mechanical stresses produced by the electrical field.**
13. Surge voltage originate in power system due to **any of the above** (lightning, switching operation, faults)
14. Corona results in **radio interference.**

15. **Peak voltmeter technique/ method** are used for measurement of ac high frequency voltages.
16. **Generating voltmeter** can be used for the measurement of high dc voltages.
17. All of the following methods can be used for the measurement of high voltages **except half effect generator.**
18. Surge diverters are **nonlinear resistors in series with spark gap which act as a fast switches.**
19. Impulse voltages are characterized by **all of the above.** (polarity ,peak value ,time of the half peak value)
20. Paschens's law is associated with **breakdown voltages.**
21. The essential condition for the Paschens's law to be valid is that **temperature must be constant.**
22. The breakdown voltage in gases depends on **all of the above.** (distance between electrodes, relative air density, humidity)
23. At unvarying temperature breakdown voltage in a uniform field is a function of the product of gas pressure and distance between the electrodes the above statement is known **as Paschens's law.**
24. Large capacity generator are manufactured to generate power at **6.3 to 10.5 KV**
25. **Peat soil** has the least specific resistance
26. **Sand Soil** has the maximum specific resistance.
27. In sphere gaps, the sphere are made of **any of the above** (aluminum, brass, bronze)
28. In 'plasma' state a gas **is conduct electricity.**
29. Corona discharge can be observed as red luminescence this statement is **incorrect.**
30. Pin type insulator are commonly used for voltages up to about **25KV.**
31. Corona results in loss of power in transmission this statement is **correct.**
32. The variety of paper used for insulation purpose is **craft paper.**
33. A good dielectric should have all the following properties EXCEPT **high dielectric loss.**
34. Which variety of mica is hard and brittle. The answer is **lepidolite.**

35. Insulators for high voltage applications are tested for **power frequency tests and impulse tests**
36. Vacuum insulation is used in all of the following EXCEPT **EHT of color TV**
37. The methods of system neutral grounding **include resistance and low reactance for effective grounding.**
38. **Mica** has been used where high temperatures and surface discharges are experienced.
39. High voltages cables are **either oil filled or gas filled.**
40. Suspension type insulator are preferred on systems operating above **50KV**
41. **Strain type insulators** are used when the conductors are at intermediate anchor towers.
42. String efficiency of an insulator can be increased by making ratio of capacity to earth and capacity per insulator **small**
43. The ideal lightning arrester is the one which Conducts electric current **above rated voltage**
44. During impulse withstand test the impulse applied to the insulator is 1**. 1/50 μ sec**
45. Usually, the impulse voltage is **unidirectional**

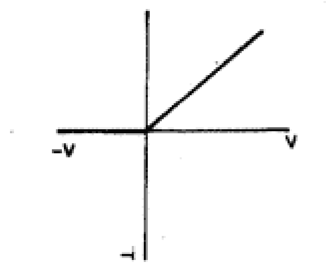
Fill in the Blanks

46. Air surrounding corona region gets converted into **ozone.**
47. Corona is responsible for consideration **loss of power** from high voltage transmission.
48. When the voltage is high corona appears like **reddish glowing spots** distributed along the length of the wire.
49. In a Townsend discharge the current increases gradually as a function of the **applied voltage.**
50. High dielectric strength of gases is attributed to **molecular complexity and high rates of attachment.**
51. In addition to insulating properties SF6 possesses excellent **arc quenching**

52. Addition of 30% SF_6 to air dielectrics, dielectric strength of air by about **100** percent.
53. Under normal atmospheric conditions, the breakdown for air is **33KV/cm**.
54. Corona loss is more in **solid conductor**.
55. Disruptive discharge voltage is the voltage which produces the loss of **dielectric** strength of insulation.
56. In an electrostatic voltmeter the moving disc is surrounded by a fixed **guard ring.**
57. The scale of an electrostatic voltmeter is **non- uniform.**
58. Sphere gaps are commonly used for the measurement of the **peak value** of high voltage.
59. When a high resistance is used for the measurement of alternating voltage, the effect of **stray capacitance** from the resistor cannot be neglected.
60. The effect of stray capacitance on a resistance can be reduced by **shielding.**

Chapter # 30 Rectifiers and Converters

1. In mercury arc rectifiers the voltage drop in arc is nearly **0.1 volt per centimeter of arc length**
2. An ideal rectifier having a linear characteristic in forward direction and an infinite resistance in the reverse direction, can be represented by



(C)

3. **Relays, Telephones and Time switches** need direct current.
4. **Mercury arc rectifier** device cannot convey from dc to ac.
5. In large motor generator sets ac motor is usually **synchronous motor.**
6. For single phase rotary converters, when the power factor is unity, the ac line to dc current ratio will be **1:4.**
7. A 100-kW motor generator set has induction motor of six poles and dc generator of eight poles. If the supply frequency is 50 Hz, the speed of the set will be **428.6 rpm.**
8. The number of slip rings in a single-phase synchronous converter will be **2.**
9. A 1 kW single phase rotary converter operates at full load from 230 volts ac source. Assume 100% efficiency and unity power factor. **The voltage will be 325V.**
10. A 1 kW single phase rotary converter operates at full load from 230 volts ac source. Assume 100% efficiency and unity power factor. **The dc current will be approximately 3A.**
11. A 1 kW single phase rotary converter operates at full load from 230 volts ac source. Assume 100% efficiency and unity power factor. **The ac input current at slip rings will be 4.1A**

12. For 3 phase rotary converters, when power factor is unity. **the ac line to dc current ratio is 0.942.**

13. If a synchronous converter is supplied with 12 phase ac supply, **the number of slip rings will be 12.**

14. In a synchronous converter, the no-load ratio of the voltage E_a between successive slip rings (i.e., the armature phase voltage) to the commutator voltage E_d for 3 phase "supply on ac side is **0.6.**

15. In a synchronous converter, ac and dc armature powers will be equal **when electrical and mechanical losses are negligible and power factor is unity.**

16. In a rotary converter armature currents are **partly ac and partly dc.**

17. In a rotary converter l^2R? losses as compared to a dc generator of the same size will be **less.**

18. In a synchronous converter, the l^2R losses are less as compared to dc generator of the same size because **ac components neutralize the dc.**

19. A rotary converter can be started with any of the below methods.

    - **From dc side as dc motor**
    - **From ac side as induction motor**
    - **By means of a small auxiliary motor**

20. When a rotor converter is started by means of a small auxiliary motor, the power of motor must be **slightly more than the value of friction and windage losses at rated speed.**

21. In a mercury arc rectifier positive ion are attracted towards **cathode.**

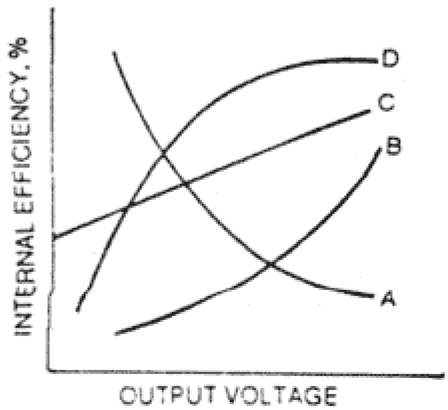
22. Maximum current rating of a glass bulb mercury arc rectifier is usually restricted to **500 A.**

23. **Steel tank rectifier** can withstand maximum voltage on dc side.

24. In an arc rectifier the drop in voltage at the cathode is approximately **6 to 7 volts.**

25. In arc rectifiers mercury is chosen as the liquid for rectifier because it has **low specific heat, low ionization potential and high atomic weight.**

26. Ionization potential of mercury is approximately **10.4 V.**
27. Least undulating current will be delivered by **6 phase** mercury arc rectifiers.
28. In a mercury arc rectifier, the cathode voltage drop is due **to expenditure of energy in liberating electrons from the mercury.**
29. In mercury arc rectifier, voltage drop at anode is due to **energy spent in overcoming the electrostatic field.**
30. The average life of the glass bulb rectifier is **10,000 to 15,000 hours.**
31. The vacuum inside the glass bulb of a mercury arc rectifier is of the order of **5 x 10^{-5} cm of Hg.**
32. For mercury arc rectifiers, the anode is usually made of **Graphite.**
33. Essential requirement of the anode material in mercury arc rectifier is that **it should not be wetted by mercury.**
34. The advantages of mercury arc rectifier are that **it is noiseless in operation, it responds quickly to varying load demands and has high efficiency.**
35. A 3-anode mercury arc rectifier has an anode current of overlap 30^0. Neglecting arc drop, the regulation will be approximately **7%.**
36. As compared to mercury arc rectifiers, metal rectifiers **operate on low temperatures.**
37. The current carried by the cathode spot of the mercury arc rectifier is of the order of **4000 A/sq-cm.**
38. **Voltage drops at the anode, cathode and in arc** are the loss within the mercury arc rectifier chamber.
39. The voltage drop at the cathode is of the order of**7 to 9 V.**
40. The voltage drop in arc primarily depends on **arc length.**
41. As the output voltage of a single anode mercury arc rectifier increases, the variation of internal efficiency is represented by **Curve D.**



42. The voltage drop across the electrodes of a mercury pool rectifier is **almost independent of load current.**

43. In a mercury arc rectifier **ion stream moves from anode to cathode.**

44. In a mercury arc rectifier if cathode and anode connections are interchanged **the rectifier will not operate.**

45. In mercury arc rectifier, mercury is used as **a cathode.**

46. In a mercury arc rectifier, mercury is used as cathode because **mercury is liquid metal, readily vaporizes and mercury vapor is easily ionized.**

47. In a mercury arc rectifier **both electrons and ions** flow from anode to cathode.

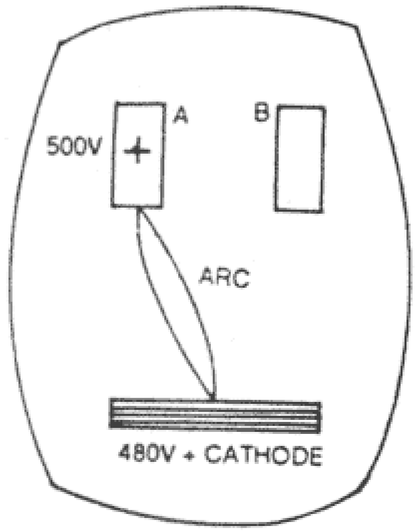
48. In a mercury arc rectifier characteristic blue luminosity is due to **ionization.**

49. For producing cathode spot in a mercury arc rectifier **an auxiliary electrode is used.**

50. The internal efficiency of a mercury arc rectifier depends on **voltage only.**

Statement for MCQs No.51-53.

A mercury arc rectifier has two anodes A and B as shown in figure. Anode A has potential difference of 500 V to earth and anode B a potential difference of 490 V both positive to the cathode.



51. If anode A is conducting the arc voltage drop will be **20 V.**

52. When anode A is conducting **anode B will not conduct.**

53. If the voltage of anode B is raised to 510 V a**node B will conduct but anode A will not conduct.**

54. **100 Hz** mercury arc rectifiers will have the highest supply line power factor.

55. A set of resonant shunts is connected across the output terminals of a multi-anode mercury rectifier to **reduce the effect of harmonics**.

56. Ripple frequency of full wave rectifier working on 50 Hz supply will be **25 Hz.**

57. In mercury arc rectifiers, mercury is selected as cathode because **it has low ionization potential, low specific heat & small latent heat of vaporization.**

58. A 3-anode mercury rectifier is connected to 440 V, 3 phase 50 Hz Supply. Each anode will conduct for **1/6 of the period.**

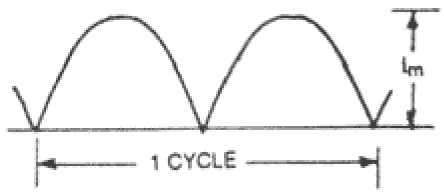
59. A 6-anode mercury arc rectifier without inter-phase transformer has rims value of anode current as 41 A. This rectifier with inter phase transformer will have rms value of anode current as **22 A.**

60. The rms value of half wave-rectified sine wave with i_m as peak value is **0.5 i_m**.

61. The mean value of half wave rectified sine wave is**0.318 i_m.**

62. The form factor for half wave rectified sine wave is**1.57.**

63. For full wave rectified sine wave, rms value is **0.6036 i_m.**



64. For full wave rectified sine wave, mean value is **0.636 i_m.**

65. For full wave rectified sine wave, form factor is**1.11.**

66. A half-wave rectifier circuit with a capacitive filter is connected to 200 volts, 50 Hz ac line. The output voltage across the capacitor should be approximately **280 volts.**

67. The ripple factor of a full-wave rectifier circuit compared to that of a half wave rectifier circuit without filter is **less than half that for a half-wave rectifier circuit.**

68. A thyratron is **agas-filled triode.**

69. A thyristor equivalent of a thyratron tube is a **Silicon controlled rectifier (SCR).**

70. A silicon-controlled rectifier is a **device with three junctions.**

71. The RMS value of a half wave rectifier current is 10 A. Its value for full wave rectification would be**14.14 A.**

72. For single phase supply frequency of 50 Hz, ripple frequency in full wave rectifier is**100.**

73. The aim of introducing reactor in the ignition circuit of mercury arc rectifier is to limit **the current in the circuit.**

74. A mercury vapor discharge tube used for domestic lighting **has two filaments.**

75. For a waveform peakier than a sine wave, the form factor will be **more than 1.11.**

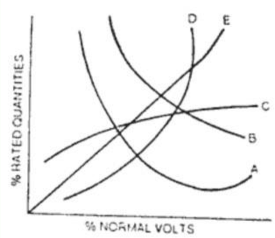
76. Peak inverse voltage for a diode is **the maximum voltage that can be applied across the diode in the non-conducting direction.**

77. When voltage applied to a diode is more than PIV, it is likely to result in **breakdown at the junction.**

78. **Copper oxide rectifier** is known as metal rectifier.
79. PIV of a diode is usually **Twice the dc output voltage.**
80. The most commonly used connection for joining the six secondaries of a transformer used for 3 phaseto 6 phase conversion is **Diametrical.**
81. A rotary converter is a **synchronous motor and a dc generator combined**.
82. The ac line current at slipping in a 6 phase, 6 ring rotary converter having 100% efficiency and unity power factor is **0.472times the dc current**.
83. The advantage of motor generator set is **dc output voltage is practically constants, dc output can be controlled by adjusting shunt field regulator &unit is self-starting.**
84. A mercury arc rectifier works on the principle of **ionization by collision.**
85. A rectifier is a **Non-linear device.**

Chapter # 31 Illumination

1. Radiant efficiency of the luminous source depends on temperature of the source.
2. Light waves travel with a velocity of 3 x 10^10cm/s.
3. Carbon arc lamps are commonly used in cinema projectors.
4. The unit of solid angle is steradian.
5. Candela is the unit of Luminous intensity.
6. The unit of luminous flux is lumen.
7. The illumination is directly proportional to the cosine of the angle made by the normal to the illuminated surface with the direction of the incident flux. Above statement is associated with Lambert’s cosine law.
8. Which curve represents life of the lamp? CURVE B.



9. Illumination level required for precision work is around 500 lm/m2.
10. Proof Reading will need the highest level of illumination.
11. Railway Platform will need lowest level of illumination.
12. Sodium Vapor Lamp gives nearly monochromatic light.
13. The illumination level in houses is in the range 100-140 lumen/m2.
14. Luminous efficiency of a fluorescent tube is 60 - 65 lumens/watt.
15. One lumen per square meter is the same as One lux.
16. Standard wattage of 3 ft. fluorescent tube is 40 W.
17. For the same wastage GLS lamp is cheapest.
18. Optical instruments used for the comparison of candle powers of different sources arc known as Photo meter.
19. Guilds Flicker photometer is used for comparing the lights of different colors.
20. Trotter Illumination Photometer depends for its operation on Lambert's cosine law.
21. Macbeth illuminometer photometer depends for its operation on Inverse Square Law.

22. 50 W is not a standard wattage of incandescent lamps in India.
23. Light is produced in electric discharge lamps by ionization in a gas or vapor.
24. Lumen/watt is the unit ofLuminous efficiency.
25. Candela is-the unit for Luminous intensity.
26. Argon gas is sometimes used in filament lamps.
27. Torch bulb operates on lowest power.
28. The output of a tungsten filament lamp depends on temperature of filament.
29. A zero-watt lamp consumes about 5 to 7 W power.
30. Melting temperature of tungsten is 3655°K.
31. The life of incandescent lamp is expected to be 1000 hours
32. The source of illumination for a cinema projector is Carbon arc lamp.
33. Sodium vapor lamps need ionization potential of about5 Volts.
34. When a sodium vapor lamp is switched on, initially the color is Pink.
35. In a sodium vapor lamp the discharge is first started in the neon gas.
36. A auto transformer used with sodium vapor lamp should have high leakage reactance.
37. The capacitor used in auto transformer circuit for sodium vapor lamps, is for improving the power factor of the circuit.
38. A mercury vapor lamp gives greenish blue light.
39. Under the influence of fluorescent lamps sometimes the wheels of rotating machinery appear to be stationary. This is due to thestroboscopic effect.
40. Power factor is highest in case of GLS lamps.
41. Sodium Vapor lamp electric discharge lamp gives highest lumens/watt.
42. The solid angle subtended at the center of a hemisphere of diameter D will be 2π
43. Neon Lamp is a cold cathode lamp
44. In a mercury vapor lamp light red objects appear black due to absence of red light from lamp radiation.
45. The flicker effect of fluorescent lamp is more pronounced at lower frequencies.
46. The frequency of flickers in a fluorescent lamp at 220 V, 50 Hz supply will be 100 per second.
47. Wavelength of green color is nearly 5500A.
48. One Angstrom is 10^-8 cm.

49. Yellow color has wave-length between green and color.
50. The purpose of providing a choke in a tube light is to limit current to appropriate value.
51. A 60 W lamp given a luminous flux of 1500 lumen. Its efficiency is25 lumen/watt.
52. One lux is the same as one lumen/sq. m.
53. The vacuum inside an incandescent lamp is of the order of 10^-4 mm Hg.
54. Car lighting does not need ultra-violet lamps.
55. When using ultra-violet lamps the reflector for maximum should be made of aluminum.
56. Magnesium-white combination of gas is filled in lamp and the resulting color is incorrect.
57. Sodium vapors/gas will give yellow color in a filament lamp.
58. Zinc Silicate phosphor produces green color.
59. If d is the distance of a surface from a source, the illumination of the surface will vary as 1/ d^ 2.
60. The level of illumination on surface least depends on ambient temperature.
61. The level of illumination from a 100 W incandescent lamp will not increase by increasing filament temperature.
62. The rate of evaporation of tungsten filament in a lamp depends on vapor pressure inside.
63. A gas filled filament bulbs, the gas used is Nitrogen.
64. Heat from the filament of a lamp is transmitted to the surrounding- mainly through radiation.
65. In a fluorescent tube circuit, choke acts as current limiting device.
66. When a fluorescent lamp is to be operated on dc, Resistance must be incorporated in the circuit.
67. For same rating the amount of radiant heat produced in Fluorescent lamp is the least
68. The amount of radiant heat produced by a fluorescent lamp is nearly 20%what percent of that of a filament lamp of same rating.
69. Carbon arc lampgives nearly ultra-violet light.
70. Luminous flux is rate of energy radiation in the form of light waves.
71. Lumens = candela power * solid angle, Luminous flux = lumens, Candela Power = lumens/ W steradian, Luminous intensity = lumens
72. Lamberts law = illuminous is directly proportion to $\cos^3 \theta$
73. Filament of incandescent lamp = carbon, tungsten, tantalum (all)

74. M.P of carbon= 3500 degree C
75. Lowest M.P filament = Osmium
76. Filament of Lamp= Unity PF
77. Neon gas in sodium vapor lamp = assist in produce heat to vaporize sodium
78. Cold cathode lamp= Neon Lamp
79. In fluorenes tube ballast resistance connected in series with choke when tube operate on DC
80. Tungsten filament no longer life than fluorescent filament
81. Last capacity to sustain voltage fluctuation = incadecent lamp
82. Neon sign argon gas used = red color and helium for yellow color
83. Neon sign board has mixture of neon and mercury for = green coloutr
84. Electrodes of neon tube= 2000 to 6000 volts
85. Glare may result from = excessive luminous and contrast of field vision
86. To avoid glare = object should be view from distance
87. GLS lamp = 10 to 18 lumens /w
88. Nitrogen or argon in GLS lamp = retard operation of tungsten filament
89. In GLS frosting is = acid etching
90. Lumen's flux reaching on working plane least depend on =colour of workingplane
91. Monochromatic light = Sodium vapor lamp
92. Material reflect al the wavelength in light spectrum = black to white
93. An object appears red to eye = absorb green radiation
94. Glare is = excess luminous
95. Glow lamp = cold cathode
96. Illumination for normal reading = 500 lum/m2
97. Lowest reflection factor = black color
98. Glass Transmit max light = clear glass
99. Glass Transmit min light = milk glass
100. B 15 size cap for GLS lamp indicate = cap dia is 15mm
101. E 40 caps for GLS lamp wattage = 300W
102. GLS Lamp if volt increases = life decreases
103. Halogen lamp = all above

104. Halogen lamp are used for = parks ground and airport all
105. Coating or fluorescent lamp = Convert UV into visible light
106. fluorescent lamp =70 lum/w
107. Best for Air-conditioned space = Fluorescent lamp
108. Fluorescent lamp life = 7500 hr
109. Color of light depend = wavelength and frequency
110. Disadvantage of fluorescent as GLS = high-cost noise stroboscopic effect all of above
111. In Fluorescent lamp if only end glow = a short circuit in starter happened
112. Blinking of Fluorescent lamp = low V low f low T low ballast rating all
113. Radio interference is due to = Fluorescent lamp
114. Fluorescent lamp = operate on DC
115. Ignition V of Sodium lamp = 400- 600V
116. Leak T/F is provided = sodium lamp
117. Leak T/F is provided in sodium lamp initially provide = high V
118. Color of Sodium lamp = yellow
119. Sodium lamp are used for = libraries
120. Life of Sodium lamp = 6000hr
121. High P mercury vapor light = bluish white
122. High P mercury vapor light life = 9000hr
123. High P mercury vapor light used for = railways factory all of above
124. Wavelength of blue color = 4400A
125. Radio interference in fluorescent lamp = put Capacitor across the lamp
126. Dimming system for lights = theaters auditorium and ball room
127. Dimming system = SCR, auto T/F, var reaction
128. Difficult for dimming = Fluorescent lamp
129. Heat from light = effect design for AC room
130. In electric discharge lamp to stable arc= var R is used
131. Lens of eye to focuses image in = retina
132. Sensor in eye = rods and cons
133. Color Temp of day light = 6000K

Chapter # 32 Electric Traction

1. Overall efficiency of steam locomotive system is close to **5 to 10%**
2. In a steam locomotive electric power is provided through **small turbo generator.**
3. Maximum horse power of steam locomotive is **1500**
4. The pressure of steam in a locomotive is **10-15 kg/cm^2**
5. The efficiency of diesel locomotives is nearly **20 - 25 percent**
6. The advantage of electric traction over other methods is no pollution problems, faster acceleration, better braking action, **all of the above.**
7. Suburban railways use **1500 V DC**
8. Long distance railways use **25 kV Single phase AC**
9. The range of horsepower for diesel locomotives is **1500 to 2500**
10. Steam Engine provided on steam locomotives is **double acting non - condensing type**
11. A submarine while moving under water, is provided driving power through **batteries.**
12. Overload capacity of diesel engines is usually restricted to **10%**
13. Which locomotive has the highest operational availability **Electric**
14. Which motor is used in tramways **DC series motor**
15. A drive suitable for mines where explosive gas exist, is **Battery locomotive**
16. The advantage of electric braking is **it avoids wear of track**
17. Which braking system on the locomotives is costly **Regenerative breaking on electric locomotives**
18. The acceleration rate of trains on suburban services is **0.4 to 6.5 km phps**
19. The coasting retardation on trains is approximately **0.16 km phps**
20. The coefficient of adhesion is low in case of **ac traction and high in dc traction.**
21. Braking retardation on suburban trains is **3 to 5 km phps**

22. Power supply frequency for 25 kV single phase system is **50**
23. For supply on 25 kV, 50 Hz single phase, suitable motor for electric traction is **dc series motor.**
24. Method of speed control used on 25 kV, 50 Hz single phase traction is **Tap changing control of transformer**
25. The coefficient of adhesion is highest when **the rails are dry**
26. When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops, is known as **Schedule speed**
27. A schedule speed of 45 km, per hour is required between two stops 1.5 km apart. The duration of stop is 20 seconds. The acceleration is 2.4 km phps and retardation is 3.2 km phps. For a simplified trapezoidal curve, the maximum speed over the mil will be **74 km per hour**
28. Speed of locomotive is controlled by **regulating steam to engine**
29. The specific energy consumption for suburban services is usually **50 to 75 watt-hours per tonnekm**
30. If the specific energy consumption for suburban services is 50 to 75 watts hours per tonne km, which of the following could be a representative figure for energy consumption on main line service **20 to 30 watt-hours per tonne km.**
31. Specific energy consumption is least in **main-line service**
32. Bearings used to support axles of rolling stock are **Roller bearings.**
33. If the coefficient of adhesion on dry rails 0.25. which of the following could be the value for wet rails ? **0.15.**
34. A train has a schedule speed of 36 km per hour on a level track. If the distance between the stations is 2 km and the stoppage is 30 seconds the actual time of run will be **170 seconds.**
35. B_0 B_0 locomotives have two bogies with **two driving axles with individuals drive motor.**

36. A locomotive exerts a tractive effort of 30,000 Newtons in pulling a train at 50 km per hour on the level hack. It is to haul the same train at the same speed on a gradient and the tractive effort required is 45000 Nw. The horse power delivered by the motor will be more if it is driven by **induction motor**

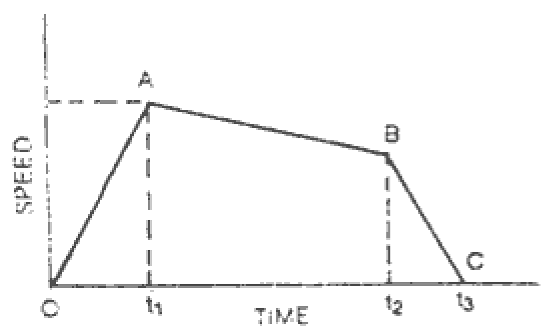
37. A composite system consists of **single-phase power received is converted into dc or three phase power ac system**

38. Horse power of steam locomotives is Up to **1500**

39. Horse power of diesel locomotives is 1500 to **2500**

40. Locomotives with manometer bogie have **suitability for passenger as well as freight service.**

41. The speed time curve for a local train is shown in Figure.



In this AB represents **Coasting**

42. The duration for braking is represented by the time **t_2- t_1**

43. Area under the curve represents **distance traveled.**

44. From the figure it can be concluded that during coating **the acceleration is negative.**

45. For tramways the return circuit is through **rails**

46. For 600 V dc line for tram cars **track is connected to negative of the supply**

47. Overhead lines for power supply to tramcars are at a minimum height of **10 m**

48. Which of the following traction system is latest used in the world? **3 phase 3.7 kV**

49. Which of the following frequencies not common in low frequency traction system ?**40 Hz**

50. In a long-distance electric train, power for lighting in passenger coach is provided **through individual generator of bogie and batteries**

51. In Kando system **single phase supply is converted into three phase system**

52. Free running and coasting periods arc generally long in case of **main-line service**

53. Which of the following factor affects specific energy consumption? Distance between stops, Gradient, retardation and acceleration values, **All of the above.**

Questions 54 and 55 refer to data given below:

54. A train runs at an average speed of 50 kmph between stations situated 2.5 km apart. The train accelerates at 2 kmph and retards at 3 kmph. Speed-time curve may be assumed to be trapezoidal. The maximum speed is **57.75 kmph.**

55. The distance traveled before the brakes are applied is **2.35 km.**

56. At an average the coal consumption per km in case of steam engine is nearly **28 to 30 kg**

57. Unbalanced forces are maximum in case of **steam locomotives.**

58. Maintenance requirements are least in case of **electric locomotives**

59. If the resistance to electric train is given by$F_r = a + bv + cv^2$

In this equation constant c is likely to cover **air resistance.**

60. A train is required to run between two stations 16 km apart at an average speed of 43 kmph. The run is to be made to a simplified quadrilateral speed-time curve. The maximum speed is to be limited to 64 kmph, acceleration to 2 kmph and coasting and braking retardations to .16 and 3.2 kmph respectively. The duration of acceleration is **32 sec.**

Questions 61 and 62 refer to data given below:

A train is required to run between two stations 16 km apart at an average speed of 43 kmph. The run is to be made to a simplified quadrilateral speed-time curve. The maximum speed is to be limited to 64 kmph, acceleration to 2 kmph and coasting and braking retardations to .16 and 3.2 kmph respectively.

61. The duration of costing is **96.8 sec**

62. The braking period is **15.15 sec**

63. When a locomotive for Railways is designated as WAM_1, in this the letter W indicates that **the locomotive is to run on broad guage track**

64. An ideal traction system should have high starting tractive effort, equipment capable of withstanding large temporary overloads, easy speed control, **all of the above.**

Questions 65-66 refer to the data given below:

A train runs at an average speed of 45 kmph between stations 2.5 km apart. The train accelerates at 2 kmph and retards at 3 kmph speed-time curve may be assumed to be trapezoidal.

65. The maximum speed attained will be nearly **50 kmph**

66. The distance traveled before the brakes are applied is **2.383 km**

67. The main difference between speed-time curves of mainline service as compared to suburban services lies in longer free running periods, longer coasting periods, shorter acceleration gand braking periods, **all of the above.**

Questions 68 to 70 refer to data given below:

An electric train is to have a braking retardation of 3.2 kmph. The ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 kmph. The run is 1.5 km.

68. Actual time of run is **154 seconds**

69. The schedule time is**180 kmph**

70. The schedule speed is**30 kmph**

71. Energy consumption in propelling the train is required for acceleration, work against gravity while moving up the gradient, work against the resistance to motion, **all of the above.**

72. Quadrilateral speed-time curve is the closer approximation for **urban and suburban service.**

73. Distance between the rails for meter gauge track is **One meter.**

Questions 74 to 76 refer to data given below:

An electric train has quadrilateral speed time curve as follows:

(i) Uniform acceleration from rest at 2 kmph for 30 seconds

(ii) Coasting for 50 seconds

(iii) Uniform braking to rest for 20 seconds the train is moving a uniform up gradient of 1 in 100, train resistance is 40 N/tonne, rotational inertia effect 10% of dead weight and duration of stop 30 seconds.

74. Braking retardations is **1.87 kmphs.**

75. The distance traveled is **1.03 km.**

76. Schedule time is**130 seconds.**

Chapter # 33 Heating and Welding

1.In arc welding the temperature of the arc is of the order of 3500 C.

2.The arc has negative resistance characteristics.

3.Arc can be produced by either AC or DC Current.

4.The resistance of arc decrease with increase in current.

5.In arc welding the voltage on ac supply system in the range 70—1000V.

6.In arc welding by dc supply the voltage required is 50 to 60 volts.

7.In arc welding once the arc is struck the voltage required to maintain it will be 20 to 30 V

8.A dc generator used for arc welding should have dropping characteristics

9.The transformer used for arc welding sets is Step down transformer

10.As the thickness of the part to be welded increases which of the following parameter for arc welding should also increase Current

11.In argon arc welding the electrode is made of Tungsten

12.In argon arc welding the purpose of using argon is All of the above

13.Stell rail is welded by Thermit welding.

14.In gas welding the gases used are Acetylene and oxygen.

15.Steel pipes are manufactured by Resistance welding.

16.Which of the following is different from the remaining Argon arc welding.

17.Two 3mm thick mild steel sheets are to be welded. The electrode of 18, 16, 12 and 10 Nos. are available which one you select No:10

18.Two 12mm steel plates are to be welded using arc welding. electrode of No: 8 is to be used. what will be current requirement 150A.

19.Gray iron is usually welded by. Gas welding

20.In ultrasonic welding the frequency range is generally. 4000-20000 cps

21.Arc blow is a welding defect which is encountered in. Arc welding using ac current

22.A rectifier for welding has voltage/current characteristics as. Dropping

23.The efficiency of a welding motor generator is usually in the range of 50 to 60 percent

24.For welding duty the rectifier commonly used are.Selenium metal rectifiers

25.In resistance welding aluminium as compared to steel requires. Smaller welding time

26.Which of the following is not a welding accessory. Cable

27.Chipping hammers are used. To remove slag from welding

28.The welding electric circuit is. Always earthed

29.The eye of welding operator must be protected against Both A and B (A. ultra violet radiations, B. infrared radiations)

30.The danger of electric shock is maximum. While in surting electrode into the holder

31.The welding transformer used in resistance welding will. Step up current

32.In resistance welding the SRC contactor will close during Weld time

33.In a resistance welder pneumatic pressure is applied during. squeeze weld and hold time

34.A 10 SWG electrode usually operates in the current range. 95 to 135 A

35.TIG welding is. Tungsten inert gas welding

36.Electrode is not consumed in case of TIG welding

37.Flux used in TIG welding is. None

38.Which method would you recommend for the welding of aluminum alloys. Tungsten arc welding

39.Argon is. Inert gas

40.Which mutual arc welding in mild steel the metal deposition rate will be nearly. 2 to 5 kg per hour

41.which of the following automatic welding process is likely to give maximum rate of metal deposition Multiple power submerged arc

42.The total load taken by a welding transformer is Highly inductive

43The power factor of the load using welding transformer is usually Very low of the order of 0.3 to 0.5 lagging

44.The power factor of the load using welding transformer least depend on Material to be welded

45.For power factor correction of welding transformer a capacitor is usually connected on Primary side

46.The welding load is always Intermittent

47.MIG welding is Maximum inner depth gas welding

48.The advantage of resistance welding is All of the above (less skill required , reduced distortion, higher production rates)

49.Which of the following is not resistance welding MIG welding

50.When t is the thickness of the sheet the tip diameter for spot welding is usually $\sqrt{t}$

51.In a synchronous welding control the welding current begins at at the power factor angle

52.The function of SRC contactor in resistance welding machine is To connect large power supply to welding transformer by closing a small switch

53.Which of the following is the unit for the thermal conductivity W/m C

54.The rate of heat flow through a 50mm thick wall of a material having thermal conductivity of 40 W/m K for the temperature difference of 10C will be 8000 W/m^2 hr

55.The ratio of heat flow Qa/Qb from two walls of same thickness having thermal conductivity Ka+2 Kb for the same temperature difference will be 2

56.The highest value of thermal conductivity is for Solid ice

57.Which insulating material is suitable for low temperature applications Diatomaceous earth

58.Which concrete is expected to have highest value of thermal conductivity Concrete having 0.4% reinforcement and 10% moisture by volume

59.The quantity of heat required to change the temperature of 1gm of ice form -6C to -5C is known as Specific heat

60.A body at temperature T K radiates beat in proportion to T^4

61.If a body reflects entire radiation incident on it then it is known as White body

62.A digital timer in a resistance welding machine provides All of these (accurate timing, identical welds, synchronous operation)

63.In the digital timer of a resistance welding machine the desired squeeze weld and hold time durations are obtained on the principle of Digital to analog conversion

64.Which of the following is of high value in case of induction heating Frequency

65.Induction heating process is based on Electromagnetic induction principle

66.In case of induction hardening Heating occurs in the core of the part to be heated

67.Induction heating the depth up to which the current will penetrate is proportional to $\frac{1}{(\text{frequency})^{1/2}}$

68.The method of heating used in an electric room heat converter is Resistance heating

69.Highest power factor can be expected in which method of heating Resistance heating

70.which of the following heating element can give highest temperature in resistance heating Silicon carbide.

71.If the temperature coefficient of the silver is 0.0338 the temperature coefficient for manganin may be expected to be 0.00001

72.Nichrome wires can be safely used for heating upto 1150C

73.If a furnace is to be used for heating to temperatures around 1500C which of the following material for heating element should be selected Platinum

74.Which of the following element will have the least range of temperature eureka

75.Which of the following device is necessarily required for automatic temperature control in a furnace Thermostat

76.Furnaces used for cremation use Resistance heating

77.Induction hardening is possible on ac supply only

78.A piece of steel is to be heated to a pre-determined temperature. in which of the following furnace it will attend the desired temperature in the shortest possible time Induction heating furnace

79.In a domestic cake baking oven the temperature is controlled by Thermostat

80.If the supply frequency is reduced from 50 Hz to 1 Hz which of the following method of heating will be least effected Resistance heating

81.Thermal conductivity is least for Air

82.Which method of heating is likely to give leading power factor Dielectric heating

83.In an electric press mica is used as an insulator

84.Which of the following method is suitable for the heating of conducting medium Induction heating

85.In dielectric heating current flows through dielectric

86.Which of the following is the desirable property of resistance heating element materials All of the above (high resistivity, high melting point, low temperature coefficient)

87.Which of the following is the ideal method of heating plastics Dielectric heating

88.If f be the frequency, then dielectric loss is proportional to f

89.When E is the voltage impressed on a dielectric the dielectric loss will be proportional to E^2

90.Molten steel is being further heated by high frequency, the principle of heat generation is Eddy current and hysteresis heating

91.Which method is appropriate for heating nonferrous metals Indirect arc heating

92.For arc heating, the electrodes are made of Graphite

93.A plywood board is to be heated through 100 C. which method is suitable for this purpose Induction heating

94.For heating of plywood, the frequency should be 1-2 MHz

95.High frequency for induction heating can be generated by Sparke gap oscillator

96.A metal bar may be heated electronically by Induction heating

97.A rod of mild steel kept inside a coil carrying high frequency currents gets heated due to Induction heating

98.Which of the following types of heating process is used for surface hardening of steel Induction heating

99.In induction heating the oscillator tube operates as Class C

100.In induction heating skin depth of penetration is proportional to $\frac{1}{(\text{frequency})^{1/2}}$

101.If the frequency of current in copper is increased from 200 MHz to 800 MHz, the skin depth of penetration would become Two-fold

102.A freshly painted layer may be dried electronically by Dielectric heating

103.In dielectric heating if the capacitor is loss free the heat produced will be Zero

104.The power density generated in dielectric heating is not proportional to Capacitance

105.The frequency used in dielectric heating lies in the range of 1-50MHz

106.In dielectric heating non uniform heating Occurs for higher frequencies

107.In dielectric heating the rate of heating cannot be increased by increasing the potential gradient because Corona takes place

108.Molten steel is being further heated by high frequency the principle of heat generation is Eddy current and hysteresis heating

109.An ignitron rated 300 A can operate well on a load current of 10 A. (F)

110.The average number of welds per hour determines the size of ignitrons needed. (F)

111.If an ignitron conducts continuously for 35 sec, followed by 35 sec off, it is operating at 100 percent duty. (F)

112.To produce a given amount of heat in a weld of constant resistance, if the welding current is doubled, it needs to flow for half as long a time. (F)

113.If the average amount of current through an ignitron is doubled, its cooling water must remove four times as much heat. (F)

114.Ignitrons that are fired by thyratrons give more accurate control of welding then big ignitrons alone can give. (F)

115.A-time delay relay is needed to protect the tubes in all controls for resistance welding. (T)

116.Any welding control is synchronous if it accurately counts the number of cycles while welding current flows. (T)

Chapter # 34 Electrical Machine Design

1. **Permalloy, Nickel, Air, Water** gives materials in order of decreasing values of permeability
2. In electrical machines the material preferred for pole shoes of electro-magnets is

Pure iron

3. The percentage of silicon in transformer stampings is usually limited to**4%**
4. Find the odd one out

(A) Absorptivity

(B) Emissivity

(C) Refractive index

(D) **Dielectric strength**.

5. Diamagnetic: Paramagnetic:

(A) **Water: Air**

(B) Iron: Steel

(C) Permalloy: Super-alloy

(D) Nickel: Cobalt.

6. If the permeability of a material is 0.999991. it can be classified as **Diamagnetic material**
7. **Permalloy** material has the highest permeability
8. For a simplex lap winding, the commutator pitch is equal to **± 1**
9. If the resistivity of aluminium is 0.0283 x 10-6 Ω-m, the resistivity of copper could be**0.017 x 10-5 Ω-m**
10. **Hard drawn copper** is used for overhead conductors
11. Annealed copper is used in

(A) low voltage cables

(B) flexible wires

(C) machine windings

(D) **all of the above.**

12. A ACSR conductor has central core of steel surrounded by a bunch of aluminium wires. In such conductors **Majority of current flows through aluminium and negligible amount flows through steel**
13. **Ductility** property of copper enables it to be drawn into thin wires and sheets
14. **Aluminium** is non-magnetic material.
15. **Large hysteresis loop** is the least desired property in magnetic materials for electrical engineering applications
16. **a ferromagnetic material becomes paramagnetic** Above Curie point
17. For a simplex lap winding, the winding pitch is equal to**± 2.**
18. If yb is the back pitch and u is the no. of coil sides per slot, then split coils can be avoided if the following quantity is an integer **(yb - 1)/ µ**
19. **Palladium** is a paramagnetic material
20. **Pure iron** is a ferromagnetic material
21. For simplex wave and lap windings, the back pitch yb and front pitch yf are as follows **both yb and yf are odd**
22. All of the following are ferromagnetic materials EXCEPT

(A) Nickel

(B**) Bismuth**

(C) Silicon

(D) Mild steel.

23. Diamagnetic: Copper: Ferromagnetic**: Iron**
24. Diamagnetic: Ferromagnetic :: Lead**: Cobalt.**
25. **Water, Air, Pure iron. Permalloy** materials in order of increasing values of permeability

26. **electrical resistivity decreases and magnetic permeability increases** by adding silicon to ferromagnetic, materials
27. **Cold rolled silicon steel** can be worked with higher flux densities
28. Hysteresis loss varies with frequency (f) as ***f***
29. Hysteresis loss varies with maximum flux density (B) as**B1.6**
30. In large bulky materials, the uni-axial anisotropy can be induced by

(A) cold rolling

(B) magnetic annealing

(C) magnetic quenching

(D) **any of the above.**

31. change in dimensions resulting from magnetisation of ferromagnetic materials called **Magnetostriction**
32. An ideal insulating material should have low **dielectric loss angle**
33. The class of insulation used for large rating HV alternators **C.**
34. Asbestos has **fibrous structure**
35. Asbestos can bear a temperature up to **_400°C._** without loosing its insulating properties
36. Fibre glass insulation can be used up to temperature of **130°C**
37. Raw form of natural rubber is known as **latex**
38. Which of the following is the characteristic of ceramic insulators?

(A) These are hard, strong and dense

(B) These are stable at high temperatures

(C) These are unaffected by commercial acids and alkalies

(D) **All of the above.**

39. The number of commutator segments in a dc machine is equal to the no. Of **coils**

40. Dielectric strength of PVC is around**30 kV/mm.**
41. Gaseous insulating material is **Sulphur hexafluoride**
42. Silver finds application generally as **contact material**

43. When I is the current in amperes, the temperature rises at which fuse wire will melt is proportional to **I 2**
44. The fusing current depends on

(A) diameter of fuse wire

(B) number of strands of wire

(C) length of the fuse wire

(D) **all of the above.**

45. Class H insulation is normally used in **traction motors**
46. An ideal liquid insulating material should have low **volatility.**
47. The electric breakdown strength of an instating material depends on

(A) composition of the material

(B) thickness of the material

(C) time of application of voltage

(D) all of the above.

48. When V is the voltage applied across the insulation, the dielectric loss for an insulating material will be proportional to **V2**
49. When δ is the dielectric loss angle, the value of tan δ increases with **presence of moisture**
50. **Cotton** has lowest dielectric strength
51. Silicon steel E330 indicates that **it is cold rolled grain oriented**
52. **E11** silicon steel will have least specific lose?
53. In silicon steel designation like E320 the first figure 3 indicates **the percentage of silicon**
54. In silicon steel designation like E320, the second figure 2 represent **specific loss**
55. In high nickel alloys the percentage of nickel is**70 to 80 percent**.
56. Pumps, blowers and fans are usually called for **continuous duty**

57. **Machine tools** is normally called for continuous duty with starting and braking?

58. In lap windings, the equalizer rings arc used to save **brushes from carrying circulating currents**

59. **Cranes** calls for intermittent duty with starting and braking?

60. The percentage of overload on a continuous rating machine is **10%**

61. Open circuit test on a transformer is conducted to obtain **core loss only**

62. Heat transfer capability of hydrogen is nearly **______7____** times that of air

63. The density of hydrogen is **__1/14_** that of air

64. Turbo-alternators of rating **__50 MW. __** and above are normally hydrogen cooled..

65. Iron losses of a machine are **directly proportional to flux density**

66. While considering hysteresis loss in a transformer, under which of the following the loss will not increase the **thickness of lamination is caused by 10%**.

67. The shaft of electric motors is generally made of **mild steel**

68. The critical speed of the shaft for an electric motor should be **away from the operating speed**

69. The shaft of electric motors is generally supported in **ball or roller bearings**

70. Ball and roller bearings are generally lubricated by **grease**

71. In case of ball bearings, the ball are made of **carbon chrome steel**

72. A ball bearing is secured to the shaft by means of **sleeve.**

73. In case of 110 MW generators, the shaft is supported on **bush bearings.**

74. Which of the following is classed as anti friction bearing?

(A) Ball bearing

(B) Roller bearing

(C) Needle bearing

(D) **All of the above.**

75. The force exerted by a lifting magnet varies with distance (D) as**1/D2**

76. The force-stroke curve for a lifting magnet will be of the shape shown in

77.

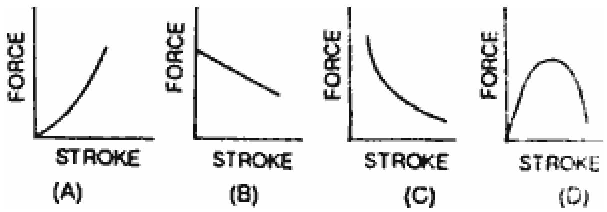


figure C

78. When B is the flux density; A is the area of the working gap and μ is the permeability, the force exerted by the attractive type magnets is given by **B A2/ 2μ**

79. Transformer-core laminations are made of **silicon steel**

80. When commutation is obtained by increasing the current density at the leading edge and decreasing the same at trailing edge, it is known as **over commutation**

81. Skewing of rotor slots helps in **suppressing undesirable harmonics**

82. The harmonics in rotating machines are generated due to

(A) non-sinusoidal field form

(B) slotting of the stator core

(C) **both (A) and (B) above**

83. The effect of harmonics in rotating machines can be minimized by

(A) use of longer air gap

(B) skewing the poles

(C) use of distributed winding

(D) **all of the above.**

84. **reducing the number of slots per pole per phase.** measure will not help in reducing the effect of harmonics

85. In dc machines the number of poles is generally decided by

(A) frequency of flux reversals

(B) weight of iron parts

(C) weight of copper

(D) **all of the above.**

86. In dc machines by increasing the number of poles, all of the following reduce except: **frequency of flux reversals**

87. Transformer action requires an **increasing magnetic flux**

88. **core loss component** of the no load current of the transformer is opposite in phase to the induced emf

89. In transformers, the cylindrical winding with rectangular conductors is generally used for **low voltage winding**

90. Cylindrical winding on transformers is generally not used beyond **6 kV**

91. The disadvantage of cylindrical winding is **low mechanical strength**

92. For transformer laminations

(A) hot rolled silicon steel is preferred

(B) cold rolled silicon steel is preferred

(C) grain oriented silicon steel is preferred

(D) **any of the above steel can be used.**

93. The percentage of silicon in the core steel is **4 to 6 percent**

94. The stacking factor will be least for **Square core**

95. In static transformers mechanical forces are produced due **to interaction of current flowing in the conductor and leakage flux around it.**

96. The thickness of laminations of the core of a power transformer usually**0.03 to 0.5** mm

97. Transformer action requires a **reducing resistivity**

98. In an oil filled transformer, oil is provided for **Insulation**

99. The dimensions of a dc machine primarily depend on **work done per revolution**

100. The diameter of a 10 SWG wire will be closer to **3 mm**

101. Tap changing facility is generally provided on **distribution transformers**

102. In case of air natural cooling, the cooling surface increases as the **_square_** of the size

103. In case of air natural cooling the losses increase as the **_cube**. **_** of the size

104. The heat generated in the transformer is dissipated to the surroundings mainly by **convection**

105. The heat transfer by convection least depends on **color of the paint.**

106. Oil for transformer cooling should have low **dielectric strength**

107. Oil for transformer cooling should have high **flash point**

108. The oil selected for transformer cooling should be free from

(A) alkalies

(B) acids

(C) Sulphur

(D) **all of the above.**

109. Normally for the design of transformer the ambient temperature is taken as**45°C**

110. A transformer is designed for certain ambient temperature. If it actually operates at a temperature 10°C above the design temperature its kVA rating should be **reduced by 20%.**

111. The overload capacity of a transformer depends on **size of the core**

112. **steeper front flatter tail** surge will be most damaging for a transformer

113. A transformer is considered to have a network of series capacitance due to **inter-turn insulation**

114. In a transformer the shunt capacitance is decreased and series capacitance is increased by the use of

(A) shielded windings

(B) inter-leaved winding

(C) layer type winding

(D) **any of the above.**

115. An air core transformer as compared to iron-core transformer has **No magnetic core loss**

116. In case of thyrite the resistance is **inversely proportional to the applied voltage**

117. The 'hum' in a transformer is due to **vibration in laminations**

118. **Impulse test** is conducted on transformers to check its ability to withstand the transient voltages due to lightening etc.

119. The density of transformer oil is around **J0.80 gm/cc.**

120. The flash point of transformer oil is usually **150°C.**

121. The maximum permissible water content in transformer oil is **50 ppm.**

122. The kinetic viscosity of transformer oil should be **2.5 cst**

123. The maximum pour point of transformer oil should be **10°C**

124. The dielectric strength of transformer oil' should not be less than **30 kV**

125. The specific resistance of the transformer oil is of the order of **10^12 ohms cm**

126. Phase spread in ac machines is almost always **60°**

127. The electric motor provided on refrigerators is usually **totally enclosed type.**

128. Flame proof motors are used in **explosive atmosphere**

129. **Hermetically sealed motor of refrigerator** machine is invariably provided with forced ventilation

130.Since hydrogen is 14 times lighter than air its use as cooling medium is mainly to **reduces windage losses**

131.As compared to air, hydrogen has **__higher__** thermal conductivity and **_lower__** density.

132.A machine is specified as 50 kW maximum continuous rating. The machine **cannot be overloaded**

133.A short time intermittent rating of electric motors is considered while selecting motors for **punching machines**

134.Short time rating machines have usually **low operating times and longer shut down times**

135.A. 3 φ, 52 slot, 8 pole machine can have a coil-span of **6**

136.In case of induction motors the value of air gap flux density usually taken is **0.35 to 0.6 Wb/m2**

137.Larger values of air gap flux density can be adopted while designing induction motors of

(A) larger output

(B) larger diameter of rotor

(C) **both (A) and (B) above**

138.Higher values of flux density can be taken while designing machines for

(A) low voltages

(B) smaller number of poles

(C) **both (A) and (B) above**

139.A 5 HP cage induction motor has power factor of 0.75 at 750 rpm. A motor of 100 HP at 750 rpm can be expected to have a power factor of **0.88**

140.An induction motor of 100 HP at 750 rpm is expected to have power factor of 0.88. A 100 HP induction motor at 1500 rpm can be expected to have power factor of **0.91**

141.An induction motor of 10 HP at 750 rpm has efficiency of 83%. An induction motor of 100 HP at 750 rpm can be expected to have an efficiency of **90%**

142. An induction motor of 20 HP at 750 rpm has efficiency of 85%. Another induction motor of 20 HP operating at 1500 rpm can be expected to have an efficiency of **88%.**

143. When D is the diameter and L is the length of rotor of an induction motor, the best power factor can be obtained when (P = no. of poles) **D = 1.35 P √L.**

144. The power factor of the induction motor will be **__low __** if the magnetizing current is **___high. _______**

145. The magnetizing current of an induction motor will be **_smaller** for **_larger__** air gap

146. In induction motors, small air gap **_increases_** power factor and **_also increases_** noise level

147. In induction motors, larger air gap **__ increases_** noise level and **improves_** cooling. In case of induction motors, phase reactance of the winding is **__inversely**. _ proportional to the number of slots per pole per phase

148. In the design of induction motors, normally the number of slots per pole per phase is taken as **three or more**

149. Normally open type stator slots in induction motors are not provided because **exciting current increases**

150. In induction motors provided with open type slots the exciting current is **__ high__** and power factor is **___low_______**

151. **Semi-closed type** of slots are generally used in induction motors?

152. In induction motors, the difference between the number of stator and rotor slots should not be

(A) P

(B) 2 P

(C) 5P

(D) **any of the above.**

153. For avoiding cogging in induction motor the difference between the number of stator and rotor slots should not be **3P**

154.In induction motor which of the following depends on the leakage reactance?

(A) starting torque

(B) maximum torque

(C) starting current

(D) **all of the above.**

155.Leakage reactance in induction motors may result from

(A) slot leakage flux

(B) overhang leakage flux

(C) differential leakage flux

(D) **all of the above.**

156.The slip rings of wound rotor machines are made from **brass**

157.Stiff shaft is necessary in case of induction motors due to **small air gap**

158.The average value of specific electric loading of induction motors is in the range **5000 to 45000 ampere conductors/meter.**

159.In case of induction motors the ratio of length to pole pitch for minimum cost, is taken as **1.5 to 2**

160.In case of induction motors, the ratio of length to pole pitch for good efficiency is taken as **1.5**

161.For small induction motors, the ratio of length to pole pitch is taken as **0.6**

162.The number of parallel paths in an integral slot winding with P poles are **P/2**

163.The use of double squirrel cage winding on the rotor provides **a large starting torque**

164.By providing deep narrow slots in the rotor punching in induction motor **a large starting torque**

165.In induction motor if the number of rotor slots is equal to the stator slots then **the motor may refuse to start**

166.A **__large__** value of magnetizing current gives **___. poor__** power factor

167.Friction and windage loss in induction motor is usually **1% of the rated output**

168.In case of double cage rotor, the upper cage which is near to the air gap is made of **brass**

169.Losses due to harmonic currents produced in the cage rotor winding can be reduced by

(A) using skewed rotor

(B) using chorded stator winding

(C) proper slot combination of rotor and stator

(D) **any of the above**.

170.In squirrel cage motors, skin effect occurs in

(A) stator winding

(B) rotor winding

(C) **both (A) and (B) above**

171.For a 3 φ fractional slot winding with P poles the number of parallel paths is

(A) P

(B) 2P

(C) P/2

(D) **none of these**.

172.The output of a rotating electrical machine is limited by **temperature rise**

173.The hum in the transformer is due to **magnetostriction**

174.Turbo alternators are characterized by **short diameters and great axial lengths**

175.Short circuit ratio for turbo-alternators is usually **0.5 to 0.7**

176.A synchronous machine having large length of the air gap will have **smaller unbalanced magnetic pull**

177.Damper windings are provided in synchronous machines to

(A) damp out rotor oscillations

(B) reduce the over-voltages under abnormal conditions

(C) facilitate starting

(D) **all of the above.**

178.The use of salient poles on high speed alternators will cause **excessive windage loss and excessive noise**

179.Arc welding transformer is basically a **step-down transformer**

180.The output voltage of arc welding transformer is usually **55 to 65 V**

181.A welding transformer should have

(A) drooping voltage-current characteristics

(B) open circuit voltage less than 80 V

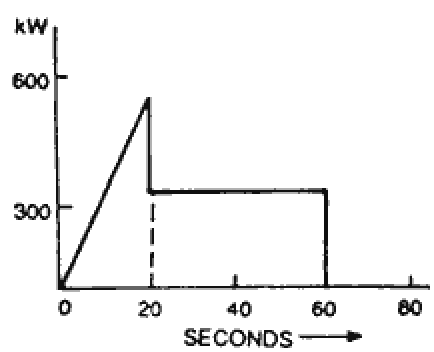
(C) current controlled continuously over the full range

(D) **all of the above.**

182.The drooping characteristics of a welding transformer are usually obtained by **using series reactance**

183.The power factor of a welding transformer is usually **very low**

184.For the load cycle shown in the figure, the rating of the motor should be



(A) 600 kW

(B) 350 kW

(C) 300 kW

(D) **275 kW.**

185.The materials in order of decreasing eddy current loss will be **aluminium, iron, wood**

186.For a 5 kW DC motor the number of slots per pole should be **8**

187.In a synchronous generator in order to eliminate the fifth harmonic the chording angle should be **36°**

188.Inter poles in DC machines are provided to reduce **sparking**

189.Skewing in the slots of an induction motor is provided to reduce **harmonics**

190.Sometimes a reactor is connected in series with a transformer to **control fault current**

191.DC motor yoke is generally made of **steel**.

192.For the same rating, the cost of an induction motor as compared to that of a DC motor is **less**

193.In case of electrical machines, the intermittent rating as compared to its continuous rating is **more**

194.For the use of mush windings in 3φ induction motors, the slot should be **semi-closed**

195.A hunting sound is produced in a synchronous motor when

(A) load fluctuates

(B) supply frequency varies

(C) **both (A) and (B) above**

196.The transformer noise is mainly because of **magnetic flux**

197.Stampings in transformers are provided to reduce **eddy current loss**

198.**no loss.** loss occurs in the yoke of a DC machine

199.The losses occurring in the rotor of an induction motor are less than those in the stator because of **Less rotor frequency**

200. In case of transformers, with increasing frequency **copper losses remain unaffected while efficiency increases.**

201. The regulation of a transformer is least affected by changes in frequency at **unity power factor**

202. In case of induction motor, with increase in supply voltage, which of the following increases **Torque**

203. In most AC machines, it is usually a standard practice to use **fractional slot winding with chorded coils**

204. In a transformer iron loss vary as **__square__** of voltage

205. In case of distribution transformers, at fractional loads **with increase in voltage efficiency decreases**

206. In case of transformers regulation varies as **square of voltage**

207. In a transformer, with change in frequency **copper losses remain unchanged.**

208. Distribution transformer has core losses ∞ **copper losses**

209. If a synchronous motor fails to start, the probable cause could be

(A) low voltage

(B) too much load at starting

(C) single phasing

(D) **any of the above.**

210. In case a synchronous motor starts but fails to develop full torque, the probable cause could be

(A) low excited voltage

(B) reverse field winding

(C) open or short circuit

(D) **any of the above.**

211.If a DC machine gives shock the probable cause could be

(A) armature field coils or brush holders earthed

(B) weak or leaky insulation

(C) loose earth wire

(D) **all of the above.**

212.If a DC motor stops after running for some time, the probable cause could be any of the following EXCEPT: **Brushes ahead of neutral**

213.If fuse blows at the starting of a DC motor the probable cause could be

(A) low capacity of the fuse

(B) overload

(C) short circuit in the starter resistance

(D) **any of the above.**

214.Sound in a DC motor may be due to

(A) unequal resistance of the armature and field coils

(B) loose fittings of the field core with yoke or frame

(C) improper fitting of the side covers

(D) **any of the above.**

Chapter # 35 Industrial Drives

1. All of the below consideration involved in the selection of the type of electric drive for a particular application depends on

(A) Speed control range and its nature

(B) Starting torque

(C) Environmental conditions

2. Ward Leonard controlled dc motors is preferred for automatic drives.

3. Any of the below type of drive can be used for hoisting machinery

(A) AC slip ring motor

(B) Ward Leonard controlled DC shunt motor

(C) DC compound motor

4. The motor normally used for crane travel is **AC slip ring motor**

5. A wound rotor induction motor is preferred over squirrel cage induction motor when the major consideration involved is **all of the below three**

(A) high starting torque

(B) low starting current

(C) speed control over limited range

6. When smooth and precise speed control over a wide range is desired, the motor preferred is **dc motor**.

7. When quick speed reversal is a consideration, the motor preferred is **dc motor.**

8. Stator voltage control for speed control of induction motors is suitable for

fan and pump drives

9. The selection of control gear for a particular application is based on the consideration of

(A) duty

(B) starting torque

(C) limitations on starting current

(D) all of the above.

10. As compared to squirrel cage induction motor, a wound rotor induction motor is preferred when the major consideration is **high starting torque**

11. A synchronous motor is found to be more economical when the load is above

100kW.

12. The advantage of a synchronous motor in addition to its constant speed is **high power factor**

13. In motor circuit static frequency changers are used for **speed regulation.**

14. In case of traveling cranes, the motor preferred for boom hoist is **AC slip ring motor**

15. The characteristics of drive for crane hoisting and lowering is

(A) smooth movement

(B) precise control

(C) fast speed control

(**D) all of the above.**

16. The capacity of a crane is expressed in terms of **Tones**

17. The traveling speed of cranes varies from **1 to 2.5 m/s**

18. In overhead traveling cranes **short time rated motors arc preferred**

19. 15 minute rated motors are suitable for **light duty cranes**

20. Light duty cranes are generally used in

(A) automobile workshops

(B) pumping stations

(C) power houses

(**D) All of the above.**

21. Heavy duty cranes are used in

(A) Heavy engineering workshops

(B) Steel plants

(C) Ore handling plants

(D) All of the above.

22. 1/2 hour rated motors are used for **medium duty cranes**

23. Which of the following drive can be used for derricks and winches?

(A) DC motors with Ward Leonard control

(B) AC slip-ring motors with variable resistance

(C) Pole changing squirrel cage motors

(D) Any of the above.

24. The number of sets used in pole changing type squirrel cage motors for derricks and winches, is **3**

25. A pole changing type squirrel cage motor used in derricks has four, eight and twenty four poles. In this the medium speed is used for **lifting**

26. A pole changing type squirrel cage motor used in derricks has four, eight and twenty four poles. In this the lowest speed is used for **landing the load.**

27. For handing fragile articles in a crane **low speed is preferred**

28. The range of horse power of electric motor drives for rolling mills is of the order of **100 to 500 HP.**

29. Motors preferred for rolling mill drive is

(A) dc motors

(B) ac slip ring motors with speed control

(C) any of the above

30. The ....motors, because of their inherent characteristics, are best suited for the rolling mills **dc motors**

31. In case of kiln drives **starting torque is more than double of the running torque.**

32. Motor preferred for kiln drives is usually

(A) slip ring induction motor

(B) three phase shunt wound commutator motor

(C) cascade controlled ac motor

(D) any of the above.

33. Belt conveyors offer **high starting torque.**

34. In case belt conveyors **squirrel cage motors with direct-on-line starters are used**

35. Squirrel cage induction motor is preferred for blowers.

36. Centrifugal pumps are usually driven by **squirrel cage induction motors**

37. In case of centrifugal pumps the starting torque is generally **less than running torque**.

38. In a centrifugal pump if the liquid to be pumped has density twice that of water, then the horse power required (as compared to that while pumping water) will be **double**

39. Wound rotor and squirrel-cage motors with high slip which develop maximum torque at stand still are used for **presses and punches**

40. Belted slip ring induction motor is almost invariably used for **jaw crushers**

41. In jaw crushers, a motor has to often start against **heavy load.**

42. Motor used for elevators is generally **induction motor**

43. In synthetic fibre mills motor with **constant speeds are preferred**

44. Reluctance motor is preferred for synthetic fibre mills.

45**.** Reluctance motor is a **self-starting type synchronous motors**

46. A reluctance motor **is compact**

47. Power factor in case of reluctance motor is **0.3 to 0.4.**

48. The efficiency of reluctance motor is around **60 to 75%.**

49. A reluctance motor on over-load runs as **induction motor**

50. The size of a excavator is usually expressed in terms of **cubic meters**

51. Ward-Leonard controlled dc drives are generally used for **heavy duty excavators**

52. In case of contactors, the contacts are generally made of

(A) copper

(B) silver

(C) cadmium copper

(**D) any of the above.**

53. DC operated electromagnet is preferred for noiseless operation

54. For high frequency choppers the device that is preferred is **Transistor**

55. The number of operations per hour in case of class IV contactor will be around **1200.**

56. In case of contactors, the duty in which the main contacts remain closed for a period bearing a definition relation to the no-load periods, is known as **Intermittent duty**

57. In case of contactors the ratio of the in-service period to the entire period, expressed as a percentage is known as **load factor**

58. A class I contactor should be mechanically sound to withstand **0.25 million times**

59. Heat control switches find applications on **cooling ranges.**

60. A saturable core reactor is basically **variable impedance.**

61. A saturable core reactor can be used **step less ac voltage variation**

62. In case of saturable core reactors, the power gain varies from **5 to 100**

63. A magnetic amplifier can be used for the control of **current**

64. An electric drive consists of **motor, transmitting shaft and control equipment**

65. In case of contactors, the contact chatter may be due to

(A) excessive jogging

(B) broken pole shader

(C) poor contact in the control pick-up circuit

(D) any of the above.

66. In a contactor overheating of contacts may result from any of the following except:**Excess contact pressure**

67. In case of contactors, the magnet may become noisy due to

(A) dirt or rust on magnet faces

(B) low voltage

(C) broken pole shader

(D) any of the above.

68. The failure of a thermal relay may occur due to

(A) motor and relay in different ambient temperatures

(B) relay previously damaged by short circuit

(C) mechanical binding

(D) any of the above.

69. Premature blowing of a fuse may occur due to **heating at ferrule contacts**

70. According to Indian Electricity rules, extra high voltage implies voltage exceeding **33 kV**

71. In case of low and medium voltage circuits, the permissible voltage variation is **5%**

72. Which of the following site will be preferred for earthing?

(A) wet mashy ground **clayey soil**

73. Resistivity of earth increases sharply if the moisture falls below **20%.**

74. Dry earth is least preferred for earthing.

75. Earth electrodes can be in the form of

(A) rods and pipes

(B) strips

(C) plates

(D) any of the above.

76. Which of the following is not use as earth continuity conductor ?

(A) water pipes

(B) gas pipes

(C) structural steel members

(D)all of the above.

77. The diameter of a 50 SWG wire is closer to **0.0253 mm**

78. Non-metallic conduits for wiring are generally made of **PVC.**

79. PVC conduits can be buried on

(A) lime

(B) plaster

(C) concrete

(D) any of the above.

80. PVC conduits can be joined by

(A) solvent cement

(B) welding

(C) threading

(D) any of the above.

81. The maximum horse power up to which 440 V electric motors are used, is **200 HP**

82. The earthing electrode should be situated at a place at least ....**1.5 m**..... meters away from the building whose installation system is being earthed

83. Coal salt mixture is preferred for filling around the earth electrode effective earthing

84. Inside the earth or pit, the earthing electrode should be placed **vertical**

85. 'Danger 440 V' plates are **caution notices**

86. The minimum clearance of any overhead line from the ground should be **6 m**

87. Earthing of electric appliances is done

(A) for the safety of human life

(B) to reduce line voltage fluctuation

(C) for protection of electric equipment

(D) for all of the above.

88. Earthing is used as the return conductor for

(A) telephone lines

(B) telegraph lines

(C) traction work

(D) all of the above.

89. The resistance of earth wire should be **very low.**

90. The earth's potential is taken as **zero**.

91. The earth wire should not be thinner than a **8 SWG wire.**

92. In automobiles the sound is produced by horn due to **vibrating diaphragm**

93. The current drawn by a 6 V horn is roughly **20 A.**

94. The hours are rated for **intermittent operation**

95. Continuous operation of automobile horn will **damage the operating coil**

96. In a constant power type load **torque is inversely proportional to speed**

97. According to fan laws: $\mathbf{V_1 / V_2 = (d_1 / d_2)^3 (RPM_1 / RPM_2)}$

98. According to fan laws when P is the power d is the diameter. N is the rpm and D is the density, then

$\mathbf{P_1 / P_2 = (d_1 / d_2)^5 (N_1 / N_2)^3 (D_1 / D_2)}$

99. Squirrel cage induction motor and synchronous motor is used for frequency converters

100. Belted wound rotor induction motors are preferred for **gyratory crushers**

101. The cooling time constant is usually **more than heating time constant**

102. A motor of less than full load power rating can be used if the load is **short time duty**

103. Pole changing method of speed control is used in **squirrel cage induction motor.**

104. To save the energy during braking **regenerative braking is used**

105. To get speed higher than the base speed of the dc shunt motor **field resistance control is used**

106. Rotor resistance speed control is used in **slip ring induction motor**

107. Effect of friction torque is more pronounced **when the drive is being started**

108. The equilibrium speed of a motor load system is obtained **when motor torque equals the load torque**

109. Most commonly used ac motor is **Squirrel cage induction motor**

110. The motor commonly used in computers and digital systems is **Induction motor**

Chapter # 36 Instruments and Measurements

1. An instrument in which the value of electrical quantity to be measured can be determined from the deflection of the instrument when it has been pre-calibrated by comparison with an absolute instrument is known as **Secondary Instrument.**
2. Damping torque in instrument is generally not produced **Electro-Statically.**
3. A pointer of an instrument once deflected returns to zero position when the current is removed due to **Controlling Torque.**
4. In hot wire instruments the sensing wire is made of **Platinum-Iradium.**
5. An ammeter is **Inserted In Series In A Circuit And Current To Be Measured Flows Through It.**
6. An ammeter is convertible to voltmeter **By Putting A Large Resistor in Series with The Actual Measuring Part of The Instrument.**
7. Which of the following material will be preferred as shunt for extending the range of voltmeter? **MANGANIN.**
8. DC potentiometer is an instrument to measure unknown **EMF**
9. The instrument which gives the value of the quantity to be measured in terms of the constants of the instrument and their direction only are known as **Absolute Instrument.**
10. Voltmeter is not **An Integrating Instrument**.
11. Deflecting torque can be produced **Magnetically, Electrostatically and Thermally.**
12. To take care of change in frequency of ac current, while using moving iron type instrument**, A Condenser of Suitable Value Is Used in Parallel with The Swamp Resistance.**
13. The advantage of moving coil permanent magnet type instrument is **Low Power Consumption, No Hysteresis Loss, Efficient Eddy Current Damping**
14. A moving coil millimeter having R = 10 ohm gives full scale deflection when a current of 5mA is passed through it. If the instrument to be used can measure current up to 1 A: **A Resistance Of 0.502 Ohm Connected In Parallel With The Resistance Of Ammeter**
15. A portable instrument is likely to have **Eddy-Current Damping**
16. In eddy current damping system, the disc is usually made of **Conducting and Non-Magnetic Material**
17. **Permanent Magnet** can be used for DC only.

18. **Induction Type Wattmeter** cannot be used for both AC and DC.
19. A moving iron type ammeter has few turns of thick wire so that **Resistance Is Less**.
20. Which of the following type of instrument cannot be used for DC? **Induction type**
21. A repulsion type ammeter when used on AC circuit reads **RMS Values of Current**
22. Eddy current damping is not used on repulsion type instrument because of **The Presence of A Permanent Magnet Required For Damping Would Affect The Deflection And Hence The Reading Of The Instrument.**
23. The error due to hysteresis in moving iron type instrument is minimized by using **Permalloy.**
24. If damping torque is not provided in an instrument, **The Pointer Will Oscillate About Its Final Deflected Position for Quite Some Time Before Coming to Rest**.
25. When the damping of an instrument is adjusted to enable the pointer to rise quickly to its deflected position without overshooting, in that case the instrument is said to be **Dead-beat.**
26. When the damping force is more than optimum, the instrument will become **Slow and Lethargic**
27. In a moving iron type ammeter, the coil has **Few Turns of Thick Wire.**
28. In repulsion type instrument, the force of repulsion is approximately proportional to Square **of Current**
29. In moving iron type instrument because of hysteresis in the iron parts of the moving system, the readings **Are Higher on Descending Values but Lower On Ascending Values**
30. Ohmmeter is used to **Measure Resistance**
31. Which type of wattmeter cannot be used for DC? **Induction type**
32. A moving coil galvanometer has a resistance 4 ohm and gives full scale deflection when carrying 30 milliamperes the instrument can be used to measure 150 volts by connecting in series with the instrument a resistance of **4996 ohm**
33. A 15-volt moving iron voltmeter has R of 30 ohm and inductance 0.12 H. The instrument reads correctly on dc and on AC at 36 Hz when it shows a voltage of 14.75 V. what will be reading for the same voltage at 100 Hz? **14.5 volt**
34. If torque/weight ratio of an instrument is low, then it can be concluded that **Sensitivity of The Meter Will Be Low.**

35. Hot wire instrument reads **R.M.S value.**
36. A moving coil instrument gives full deflection with 15mA. The instrument has a resistance of 5 ohms, if a resistance of 0.80 ohm is connected in parallel with the instrument, the instrument will be capable of reading up to **1000 mA.**
37. A 250-V voltmeter needs a current of 0.4 A to produce a full-scale deflection at 20 degree centigrade, if the coil is made of copper with a temperature coefficient of 0.4% the reading shown by the instrument for the same current at 45 Centigrade will be **0.36 A**
38. Which instrument has necessarily the square law type scale? **Hot Wire Instrument**
39. Which of the following cannot be described as the advantage of moving coil permanent magnet type instrument? **They have low torque/weight ratio.**
40. A moving coil ammeter having a resistance of 10 ohm gives full scale deflection when a current of 5 mA is passed through it. The instrument can be used for the measurement of voltage up to 5 V **by Connecting A Resistance Of 990 Ohm in Series with Instrument.**
41. Which of following instrument is incorrect about hot wire instrument? **Their response is instantaneous.**
42. Which type of damping is generally preferred in case of instrument having weak magnetic field? **Air fraction damping**
43. Voltmeter resistivity is defined as **Ohm Per Volt**
44. Power is being measured by two wattmeter method in a balanced three phase system. Wattmeter readings are W1= 250 KW, W2= 50 KW. If the latter reading is obtained after reversing the connections to the circuit coil of W2, the power factor of the load **is 0.359**
45. Which of the following is undesirable for measuring AC values? **Permanent magnet moving coil type.**
46. In which type the deflecting torque depends on frequency? **Induction type instrument**
47. An electrostatic voltmeter has a full-scale deflection of 10 KV. If the capacitance of voltmeter is negligible, and the largest capacitor available has a capacitance of 0.1 microfarad, the capacitor so as to make the full-scale deflection to represent 60 KV will be **0.02 micro farad.**
48. A dynamometer type wattmeter with its voltage coil connected across the load side of the instrument reads 180W. if the load voltage be 200 volt and voltage coil branch a resistance of 2000 ohm, the power taken by load is **160 watt.**

49. An ampere hour meter calibrated at 210 volts is used on 225-volt circuit and indicates a consumption of 639 unit in certain time. What is actual energy supplied? **675 units**
50. When the shunt resistance of galvanometer is increased, its **Current Sensitivity Decreases**.
51. In series type ohmmeter, full scale deflection current indicator is marked **Zero.**
52. For the measure of voltages and currents in the radio frequency range, suitable instrument is **Electro-Thermic Type**
53. When a 10 micro farad capacitor is connected across the terminals of an ohmmeter, instrument shows low resistance and then slowly rises the resistance to a very high value, what conclusion can be drawn about the condition of capacitor? **The Capacitor Is Straight.**
54. Which of the following meters will require smallest shunt resistance? **0-10 mA**
55. A permanent type magnet moving coil type ammeter and a moving iron type ammeter are connected in series with the output of a half wave rectifier, if the moving iron type instrument reads 5 amperes magnet moving coil type instrument is likely to be **3.18 Amps**.
56. In shunt type ohmmeter, full scale deflection current indicator is marked **infinite**
57. Thermocouples are generally used for accurate measurements up to **1600 Degree Centigrade**.
58. The commonly used material for thermocouples are **Chromel Copel, Chromel-Alumel, and Platinum-Rhodium.**
59. Bolometers are used for the measurement of **Thermal Radiations.**
60. A balometer is an element **Which Senses Optical Input and Delivers Thermal Output.**
61. Least expensive instrument for measurement is **Attraction Type Moving Iron Instrument.**
62. A cadmium sulphide cell is a **Photo Conductive Cell.**
63. Advantages of LVDT are **0.05% linearity and finite resolution, high output and high sensitivity, rugged and less friction, low hysteresis and low power consumption.**
64. Some substances generate voltage when they are subjected to mechanical forces or stress along specific planes. Such substances are known as **Piezo-Electric**.
65. Which of the following instrument can be used for the measurement of temperatures above 1500 K? **Thermo-electric pyrometer**

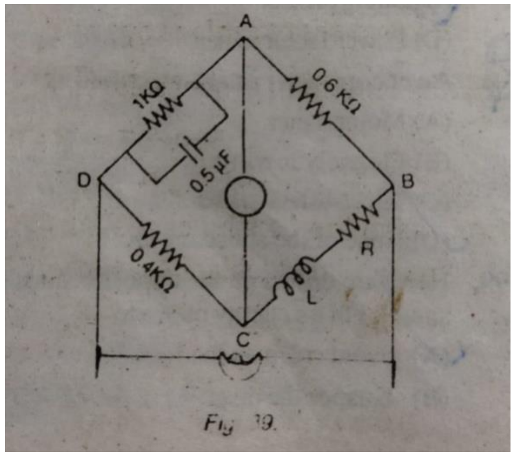
66. A solar cell is a **Same as Photovoltaic Cell**
67. A piezometer is used to **Measure Very Low Pressures**
68. A load cell **is Strain Gauge**
69. Which of following cannot be measured by load cell? **Temperature**
70. The accuracy of 0 – 100 mV voltmeter is 5 %. a full scale reading of 100mV may be due to voltage of **105Mv OR 95mV.**
71. A meter has a constant of 600 revolutions /kWh. If the meter makes 10 revolutions in 2o seconds, what is load in KW? **3 KW**
72. A 220 v single phase meter has a constant load current of 0.5 A passing though it for 2 hours at unity power factor. if the meter disc makes 1056 rev during this period, what is the meter constant in revolutions/kWh? **480.**
73. A 200 v single phase meter makes 1000 revolutions in 2 hours when the power of load is unity, if the meter is connected to a load of 0.8 pf, the number of revolutions will be **800.**
74. The readings on the ammeter connected for three ammeter method of power measurement are 2 A, 4 A and 6 A in non - inductive resistor, the load and mains respectively. The terminal voltage is 300 volts, the non-inductive resistance of the load is **150 ohms**.
75. The bridge used to measure dielectric loss of an insulator is **Anderson Bridge.**
76. Which of the following instruments can be used in ac bridges for less frequency up to 200 HZ only? **Vibration Galvanometer**
77. A Maxwell bridge is used to measure **Inductance.**
78. Bridge used to measure capacitance is **Schearing Bridge**
79. A 10 MHZ CRO has **10mhz sweep.**
80. A 100 V voltmeter has an accuracy of 5 %on full scale, the percentage error while measuring 50 V will be **10 %.**
81. Which of the following instrument does not use the effect of current for measurement purposes? **Electrostatic ammeter.**
82. A capacitor type potential divider is used to extend the range of which type of voltmeter? **Electrostatic Voltmeter**
83. Which of following frequency meters can be used for measuring radio frequency? **Heterodyne Frequency Meter**

84. One wattmeter method is used to measure power in a three circuit when **the load is balance in all three phases.**
85. Which method can be used to measure power in a three-phase unbalanced load system? **Two Wattmeter Method**
86. What could be maximum reading on a 3 ½ digit voltmeter? **1999**
87. The resolution of a digital ammeter with a 4-digit display is **1/10000.**
88. In two wattmeter method, if power factor is 0.5 then one of the wattmeter will read **Zero**.
89. A 0-100 A ammeter has been guaranteed accuracy of 20% on full scale reading. What will be the limiting error when meter is measuring 10 amperes? **20%**
90. A resistance is measured by the voltmeter ammeter method, the voltmeter reading is 50 volt on 100 volts scale and ammeter reading is 50mA on 100 mA scale, if both meters are guaranteed for accuracy within 2 % of full scale, the limit within which resistance is measured will be **40 ohm.**
91. Synchro is a transducer in **Angular Position.**
92. A cell in which a semi-conductor having a negative illumination coefficient of resistance is used is known as **Photo-Conductive Cell.**
93. The sensitivity of photoelectric cell is measured in terms of **Current per Unit of Luminous Flux.**
94. Which cell has highest sensitivity (current per unit of luminous flux)? **Germanium Junction Photo-Conductive Cell.**
95. Which cell has lowest sensitivity (current per unit of luminous flux)? **Vacuum-Photo Emissive Cell.**
96. In an energy meter, the steady speed of disc can be achieved **when operating torque is equal to braking torque.**
97. Which is integrating instrument? **Energy Meter**
98. An energy meter can be defined as motor meter, electrolytic meter, and electrostatic meter**, none of the above.**
99. Holes are drilled on the opposite side of an energy meter to **Avoid Creep on Load.**
100. The phenomena of creeping occurs in **Watt-Hours Meter.**
101. A thermistor is as **semiconductor device with a negative temperature coefficient of resistance.**

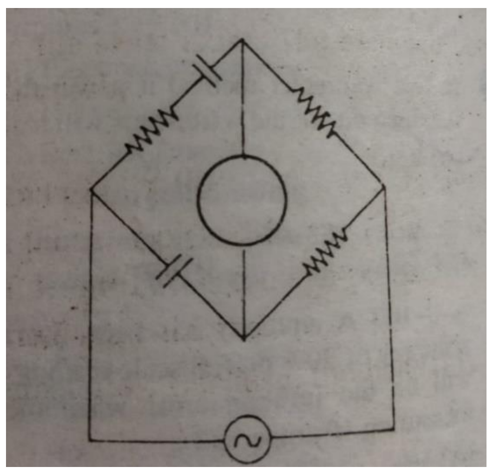
102. The harmonic distribution is given **by D= square root of D_2^2 +D_3^2 + D_4^2 + …….**

103. A Meggar is basically a **moving coil type instrument.**

104. The value of bridge shown in figure below is balanced, value of R and L will be **240 ohm,0.12 H**



105. The bridge shown in figure below is **Wein Series Bridge**.



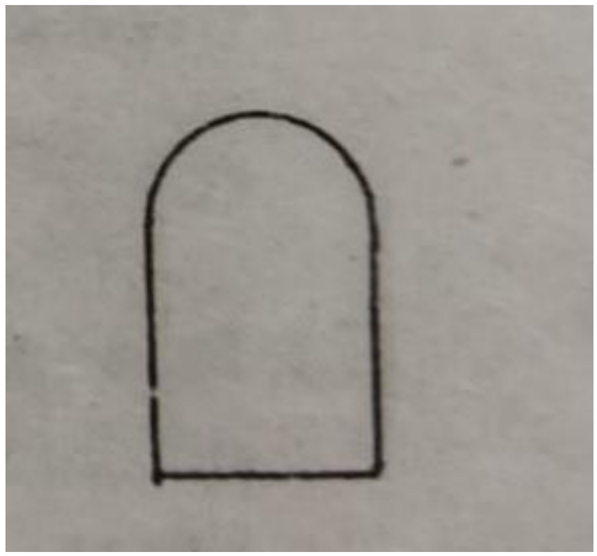
106. Two voltmeters A and B having resistance 5000ohms and 1000 ohms respectively are jointed in series across 240V supply. The voltage across the two voltmeters will be **V_A = 60 V & V_B =180V**

107. The output signal an LVDAT for sinusoidal displacement of its core **Is A Frequency Modulated Voltage**

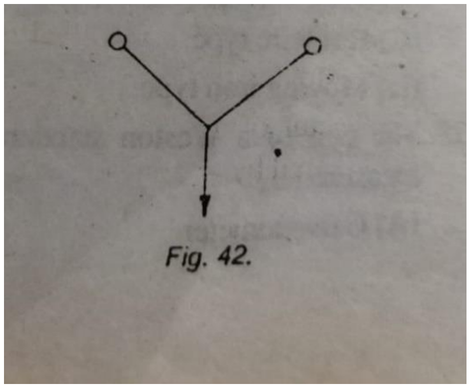
108. In a moving iron instrument 12A current causes a deflection of 60 degree .A deflection of the needle by 15 degree will be obtained by a current of **6A**

109. In a moving coil instrument by 60 degree, for deflection of 15-degree current will be **3 A**

110. Which of the following instrument can be used in ac bridges for frequencies up to 100 kHz? **Tunable amplifier detector**
111. Hays Bridge can be used for measurements on **High Q Inductive Circuits**
112. The number of turns in the primary of a current transformer is usually **1 -5**
113. The ratio error of a current transformer is due to **Exciting Current**
114. Which type of instrument is represented by the symbol shown below **Permanent magnet moving coil type**



115. A rosette is used for the determination of **principle strains or stress direction and magnitude.**
116. To compensate for temperature changes Dummy **strain gauge is used.**
117. Which of the following bridges is used in strain gauge instrument **Specially designed bridges.**
118. The gauge factors k and the Poisson's ratio (u) are related as **k = 1 + 2 u.**
119. Buchholz relay is used in **Transformer Protection**.
120. State fluid pressure measurement is widely done using **A) Bourdon tubes B) Pitot tubes**
121. The fact as to how closely the instrument reading follows the measured variables is termed as **Fidelity.**
122. Which multiple of basic unit is "atto "?**10^-18**
123. Which type of instrument is represented by the following symbol shown in figure **Hot Wire Type**

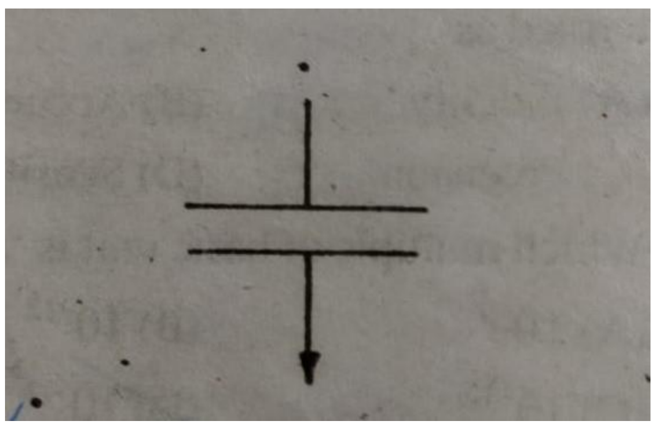


124. The purpose of providing a swapping resistance in dynamometer type moving coil instrument is **to provide equal time constant for fixed coil and moving coil when used for ac measurement.**

125. A photoelectric device in which the resistance of the metal changes directly in proportion to the light striking on it, is known as **Photo –Conductive Cell.**

126. Hot wire anemometers are used to measures **Velocity of Air Stream**

127. Which type of instrument is represented by the symbol shown **Electrostatic Type**.



128. The EMF of a Weston standard cell can be measured by **Potentiometer.**

129. Which of the following instrument will be suitable for the measurement of temperature of a furnace **Optic Pyrometer**.

130. Permanent magnets used in instrument are generally made of **Alnico.**

131. The significance figures of 100,000 is **5.??**

132. An electrodynamic wattmeter is not considered suitable for low power factor circuits due to Power **Loss in Voltage Coil.**

133. The scale of a wattmeter gives maximum indications of 100. The current and voltage ranges are 10A & 220 V, the multiple factor is **22**.

134. In a megger when not in operation the needle shows a resistance of **infinity**.

135. Meters range is normally so selected that the indications are obtained at **the middle of the scale.**

136. A VTVM can measures Voltage **and Resistance**.

137. Which voltmeter would you prefer to measure the voltage between the resistance AB as shown in circuit below? **0-200 V& 150 ohm/volt &3 percent accuracy**

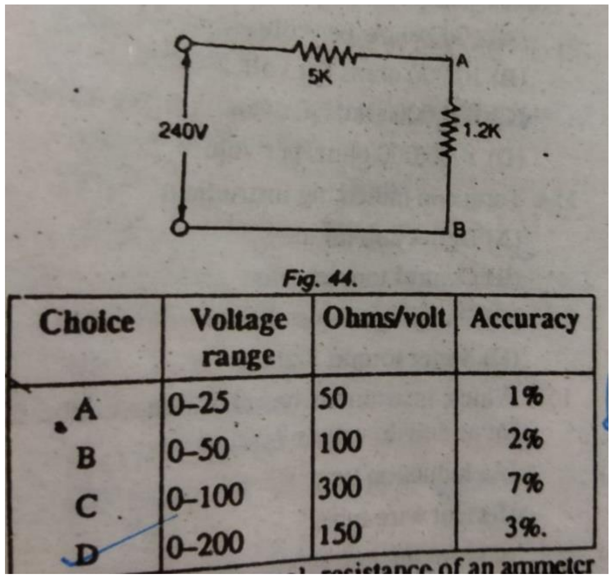


Fig. 44.

Choice	Voltage range	Ohms/volt	Accuracy
A	0–25	50	1%
B	0–50	100	2%
C	0–100	300	7%
D	0–200	150	3%.

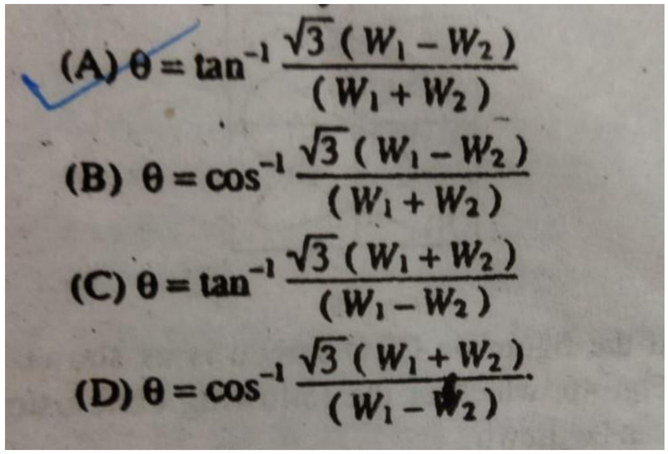
138. Ideally the internal resistance of an ammeter should be **Zero**

139. Two 100V dc voltmeters having resistances of 15 kohm & 10 kohm are connected in series to the 60 V dc supply. The readings of the two voltmeters will be **40 V & 20V.**

140. Two 200V dc voltmeters having resistances of 15 kohm and 10 kohm are connected in series. the safe voltage which can be measured by this combination will be **200V.**

141. Measurements finds applications in **Engineering Experimental Analysis, Automatic Control of Process and Operations, Monitoring Of Process And Operations**

142. In two wattmeter's method the power factor angle is given by



(A) $\theta = \tan^{-1}\frac{\sqrt{3}(W_1 - W_2)}{(W_1 + W_2)}$

(B) $\theta = \cos^{-1}\frac{\sqrt{3}(W_1 - W_2)}{(W_1 + W_2)}$

(C) $\theta = \tan^{-1}\frac{\sqrt{3}(W_1 + W_2)}{(W_1 - W_2)}$

(D) $\theta = \cos^{-1}\frac{\sqrt{3}(W_1 + W_2)}{(W_1 - W_2)}$

143. In two wattmeter’s method, if one of the wattmeter’s shows negative reading, the power factor of the load should be **Lagging**

144. A Q –meters works on the principle of **Series Resonance Circuit**

145. A 200-mA meter has accuracy of +-55.its accuracy while reading 100mA will be**+-10%**

146. The dimension of force is **LMT** $^{-2}$

147. The dimension of power is **L**^{2} **MT** $^{-2}$

148. For the lissajous figure shown below, the ratio of frequencies Fy/Fx **3:2**

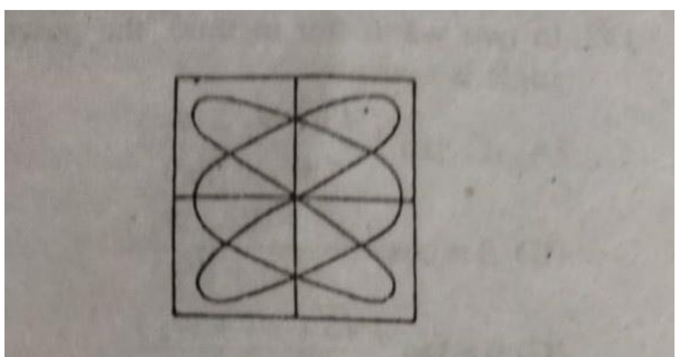


Fig. 45.

149. If the figure on CRO screen is as shown in fig below which of the following conclusion can be drawn **Frequency of vertical Deflection voltage is four times the frequency of horizontal deflection voltage**.

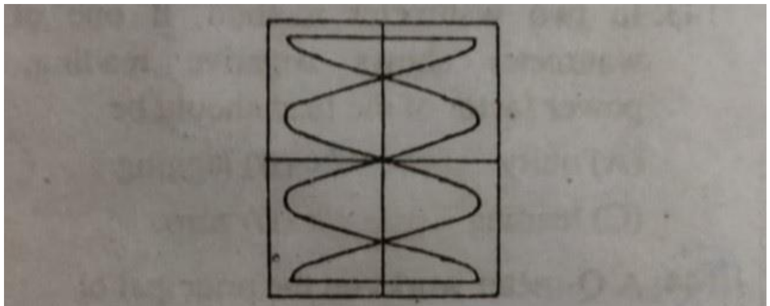


Fig. 46.

150. In a Ferraris induction instrument the mean torque is proportional to**: (Current) ^2**

151. Which of the following methods will be suitable for the measurement of the resistance of an ammeter shunt? **Kelvin's Double Bridge**

152. The resistance of the shunt for an ammeter is usually of the order of **Less Than 1 Ohms**

153. A voltmeter utilizes a uA meter movements the sensitivity of the voltmeters is **100,000ohms / volts**

154. Torque in indicating instrument **Control Torque, Damping Torques, and Deflecting Torque.**

155. Which instruments has same calibrations for the ac & dc values? **Hot Wire Type**

156. To double the current range of a 50 uA 2000-ohm movement, the shunt resistance required is **2000 Ohm.**

157. Which voltmeter has the least power consumptions? **Electrostatic type.**

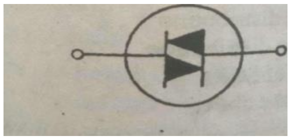
158. For the hot wire type instruments, the hot wire is made up of **Platinum iradium**.

159. A shunt of 250-ohm resistance is being used with a galvanometer of 1500Ohm resistance, what is the multiplying factors? **7**

160. To protect a galvanometer during a transport **Critical Damping Resistances Is Connected Across the Terminals**

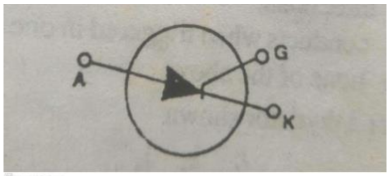
Chapter # 37 Power Electronics

1. Silicon Controlled Rectifier (SCR) is a **Device with three junctions.**
2. Thyristor is basically a **PNPN Device.**
3. A PNPN device having two gates is **BCS.**
4. The device that incorporates a terminal for synchronizing purpose is **SUS.**
5. The advantage of thyristor over SCS is **Faster switching time and smaller Vh.**
6. Thyristor equivalent of a Thyratron tube is **silicon-controlled rectifier (SCR).**
7. A Triac is a **Three terminal bidirectional switch.**
8. Fig.10 below represents a



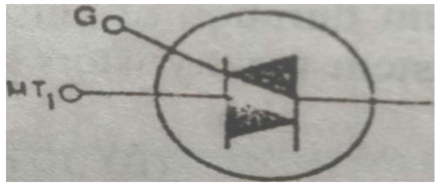
Diac Trigger

9. The triple frequency of a six-phase half wave rectifier for 220v,60Hz input will be **360hz**
10. The minimum duration of pulse in a pulse triggering system for thyristors should be at least **10μs**
11. As compared to Oscillators, an Inverter provides **Low Frequency output.**
12. During induction heating, the skin depth of penetration is proportional to $\mathbf{1/\sqrt{f}}$
13. A device that cannot be triggered with high voltage of either polarity is **SCS.**
14. Fig11 below represents a



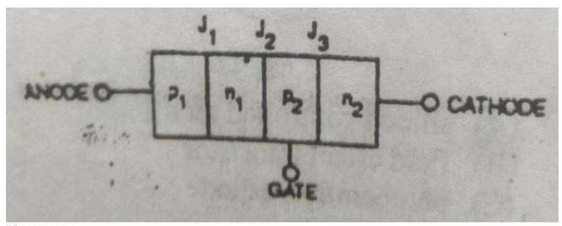
Silicon controlled rectifier (SCR)

15. In a three-phase half wave rectifier, each diode conducts for a duration of **60°**
16. **SCR** finds applications in speed control of DC motor.
17. Fig12 below represents a



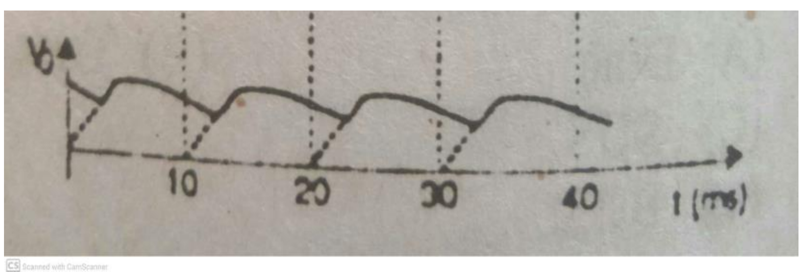
Triac thyristor

18. The ward-Leonard system is used for controlling the speed of **Dc motors.**
19. A device that does not exhibit negative resistance characteristics is **FET.**
20. A Triac **conducts when not triggered in both directions.**
21. For a thyristor shown



J1,J2 are reverse biased and J3 is forward biased.

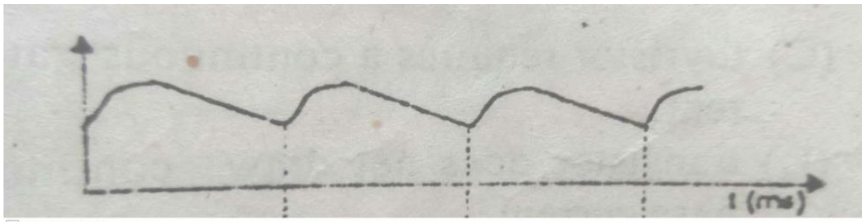
22. Single phase full wave converter with 50Hz supply and RC parallel load has output voltage wave form as:



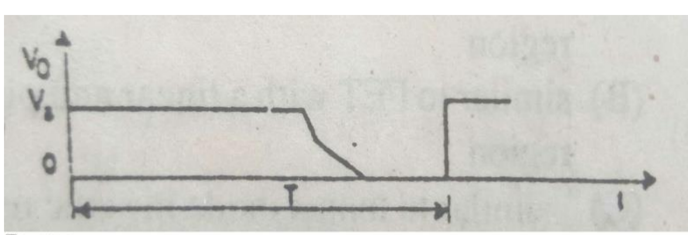
23. A voltage source 200sin 314t is applied to a thyristor controlled half wave rectifier with resistive load of 50Ω.If the firing angle is 30° with respect to supply voltage waveform, the average power in the load is **70.6watt.**
24. RC snubber circuit is used to limit the rate of **rise of voltage across SCR.**

25. A freewheeling diode is connected across an inductive load is **to restore conduction angle on phase.**

26. Equalizing circuits are provided across each SCR is series operation to provide uniform **voltage distribution.**
27. Voltage across an RC parallel load connected through a full wave rectified bridge waveform



28. The thyristor is turned off when the anode current falls below **the latching current.**
29. In a thyristor circuit, the angle of conduction is changed by changing **gate current.**
30. In single phase full-wave controlled bridge rectifier, minimum output voltage is obtained at conduction angle **<u>0°</u>** and maximum at conduction angle **<u>180°</u>**
31. A single-phase AC regulator with an inductive load has the following details- source voltage=230V, frequency=50hz, wL=5ohm. The control range of the firing angle is **Π/2 ≤ a≤ Π.**
32. In a thyristor, **Latching current is about 3 times the holding current.**
33. The VI characteristics of UJT is **similar to tuned diode in some respect.**
34. Chopper control of DC motor provides variation in **input voltage.**
35. In a thyristor, ratio of latching current to holding current is **3**
36. In a thyristor, dv/dt protection is achieved through the use of **RC across thyristor.**
37. In a thyristor, di/dt protection is achieved through the use of **L in series with thyristor.**
38. UJT when used for triggering an SCR, has **saw tooth waveform.**
39. A resistor connected across the gate and cathode of a thyristor increases its **noise immunity and holding current.**
40. For current-commutated chopper, output voltage waveform is;



41. Inverter converts **DC to AC.**
42. The latching current of a SCR is 12mA. Its holding current will be **4mA**
43. In series connected thyristors, **RC is called a snubber circuit.**
44. When thyristor and transistor compared as a switch, true statement is: **Thyristor requires turn off circuit while transistor don't.**
45. In dc choppers, the waveforms for input and output voltages are respectively **continuous, discontinuous**
46. In dc choppers, per unit apple is maximum when duty cycle α is **0.5**
47. In a step-up chopper circuit, if Vs is the source voltage and α is the duty cycle, then output voltage is **Vs/1-α**
48. In a single-phase full converter bridge, average output voltage is **1/Π** $\int_{\alpha-\Pi/2}^{\alpha+\Pi/2} VmCos\Theta d\Theta$
49. In a single-phase semi converter, for continuous conduction, freewheeling diode conducts for **α**
50. If firing angle in a SCR rectifier is decreased, output is **Increased.**
51. SCR is a **One Directional** switch.
52. If we compare Triac and SCR **Triac requires more current for turn on than SCR and A Triac has less time for turn off than SCR.**
53. In a three-phase half wave diode rectifier, the ratio of average output voltage to per phase maximum ac voltage is **0.827**
54. Each diode in 3Φ, half wave diode rectifier conducts for **120°**
55. In a 3Φ half wave rectifier circuit, each diode is subjected to PIV of $\sqrt{3}$**Vm**
56. In a semi phase semi converter, average output voltage is **1/Π** $\int_{\alpha-\Pi/2}^{\Pi/2} VmCos\Theta d\Theta$
57. In a 1Φ, half wave-controlled rectifier, if input voltage is 400sin314t, the average output voltage for a firing angle of 60° is **300/Π**
58. For a 3Φ, 6 pulse diode rectifier, average output is **3Vm/Π**
59. In a 3Φ semi converter, for firing angle less than or equal to 60°, wheeling diode conducts for **zero degree.**
60. In a 3Φ full converter, 6 SCRs are fired at an interval of **120°**
61. In a 1Φ full converter, for load current I ripple free, average thyristor current is ½ **I**
62. In a 1Φ full converter, no of SCRs conducting during overlap are **4**

Chapter # 38 Computation

Tip: Keep your book with you while preparing this chapter because it includes a lot of mathematical expressions, charts and tables etc.

1. **Merge Sort** is a sorting algorithm that has an average-case and worst-case running time of (n log n).

2. Let P be a quick sort program to sort numbers in ascending order. Let, t1 and t2, be the time taken by the program for the inputs [1 2 3 4 5] and [5 4 3 2 1] respectively. Which of the following holds? **t1 < t2**

3. Study the following program written in a block-structured language.

Var x, y: integer ;

Procedure P (: integer) :

begin

x: (n + 2) / (n+3)

end;

Procedure Q;

Var x,y: integer;

begin

x : = 3;

y: =4

P(y);

Write (x)

end;

begin

x : = 7;

y : = 8;

Write (x)

end.

What will be printed by the write statements marked (1) and (2) in the program if the variables are statically scoped? **3, 7**

4. For the program in the above question what will be printed by the write statements marked (1) and (2) if the variables are dynamically stopped? **6, 7**

5.The logical expression

X. AND. Y. OR. (Z * * 3 + Z). GT. (9.67 - R) will be evaluated as follows:

e_1 = Z * * 3 + Z

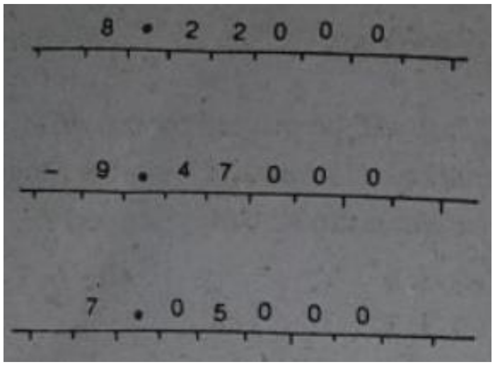
e_2 = 9.67 - R

e_3 = e_1. GT. e_2

e_4 = X. AND. Y.

e_4 OR e_3

6. The values of the variable A, B, and C (stored internally) are 8.22, - 9.47, and 7.05 respectively. Using output statement WRITE (9.88) A, B, C, we get the following output: Which of the following format/formats are used?



Answer: 88 FORMAT (I HO, F8.5/I HO, F8.5/I HO, F8.5)

7. Sometimes the object module produced by a compiler includes information (from the symbol table) mapping all source program names to their addresses. The most likely purpose of this information is **for use as input to a debugging aid**.

8. With regard to the Pascal declarations Type

Vector = array [1: 10] of integer;

Var

a : Vector ;

b. c array [1:10) of integer

d: Vector ;

which of the following is FALSE?

b and d have name equivalent types

9. Which of the following statement is not valid in FORTRAN: **P + Q + ……**

10. If the maximum exponent that can be stored in computer is 38, then the operation

W = X*Y/Z (FORTRAN)

Or W = X*YZ (PASCAL)

for X = 0.5 E 30 Y = 0.5 E 30 and Z = 0.25 E 30 will cause **overflow error.**

11. Compared with the time for storage access, the speed of the arithmetic module **can be neglected**.

12. **Loader** is a programme that has the task of allocating a storage area in the main memory to a programme and of locating the programme into this area.

13.Consider the logic function in the table below where x denotes a don't care value, which of the following statements describes correctly the relation between the minimum sum and the minimal product form of f?

A	B	C	f
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	x
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	x

Answer: They are logically equivalent because don't cares are used in the same way

14. Subroutines are used in larger programmes not **for ease of program testing at the program development time.**

15. An assembler that runs on an IBM360-370 produces machine code for an INTEL-8080 based machine is called **Cross-Assembler**.

16. An assembly language is a **machine-oriented** programming language but BASIC is **high level** programming language.

17. A utility programme that takes a procedure and searches a library to locale copies of any procedures called but not defined in the first procedure, is called **Linker**.

18. ALGOL is oriented to the solution of scientific language. ALGOL introduced the idea of **nested procedures**.

19. CP/M is a popular operating system for **8080 based micro-computers**.

20. 13 Bits are used for addressing the memory. The last storage address will be **8191**.

21. **Micro-Programming** is a language that actually controls the path of signals or data within the computer is controlled.

22. DEC –10 uses a **36-bit word**.

23. A language in which a statement in a loop that runs 100 times and is decoded 100 times, is **BASIC**.

24. A computer is always freely programmable if **it has random access memory**.

25. **Operation part and address part** are basic components that comprise machine instruction.

26. A critical region is **A program segment that often causes unexpected system crashes**.

27. Using longer identifiers in a program will necessarily lead to **somewhat lower compilation**.

28. FORTRAN is a **compiled imperative programming language**.

29. A operator precedence parser is a **back-tracing parser**.

30. In a circular-linked list organization, insertion of a record involves modification of **one pointer**.

31. In a compiler the module that checks every character of the source text is called **the code generator**.

32. The context-free grammar is ambiguous if **it produces more than one parse tree from some sentence**.

33. On receiving an interrupt from a 10 device the CPU **branches off to the Internet service routine after completion of the current instruction**.

34. The data transfer rate of a double density floppy disc system is about **50 K bits/sec.**

35. The most relevant addressing mode to write position-independent codes is **relative mode**.

36. A micro-programmed control unit **facilities easy implementation of new instructions**.

37. The exponent of a floating-point number represented in excess-N code so that **the smallest member is represented by all zeros.**

38. In machine language the operand can be **an addressable register or the location of an instruction in memory or literal numbers to be used by the program**.

39. Match the following:

(A)	The most popular first-generation computer	(i)	IBM system/ 360
(B)	The second generation computer	(ii)	Third generation computer
(C)	Third generation computer	(iii)	UNIVAC I
(D)	Period 1965 to 1970	(iv)	IBM -1401.

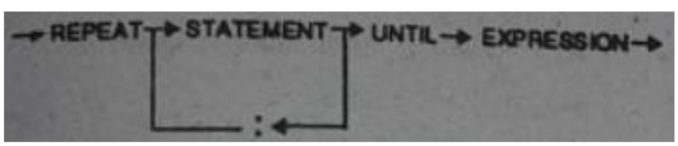
Answer: a – (iii), b -- (iv), c – (i), d – (ii)

40. Which of the following dimension/statements are correct when A and B are common: **DIMENSION A (50), B (30, 30)**.

41. Using PASCAL statement Write (tax due is Rs_4,. Tax4). Which of the following output will be produced when Tax = 6666 **Rs. 66666**.

42.Which repeat statement is correct?

Answer:



43. Consider the FORTRAN segment given below:

DO 10I = 1000

DO 10J = 1,100

10A (I, J) = (I/J) * (J/I).

When executed. It sets **all off diagonal elements of A to O and the diagonal elements to 1.**

44. F = AB + AB is **Comparator**.

45. Given the values of A = 5.0, B = 10.5, C = 6.0, and I = 2, compute the value of A**2 + C**2 = **61**.

46. If the maximum exponent that can be stored in a computer is 38 then the operation

W = X*Y/Z (FORTRAN) OR

W = X*Y/Z (PASCAL)

for X = 0.5 E30

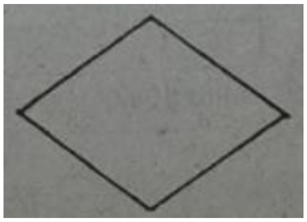
Y=0.5 E30 and Z = 0.25 E30 will cause **overflow error**.

47. Which step of the flowchart is redundant? **None**

48. **MODEM** is not a HIGH-LEVEL computer programming language.

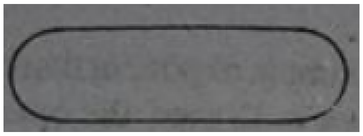
49. The assignment operator x ← 3.5 means**x is given the value 3.5**.

50. The symbol shown in Fig. below in the flow chart represents:



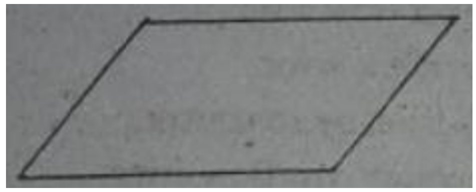
Answer: Decision

51.The symbol shown in Fig. below in the flow chart represents:



Answer: End

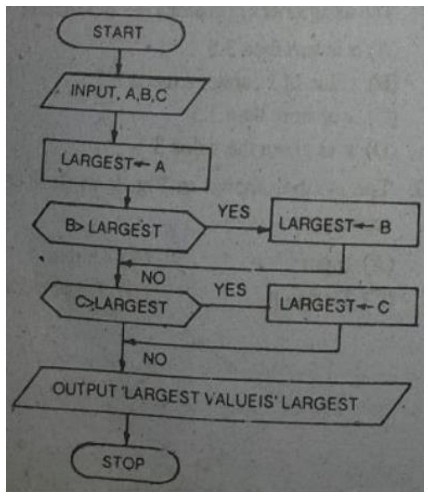
52.The symbol shown in Fig. below in the flow chart represents:



Answer: Input/Output

Questions 53 and 54 refer to data given below:

53.The problem represented by the flow chart given below is:



Answer: To find largest value of A, B, and C.

54. The output will be: **Largest Number**.

Questions 55 and 56 concerned with a single surface disk drive having the following characteristics

Number of tracks per disk: 35

Number of sectors per disk: 10

Bits per second transfer rate: 250,000

Revolutions per minute rotational speed: 300

Assume that one byte is 8 bits.

55. If no gaps or special formatting is assumed, then the nominal storage capacity, in bytes, of one such disk is**218,750**.

56. Assume that data transfers between the disk and the memory of a host system are interrupt-driven, one byte at a time. If the instructions accomplish a one-byte transfer take 8 μs and the interrupt overhead is 10 μs, then the time available, in μs, for other computing between byte transfers is **14**.

57. The language [ω ω/ω ϵ (0 + 1) *]is **accepted by some Turing machine, but by no push down automation**.

58. The binary relation on the integers defined by R = [(x, y) ; | y-x | ≤ 0] have **Reflexivity andSymmetry** properties.

59. Two computers communicate with each other by sending data packets across a local area network. The size of these packets is 1000 bytes. The network has the capacity to carry 1000 packets per second. The CPU time required to execute the network protocol to send one packet is 10 mill-seconds. The maximum rate which one computer can send data to another is approximately is **100,000 bytes/second.**

60. The major advantage of direct mapping of a cache is its simplicity. The main disadvantage of this organization is that **the cache hit ratio is degraded if two or more blocks used alternately map on to the same block frame in the cache**.

Questions 61 and 62 are based on the following program fragment written in a Pascal like language

```
L0 : begin
    var a, b, c : integer ;
    var d, e : real ;
    -----------------
    -----------------
    -----------------
```

```
L3 : begin
     var a, f : integer
     var g, h : real ;
     -----------------
     -----------------
     -----------------
     end;
end
```

Let the destination “block Li" refer to all the statements from the begin labeled with labeled with Li to its corresponding end.

61. In block L2 the variables g and h are best described as: **local variables**

62. If the notation L1-L2 means “the portion of block L1 that is not in block L2”, then the scopes of the variables a and b declared in the statement numbered: **L1 -- L2 for a and L1 for b.**

63. A software package to aid text processing and produce letters etc. is called **word processor**.

64. A Small movable symbol that appears on the screen to indicate the current position is a **cursor**.

65. Basic stands for Beginners All-purpose **symbolic, instruction** code.

66. To read data from (and write it to) peripheral devices in parallel with normal job processing via a faster medium is called **spooling**.

67. In the time-sharing mode, the user communicates with the computer via a **terminal**.

68. The first commercial computer built by M/s. Sperry Rand corporation was **UNIVAC-1**.

69. The standard punched card is divided into **80** columns and **12** rows.

70 A flow-charting tool, called **template** contains all the standard symbols used to draw a flow chart.

71. The number of flow-lines leaving a decision-box is **2 only**.

72. The FORTRAN equivalent is 0.000000895/√(α + β) is **0.895 E-6/√(α + β).**

73. The FORTRAN equivalent of the mathematical formula Δ √ s(s-a)(s-b)(s-c) is **ΔA = √(S* (S-A)* (S-B)* (S-C).**

74. Which of the following FORTRAN statement is valid? **Z = T/(x-y)**.

75. A FORTRAN variable of at the most six or less letters or digits begins with a **Letter**.

76. The output of the program C FIRST SOLVED PROGRAM

J = 1,

K = 3,

L = 2*J + KL,

J = 3*J + 2*L,

K = K + 2

L = J + K + L

PRINT J, K, L

STOP

END

OUTPUT: 13, 5, 23

77. When following program is executed the output will be

I = 1

KSM = 0

20 KSM = KSM + I*1

I = 1+3

IF (I.LT. 10) GO TO 20

PRINT 10, KSM

10 FORMAT (1 x 110)

STOP

END

OUTPUT = 66

78. Which of the following is an invalid Do statement in FORTRAN? **DO 71 X = 1, 10, 2.**

79. The FORTRAN statement DO 400, K =X, J,18 is incorrect. It should be **DO 400 K = IX, J, 18.**

80. The FORTRAN expression E.1E6 is recognized as **5.1 X 10^6.**

81. The number of elements in array x, y in the statement

DIMENSION x (.150), y (4,8) are respectively

50 and 32.

82. The maximum number of digits in double precision (DP) integer constants, in the systems, is **16**.

83. Which of the following GO TO statements is valid? **GO TO 72.**

84. The format statement for the WRITE men in the partial program

I = 200

J = 40

K= I * J should be

11 FORMAT (IX. 15, 5X, 15, 5X, 110)

85. An information-retrieval system store records with 5-bit keys. In response to a given query, which is a 5-bit key q, the system lists all records whose key K have Hamming distance at most 1 from q, i.e. k and q differ in at a most one-bit position. Suppose the keys of all the records in the system are:

00000

00011

01101

10100

11111

In response to an arbitrary query, which are the minimum and maximum numbers of these records the system could list? **Maximum 0, Minimum 2.**

Questions 86 and 87 refer to data given below:

Consider the FORMAT statement: 50 FORMAT (21.3, 5X, 2I 3).

86.The value assigned to J and K are respectively: **111, 110.**

87.The value assigned to L and M are respectively: **222, 200.**

88. Indicate, which will be acceptable and preferred form of representation of 8654341.36? **0.0865434136 E6.**

89. Which of the following is valid real variable пame: **GGGGG**

90. The mathematical expression 5 + xy/ab is written in FORTRON as **5 + X*Y/(A*B).**

Questions 91 and 91 refer to data given below:

Consider the FORMAT statement

50 FORMAT (2,13,18, 13).

91. The values assigned to J and K respectively are: 11, 111

92. The values assigned to Land M respectively are: 222, 220

93. The output of the following program will be

J = 3

ISUM = 0

ISUM = ISUM + J

J = J + 4

IF = (J.LT.25) GO TO 17

PRINT 18, ISUM

18 FORMAT (IX, 110)

STOP

END

OUTPUT = 78

94. The output as a result of the execution of the following program will be

I = 1

J = 1

11 K = 3*I + 4*J

I = J + K

J = 1 + 2 * J

IF (K.L.T. 110) GO TO 11

PRINT 9,1,J,K

9 FORMAT (IX. 3110)

STOP

END

OUTPUT = 13, 17, 107

95. The FORTRAN expression A ** (I-2) is equivalent to the mathematical expression $\mathbf{A}^{\mathbf{1-2}}$.

96. If A and B are floating point numbers stored with 10-bits mantissas and if A = 1.0 and B = 2^{-10}, which of the following is (are) true? **A = A * B and B = A*B**.

97. If you have punched

INTEGER XO, A, CAP, NX

which format would you be using to print the above-mentioned variables? **F-format.**

98. Which of the following is a valid arithmetic IF statement? **None**

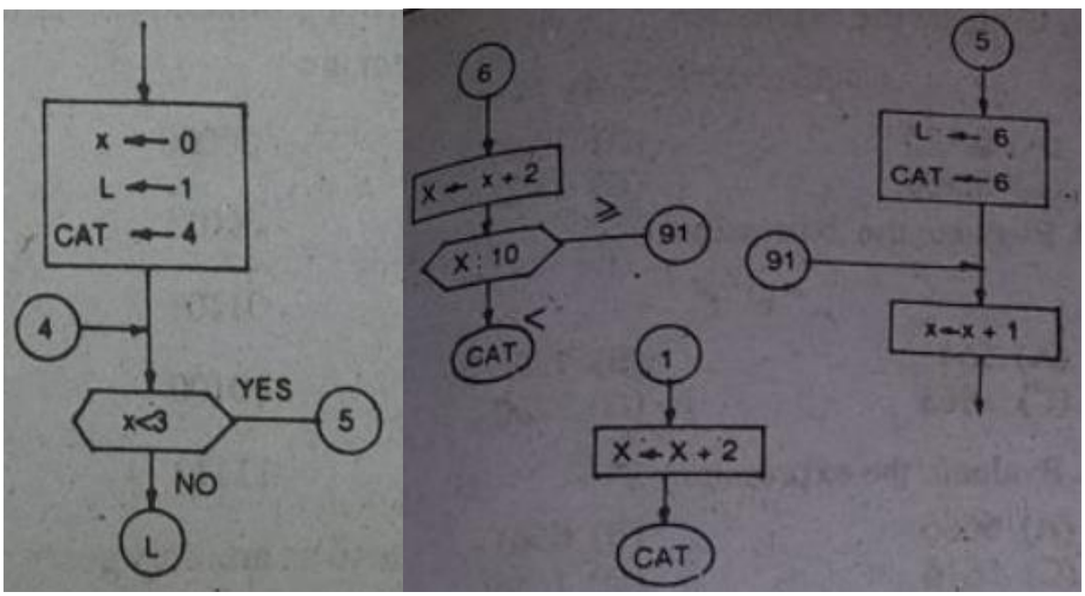
99. The expression a^b - c^d / b - d will be written as FORTRAN as **(A ** B - C**D) / (B - D).**

100. Which of the following statement is valid in FORTRAN: **N = N + 1.**

101. The maximum number of digits in a statement number, in most systems, is **5**.

Questions 102 to 105 refer to the data given below.

Assuming that the flowchart given in Fig. 13 is correct and appropriate type declarations have been made



102. The label constants are: **1, 4, 5, 6, 9, 1**

103. The variables are: **L and CAT**

104. In-connectors are: **4, 91, 1, 5, 6**

105. Out-connectors are: **5, L, CAT, 91**

Questions 106 and 107 refer to data given below:

Given the following types of constants Numeric (real or integer) and character string.

106. Identify which of the following list of constants is valid**0.0.**

107. The constant - 16.2 +1.106 in invalid because **special character within a number.**

Question 108 to 111 refer to data given below:

Given the input data:

5, 6, ‘LITTLE TIME’, 22.73’. 'NO DEAL’

After executing the following INPUT statement

INPUT X, Y, CAT, X, STRING

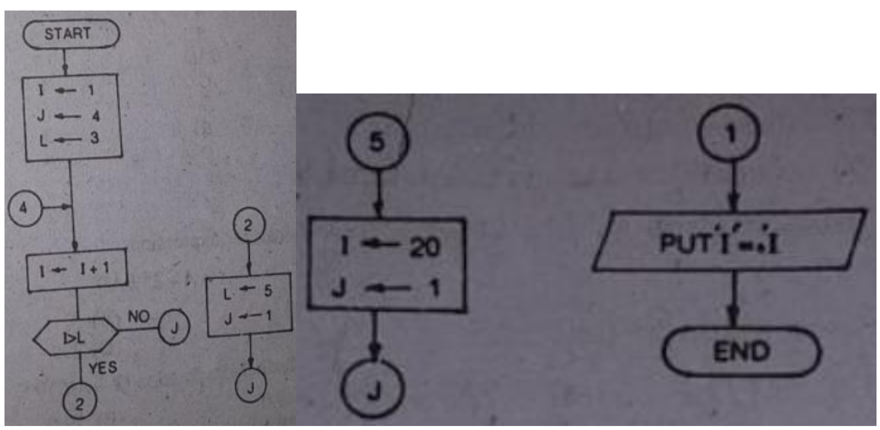
108. What value could be associated with X = **22.73**

109. What value could be associated with Y = **6.**

110. What value could be associated with CAT = **LITTLE TIME**

111. What value could be associated with STRING = **NO DEAL**

Question 112 to 116 refer to chart given below:



112. Identify the label constants:**1, 2, 4, 5**

113. Identify the label variables:**J**

114. How many times is symbol 1 executed?**3**

115. What is the value of *I* when symbol 2 is executed?**4**

116. Which are the numeric constants? **1, 3, 5, 20**

Questions 117 to 119 refer to data below:

Values of Variables :

Variable	*Value*
A	–2
B	0.5
BAD	15
C	4
D	5
E	3
F	4
X	3
Y	2

117. Evaluate the expression X + A – 2 * BAD: **-21.**

118. Evaluate the expression $(X – A/C)^{\gamma * F}$: **49.0.**

119. Evaluate the expression A – B^2/C*D*ABS(A): **0.625.**

120. Evaluate the expression $(X^{t})^{E}$: **729**.

121. Evaluate the expression$(X^{\gamma})^{E}$: **6561.**

Questions 122 to 124 refer to data below:

122. If A=2, B=3 C=2, D = 1 and G=2, evaluate √ (D + BA + B*G) = **4.**

123. Evaluate ABS (A + B) = **5.**

124. Evaluate A+ B/C*D = **7/2**

Questions 125 to 127 refer to data given below:

125. Evaluate the following arithmetic expression with values for the variables.

A=2,B=4 and C=3

(A+B)/(B-C) = **6**

126. Which of the following expression has value 0? **A+ B/A - B**

127. Evaluate B (A*B) = **1/2**

128. If a = ‘MOPPY'; b = ‘RAP’; c = ‘P’ which at the following represent O? **INDEX (a, b)**

129. In the Fortran language, which of the following statements is correct? **IF (A + B) A = √ (B)**

130. A BASIC program to reverse the numbers in a100-element array X is given below. What should 80 read?

10 REM USING IF/THEN LOOP

15 DIM X (100)

20 LET I = 1

30 IF I > 50 THEN 82

40 LET Y = X (I)

50 LET X (I) = X (101 - I)

60 LET X (101-I) = Y

70 LET I = I + 1

80

81 REM FOR/NEXT LOOP

82 FOR I = 1 to 50

83 LET Y = X (I)

84 LET X (I) = X (101-1)

85 LET X (101-I) = Y

86 NEXT Y

90 END

Answer: GO TO 30

131. A computer program for area integral is given below:

```
C.......RULE FOR AREA INTEGRAL
FUNF (X) = 3*X*X+2*X+3.
READ 1, N, A, B
AN = N
H = (B-A)/AN
M = N + 1
VI = 0
DO 20 I = I.M
WF = 4 - 2* (I-I/2*2)
22. (I-M) 23, 21, 21
21. WF = 1
23. AI = I -1
    X = A  + AI*H
20. VI = VI + WF*FNUF (X)
    VI = V1*H/3
    PRINT 2, VI
1. FORMAT (15,2F 10.0)
2.  FORMAT (3HVI = El 2.4)
END
INPUT
4. 2, 6
```

OUTPUT

VI = 0.2520E 03.

From the program, it can be concluded that this is for **Simpson's Rule.**

132. In a 16-bit computer, 10 digits are allowed for mantissa (including one sign digit) and 6 digits allotted for exponent (including one sign digit) write the value of the function given below, in normalized form when n=12

$1/2 + 1/2^2 + 1/2^3 + \text{--------} + 1/2^n$

= + 0.111111111 E + 03

133. In the following basic program, spot the statement containing error, if any

10 REM TO FIND SQUARE, ROOT,

CUBE, FOR 1-99

20 PRINT 'NUMBER''SQUARE'SQUARE

ROOT, CUBE

30 FOR I = 1 TO 99

40 LET A = 1**2

50 LET B = A*7

60 LET C = I**(1/2)

70 PRINT I, A, C, B

80 NEXT I

90 END

Answer: None of the above

134. A Fortran language program to convert (Fahrenheit degree) into a centigrade unit when A = 10, 20, 30 and 40 is given below. What should entry 30 read.

C COMPUTER PROGRAM FOR CON-

VERSION OP

C DEGREES

DIMENSION x (5), TEMP (5)

READ (5, 20) (x (I), I = 1, 5)

20 FORMAT (5F 6.2)

DO 30 I = 1, 5

TEMP (I) = (5/9)* x (D - 32.0)

WRITE (6, 40) x (I), TEMP (I)

30

40 FORMAT 2F (10.3)

STOP

END

Answer: CONTINUE

135. A Fortran language computer program is given below

C ------- COMPUTER PROGRAM TO COMPUTE THIRD SIDE

C ------- AREA, AND SUM OF THREE SIDES OF A TRIANGLE REAL

P, Q, R

READ (5, 10) P, Q ALPHA

10 FORMAT (3F 10.3)

K = SQRT (P**2 + Q**2 - 2*P*Q

COS (ALPHA)

SUM = P + Q + R

AREA = 0.5*P*Q*SIN (ALPHA)

WRITE (6, 20) P, Q, R ALPHA,

SUM AREA

FORMAT GF (10.4)

STOP

END

In the above program **the angle alpha should be in radians**.

136. Which of the following is invalid statement in FORTRAN: **P + Q +**

136 Which of the following is invalid statement in FORTRAN,

FORTRAN (A) P+Q+ (H) DO 10001 - 1,5 IC) DIMENSION X 030.20

(D) CONTINUE

137. In Fortran computer language, what should be written in the blank provided. The program to find the largest of the given number

‘LARGEST’ ← ‘NUMBER’

DO THE FOLLOWING

UNTIL ALL NUMBERS

ARE FINISHED

IF ‘NUMBER' ‘LARGEST’

‘LARGEST’ ← ‘NUMBER’

Answer: GT

138. In a 16-bit computer, 10 digits are allowed for mantissa (including one sign digit) and 6 digits allotted for exponent (including one sign digit) write the value of the function given below, in normalized form when n= 5.

$1/2 + 1/2^2 + 1/2^3 + \text{--------} + 1/2^n$

= + 0.111110000 E + 00

139. The value of M in the end will be

M =0

DO 100I = 1, 2

DO 200I = 1, 2

M = M + I + J

200 CONTINUE

100 CONTINUE

STOP

END

= 12

140. Which of the following is invalid real Fortran constant? **-143.6 F**.

141.Given

i	x_i	f_i
0	1	1
-1	2	3
2	5	6
3	9	10

Interpolate f (6) by Lagrangian polynomials: **6.625.**

142. Which of the following is invalid real Fortran constant? **All of the above**

143. In Fortran language, all of the following are acceptable as integer constant EXCEPT: **+812**

144. Consider any set of 201 observations x_1, x_2, ------- x_{200}, $x_{201}<_{201}$. Then the mean deviation of this set of observations about a point k is minimum when k equals: $\mathbf{x_{101}}$

145. $\displaystyle \mathop{\mathrm{Lt}}_{\theta \to \frac{\pi}{2}} (\sec\theta - \tan\theta)$ has the value: **-2**

146. 146. According to orthogonal property of Legendre's function

$$\int_{-1}^{+1} P_m(x)\, P_n(x)\, dx = 0.$$

When: **m ≠ n**

147. If the cube of x varies as inverse square of y and when x = 2, y = 3, the equation between x and y will be: $\mathbf{x^3 = 7^2 / y^2}$

148. The equation $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} + \dfrac{\partial^2 u}{\partial z^2} = 0$ is known as: **Laplace Equation**

149. Given

Table

Class Interval	Frequency
0 — 10	4
10 — 20	3
20 — 30	5
30 — 40	1
40 — 50	4
50 — 60	2
60 — 70	1

The deviation about the mean will be: **15.8.**

150. An anti-aircraft gun can take a maximum of four shots at an enemy plane moving away from it. The probabilities of hitting the planes at the first, second, third, and fourth shot 0.4, 0.3, 0.2 and 0.1 respectively. What is the probability that the gun hits the plane? **0.6976**

151. If A varies inversely as B^2-1 and A is equal to 24 when B = 10, the value of A when B = 5 will be **99**.

152.A table for values of x and y is given below:

x	y
93.0	11.38
96.2	12.80
100.0	14.70
104.2	17.07
108.7	19.91

Using Lagrange's formula, the value of x when y = 13.5 will be: **98.14.**

153. The off sets taken from a chain line are given below:

Chainage (m)	Offset (m)
0	7.60
15	8.5
30	10.7
45	12.8
60	10.6
70	9.5
80	8.3
100	7.9
120	6.4
140	4.4

The area between the survey line and the edges by Simpson's rule will be: **1230.3 sq. m.**

154. The following perpendicular offsets were taken at 10-meter intervals from a survey line to an irregular boundary line 3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25, 4.20, 5.65:

The area enclosed between the survey line, the irregular boundary line, and the first and last offsets, by trapezoidal rule will be: **433 sq. m**

155. In the above case the area by Simon's rule will be: **439.67 sq-m**.

156. The following is the distribution of ages (in years) of teachers of an engineering college:

Age	Number of teachers
23 — 29	10
29 — 35	12
35 — 41	22
41 — 47	16
47 — 53	7
Total	67

The class mark and class size of the class (35--40) is: **38, 6**

157. The value of is: $\underset{x \to 0}{\mathrm{Lt}} (1 - x) \tan \frac{\pi x}{2}$ 2/π

158. The offsets taken from a chain line are given below:

Chainage (m)	Offset (m)
0	7.60
15	8.5
30	10.7
45	12.8
60	10.6
70	9.5
80	8.3

Chainage (m)	Offset (m)
100	7.9
120	6.4
140	4.4

The area between survey line, and the edges by trapezoidal rule will be: **1138 sq-m.**

159. The function $\underset{x \to 0}{Lt}\ (x-1)^{1/x}$ is equal to: **e**

160. The value of function is given by the formula: f = abc/550

The value of 'a' varies from 62.3 to 62.5 the measured value of b and c is 16.42 463 respectively. Find the value of the function and indicate how many figures of the result are reliable: **between 860 and 865**.

161. The solution of the differential equation: y'' (t) – 2y'(t) + y(t) = 1 is: **$y(t) = (C_1 + C_2 t)\, e^{-4} + 1$.**

162. In the solution of ordinary differential equations in case dy/dx is a function of alone, then which pair of methods becomes identical: **Simpson's rule and RungaKutta method.**

163. The m^{th} derivate of e^{nx} with respect to x is: **$n^m e^{nx}$**

164. Simpson's formula is applicable to **odd or even number of intervals**

165. Which of the formula does not require that the Interval of integration be divided into an even number of intervals? **Trapezoidal Rule**.

166. For the function f(x) = x + sin x we may infer which one of the following: **It has no relative maxima or minima**

167. The velocity v, of parachute falling vertically satisfies the equation

$$v \frac{dv}{dx} = g\left(1 - \frac{v^2}{k^2}\right)$$

Where g and k are constants. If v and x are both initially zero, which of the following expresses v in terms of x?**$v^2 = k^2 (1 - e^{-29\, x/k^{2}})$.**

168. The value of function

$$\iint_{\Omega} \frac{dx\ dy}{(1 + x^2 + y^2)^{3/2}},$$

Where is the region x2 + y2 ≤ 1, x ≥ 0, y ≥ 0 is: **π/2 [1 – 1/√2]**

169. The following table gives the relation between steam pressure and temperature:

Temp.	361°	367°	378°	387°	399°
Pressure	154.9	167.0	191.0	212.5	244.2

The pressure at temperature 372.1°will be: **177.4**

170. The values of the probability integral

$$(2/\ \pi) \int_0^x e^{-x^2}\, dx$$

are given in the table for certain values of *x*.

Function $(2/\sqrt{\pi}) \int_0^x e^{-x^2}\, dx$	x
0.4846555	0.46
0.4937452	0.47
0.5027498	0.48
0.5116683	0.49

The value of x for which this integral is equal to 1/2, will be: **0.476936**

171. In the formula

$$D = \frac{d^2}{2h} + \frac{h}{2}$$

the percentage error in D is not exceed 0.3% the allowable percentage error in r and h will be: **0.177 and 0.98**

172. In order to evaluate the value of definite integral $\int_4^{5.2} \log_e x \, dx$, the integral of integration is divided into six equal parts each of width 0.2. The values of the function for different values of x are given below:

x	$\log_e x$
4.0	1.38629436
4.2	1.43508453
4.4	1.48160454
4.6	1.52605630
4.8	1.56861592
5.0	1.60943791
5.2	1.64865863

The value of the integral according to Simson's rule will be: **1.82784726**

173. Which of the following formulas is most accurate for numerical integration? **Gauss's Quadrature formula**

174. For the year 1984 the declination of the sun at Allahabad noon on certain dates was as given below:

Date	Declination
March 1	23°25′ 23″.5
March 2	23°26′ 19″.4
March 3	23°26′ 50″.5
March 4	23°26′ 56″.8
March 5	23°26′ 38″.3
March 6	23°25′ 55″.1
March 7	23°24′ 47″.1

The declination was maximum on: **March 4.**

175. When the number 67.4950800 is rounded off correctly to four significant figures. The number will become **67.50**.

176. The value of $\int_{0.5}^{1.1} xy\,dx$ using Simpson's rule will be: **0.3585**

177. The value of $\int_{0.5}^{1.1} y^2\,dx$ will be: **0.3201**

178. The value of $\int_{0.5}^{1.1} x^2 y\,dx$ will be: **0.3104**

Questions 179 and 182 refer to data given below:

A system given below:

$$\begin{bmatrix} 10 & -2 & -1 & -1 \\ -2 & 10 & -1 & -1 \\ -1 & -1 & 10 & -2 \\ -1 & -1 & -2 & 10 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 3 \\ 15 \\ 27 \\ 9 \end{bmatrix}$$

The above system is to be solved by Gauss Seidel Iteration Method.

179. Which of the following will have zero value? **x_4**

180. The value of x_1 will be: **1**

181. The value of x_2 will be: **2**

182. The value of x_4 will be: **4**

Questions 183 and 184 refer to table given below:

19°	12'	22".4
19°	25'	54".7
19°	39'	7".3
19°	51'	53".8
20°	4'	31".9
20°	16'	43".5
20°	28'	34".3

183. In this table the error occurs in: **fourth row**

184. In the above table fourth row should read: **19° 51’ 59”.8**

185. $x - \frac{x^3}{3!} + \frac{x^5}{5!} + \ldots\ldots + (-1)^{\frac{n-1}{2}} \frac{x}{n!} + \ldots\ldots$ is the expansion of: **sin x**.

186. A Basic statement is given: 15 LET A=C+Q/P + N. The formula represented by the statement is: **C + q/p + n**

187. If f (x + y) = f(x) f(y) for all x and y and f(5) = 2 also f'(0) = 3 then f'(5) will be equal to **6**.

188. If the function y = f(x) has an inverse function y=f-1(x). we may conclude that **the graph of y= f (x) is not symmetric with respect to y-axis.**

189. Given that the area of a figure varies as a square of mean ordinate. The area of the figure is 154 sq-cm when the mean ordinate is 7 cm. The area of the figure when mean ordinate is 10.5 cm, will be: **346.5 cm**

190. The minimum and maximum value of 7 cosθ + 24 sinθ will be: **-25 and +25.**

191. Find the interval of the convergence for the series

$$x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots\ldots$$

Is: **$1 < x \leq 1$**.

192. The mean of the following frequency distribution will be

Age (years)	No. of workers	Age (years)	No. of workers
50—55	22	25—40	47
45—50	29	30—35	51
40—45	21	25—30	70

Answer: 36.8 years

193. Which of the following floating-point variables is invalid in Fortran? **IST**

194. If x is normal with mean and variance σ^2, y = ax + b, where a and b are constants, is normal with: **mean a μ + b and variance $a^2\sigma^2$**

195. $\int_0^1 f(x)\,dx$ is equal to $\int_0^1 f(1-x)\,dx$

196. In Fortran which of the following statements correct? **10 IF (X+Y) 9, 20, 9**.

197. In the expression Z=3U2V, U is decreasing at 3 cm/s, when V is increasing at 4 cm/s. What is the rate of change of Z when U = 30 and V= 10? **5400**.

198. The series $\sum \frac{1}{\frac{p}{n} + \frac{q}{n}}$ is convergent if: **p** > **1**.

199. A table for values of x and y is given below:

x	y
93.0	11.38
96.2	12.80
100.0	14.70
104.2	17.07
108.7	19.91

Using Lagrange's formula, the value of y when x = 102 will be: **15.79**

200. The order of convergence of Newton-Raphson iterative algorithm is **second order.**

201. In the quotient 876.3/494.2 if both numbers are approximate and true only to the number of digits given, give the trustworthy figures in the quotient: **1.773**

202. Newton Raphson method of solution of numerical equation is not preferred when **the graph of f(x) is nearly horizontal where it crosses the x-axis.**

203. What value must be assigned to the function $(\cos x)^{1/x}$ when x=0, so that the function will be continuous at x=0 is **1**.

204. Which of the following is an implicit function of x: $\mathbf{x^3 = 3axy = y^2 = 0}$.

205. The values of a b and c for which the function

$$f(x) = \begin{cases} \dfrac{\sin(a+1)x + \sin x}{x} & \text{for } x < 3 \\ = C & \text{for } x = 0 \\ = \dfrac{(x + bx^2)^{1/2} - x^{1/2}}{bx^{3/2}} & \text{for } x > 0 \end{cases}$$

a = -3/2, b ≠ 0, c = ½

206. The value of integral ex evaluated from 0 to 0.4 by the following formula. Which method will give the least error? **Simpson's 1/3 rule with h = 0.1**

207. The results obtained by using Simpson's rule will be greater than those obtained by using the trapezoidal rule **provided the boundary is concave towards the baseline.**

208. A function $\dfrac{ax+b}{(x-1)(x+4)}$ has turning value at the point (2, -1).The value of a and b will be: **a = -7, b = 8.**

209. Five Numbers are given 930.42, 432.0 x 10, 191.6, 86.43, 0.15625. The sum of the numbers will be: **5528 or 5529.**

210. Which of the following is a one-dimensional wave equation? $\dfrac{\partial^2 u}{\partial t^2} = C^2 \dfrac{\partial^2 u}{\partial x^2}$.

211. A series of offsets taken from a chain line at the intervals of 15 meters are in the following order: 0, 2.65, 3.80, 3.75, 4.65, 3.60, 495 and 5.85 m. The area between the chain line, the curved boundary and the end of sets by trapezoidal rule will be: **394.87 sq-m**.

212. The area of cross-section of a rod is desired to be 0.2 percent. How accurately should the diameter be measured? **0.1%**

213. When the number 48.365 is rounded off correctly to four significant figures, the number will become: **48.36**.

214. If x and y are two real variables such that $x > 0$, $xy = 1$, the minimum value of $x + y$ will be: **2**

215. The table gives the value of a variable x and an unknown function y

x	y
3	–205
4	–240
5	–259
6	–262
7	–250
8	–224

For what value of x, the value of function y is minimum: **5.697**

216. The following table gives the values in meters of the offsets taken from a chain line to an irregular boundary:

Distance	*Offset*
0	10.6
50	15.4
100	20.2
150	18.7
200	16.4
250	20.8
300	22.4
350	19.3
400	17.6

Using the Simpson's Rule the area in square meters included between the chain line, irregular boundary and the first and the last offset will be: **820.38 sq-m**

217. If the determinant of coefficients is not very small, Gaussian elimination **gives solution**.

218. Compute $\log_g 2$ by taking three terms in the expansion of series: **0.693004**.

219. The maximum and minimum values of $\sin^2 x$ are respectively: **(1, 0)**

220. The minimum value of the function $y = x^5 – 4x^4 + 5x^3 - 1$ occurs when: **x = 3**

221. Which of the following variable is discontinuous? **Number of individuals in a factory.**

222 The value of “C” of Lagrange's mean value theorem for the function

f (1) = 2

f (x) = x2 where 1 < x < 2

f (2)=1

in the initial (1, 2) is: **-1/2**

223.The harmonic mean of the table given below

Number of students	Marks obtained
5	10
8	20
12	30
5	40

Answer: None of the above

224. The following table gives the frequency distribution of marks obtained by a batch of 20 students:

Marks obtained	Number of students
5	5
15	4
25	6
35	3
45	2

The mean and standard deviation will be respectively: **21.5, 12.7.**

225. A number 864.32 is correct to five significant figures. The relative error will be: $< \frac{1}{8 \times 10^4}$.

226. The maximum value of sin x (1 + cos x) occurs at: **x = π / 3**

227. If x and y are two real variables such that x > 0 and xy = 1. The minimum value of (x+y) is: **2**

228. If the square of x varies as the cube of y and x= 3 when y = 4, the value of y when x = 1 / √ 6 will be: **2/3**

229. A candidate obtained the following percentage of marks in the examination

English	60
Hindi	65
Mathematics	92
Physics	74
Chemistry	55

The weights allotted to the subjects are 1, 2, 1, 3, 3 the candidates weighted mean would be: **72.9**.

230. The series $\sum \frac{1}{n^{p-1}}$ is: **convergent if p < 0**

231. The differential equation: $t^2 y''(t) + ty'(t) + (t^2 + n^2) y(t) = 0$ is called: **Bessel's equation of index n.**

232. When $f(x) = \frac{1 - x}{1 + x}$, then $f\left(\frac{1}{x}\right)$ equals: **$- f(x)$**

233. If for the function $y=f(x)$ at a point $\frac{dy}{dx}$ is zero, $\frac{d^2x}{dy^2}$ is zero and $\frac{d^3y}{dx^3}$ is non-zero, then the point is : **a point of inflection**.

234. The square of the standard deviation (variance) of the natural numbers 1, 2, 3, ….,n is: **$(n^2-1) / 2$.**

235. Given that the area of a figure varies as square of mean ordinate the area of the figure is 154 sq. cm. when the mean ordinate is 7. The area of the figure, when mean ordinate measures 10.5 cm, will be: **346.5 cm^2**

236. 100 is to be divided into two parts such that their product is maximum. The parts will be: **(50, 50).**

237. The series $\sum \frac{1}{(\log n)^{1/n}}$ is is: **Convergent**.

238. If the cube of x varies as inverse square of y and when x 2, y = 3, the relation between x and y can be expressed as: **$x^3 = 72 / y^2$**.

239. The partial differential equation $\frac{\partial^2 y}{\partial n^2} = a^2 \frac{\partial^2 y}{\partial n^2}$ is known as: **Wave equation.**

240. If a function has a differential coefficient that vanishes for all values of x in the interval $a \leq x \leq b$, the function is: **A constant.**

241. An ordinary die Numbered through 1 through 6 is thrown. What is the probability that the number which turns up is less than 4? **1/2.**

242. Let b_q, b_{q-1}, ..., b_0 be the binary representation of integer b. The integer 3 is a divisor of b if and only if: **The alternating sum $b_0 + b_1 + b_2$ -..... is divisible by 3**.

243. K digits are to be chosen at random (with repetitions allowed) from0,1,2,3,4,5,6,7, 8,9). What is the probability that 0 will be chosen? $\mathbf{(9 / 10)^{k}}$.

Questions 244 and 245 refer to data given below:

On a computer having 8-digit mantissa and two-digit exponent, the program given below is executed:

A = 0.052

B = 5.28 E + 11

C = B - B + A .

D = B + A - B

PRINT CD

END.

244. What will be the computer print as the value of C? **0.052.**

245. What will be the computer print as the value of D?**0.**

Questions 246 and 247 refer to data given below:

For the function: u = xy2 z3

If x = 37.1, y = 9.87, z = 6.052 and $\Delta x = 0.3$, $\Delta y = 0.11$, $\Delta z = 0.016$

246. The relative error of the function is: **3.8%**

247. The absolute error is: $\mathbf{0.3 \times 10^{6}}$.

248. Using Simpson's rule find $\int_0^2 f(x)\ dx$ given below:

$x = 0$	0	0.5	1.0	1.5	2.0
$f(x) = 0$	0.3989	0.3521	0.2420	0.1296	0.0540

Answer: 0.4458

249. If the letters of the word MISSISSIPPI are written down at random in a row, the probability of no two 's occurring together is: **7/33.**

250. If the chance of a bad reaction from a certain medicine is 0.001, determine the chance that out of 20000 men more than 3 will be affected badly by the medicine: **0.14**

251. The diameter and altitude of a can in the shape of a right circular cylinder are measured as 4 cm and 6cm respectively. The possible error in each measurement is 0.1 cm. The maximum possible error in the value computed for volume would be nearly: **5cm^3**.

252. Match the following

(a) Tautology	(*i*) $A + \bar{A} = \phi$
(b) Absorption	(*ii*) $\bar{A} + \bar{B} = \bar{A} . \bar{B}$
(c) Complementation	(*iii*) $A.A.A..... = A$
(d) Law of De Morgan	(*iv*) $A + AB = AA + AB.$

Answer: a – (iii), b – (iv), c – (i), d – (ii)

253. For any instantaneous decodable system, the entropy supplies **a lower bound on the average code length.**

254. To what accuracy must the radius R of the base circle and the altitude H of a cylindrical container be determined so that its capacity could be determined accurately to 1%? **Radius 0.25%; Height 0.5%.**

255. In the quotient 876.3 / 492.2 if both numbers are approximate and true only to the number digits given, give the trust worthy figures in the quotient: **1.1773**

256. Excess 3 code for 3398 is: **0110 1000 1100 1011**

257. A rectangular box, open at the top, is to have a volume of 32 cc. Find the dimension of the box requiring the least material for its construction: **L = 4 $(2)^{1/3}$, B = 4 $(2)^{1/3}$; H = $(2)^{1/3}$**

258. $\lim_{n \to \infty} \left(\frac{n+1}{n-1} \right)^n$ is: **e^{-1}**

259. Every solution of the differential equation dy/dx = kxy is bounded on $-\infty < x < \infty$ if: **$k \leq 0$**.

260. The function $f(z) = \frac{1}{(1-z)^2} + \sin\left(\frac{1}{1-z}\right)$ has at z = 1: **a pole of order one.**

261, If X is a normally distributed random variable with mean μ and variance σ^2, then 5x -3 is a random variable with means $5\mu - 3$ and variance: **25 σ^2.**

262.1f 20 shots are fired independently with expected value of 2 hitting a certain target. Find the probability of hitting at least one: **0.33**.

263. $\sum_{n=1}^{\infty} \frac{n}{n+1} =$ = $+\infty$

264. a, b and c are real numbers. Which of the following is necessarily true?

I. If $a < b$ and $ab \neq 0$, then $\frac{1}{a} > \frac{1}{b}$
II. If $a < b$, then $ac < b \quad c$ for all c
III. If $a < b$, then $a + c < b + c$ for all c
IV. If $a < b$, then $-a > -b$

Answer: I AND III Only

265. Let * be the binary operation on the national numbers given by a * b = a + b+ 2ab Which of the following are true?

I. * is commutative

II. There is a rational number that is a * identity

III. Every rational number has a *..... inverse

Answer: I AND II Only

266. A fair die is tossed 350 times. The probability that a six comes up on 70 or more of the tosses is: **between 0.02 and 0.16.**

267. $\sum_{n=2}^{\infty} \frac{1}{n!} =$ = **e – 2**

268. The number of 1's in the binary representation of 13 * 163 + 11 * 162 + 9 * 16 + 3 in which of the following? **10**.

269. Which of the following sorting algorithms has average-case and worst-case running times of 0 (n log n)? **Merge Sort.**

270. Let A bea n x n matrix and let P be an n x n permutation matrix which of the following must be true? **det (A) = det (P^{-1} AP)**.

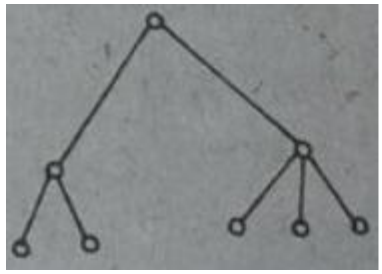
271. Consider the representation of six-bit numbers by two's complement one’s complement, or by sign and magnitude. In which representation is there overflow from the addition of the integers 011000 and 01100? **All three representation.**

272. A 2-3 tree is a tree in which

(i) every interior node has two or three children, and

(ii) all paths from the root to a leaf have the same length.

An example of a 2-3 tree is shown in Fig.



Which of the following could be the number of interior nodes of a 2 - 3 tree with leaves? **7**.

273. As $n \to \infty$ the function $2\sqrt{n}$ grows faster than **n^2 but slower than $\sqrt{2^n}$**.

274. Which of the following assertions has the property that if the assertion is true before executing the program fragment

Z : = Z * a ; y : = y - 1

Answer: $a^b = Z * a^y$

275. Which of the following regular expressions is equivalent to describe the same set of strings as) (a* + b*) (c+ d)? **(a + b)*c + (a + b)*c.**

276. Let b_q, b_{q-1},......, b_0 per the binary representation of integer b. The integer 3 is a divisor of b if and only if **the alternating sum $b_0 - b_i + b_g - \ldots$ is divisible by 3**.

277. All functions f defined on the xy plans such that

$$\frac{\partial f}{\partial r} = 2xy + y \text{ and } \frac{\partial f}{\partial y} = x + 2y$$

Are given by f(x, y) = **0 : $x^2 + xy + y^2 + c$**

278. K digits are to be chosen at random (with repetitions allowed) from {0,1,3,4,5,6,7,8, 9}. What is the probability that 0 will not be chosen? **$(9 / 10)^k$**.

279. Which of the following is true of the behavior of

$$f(x) = \frac{x^3 + 8}{x^2 - 4} \text{ as } x \to 2 \,?$$

Answer: The graph of the function has a vertical asymptote at 2.

280. If f is a linear transformation from the plane to the real numbers and if f(1,1) = 1 and f(-1,0) = 0 then f(3,5): **9.**

281. If c > 0 and f (x) = e^x - cx for all real numbers x, then the minimum value of f is: **f (log a).**

282. Let x and y be positive integers such that 3x+7y is divisible by 1e. Which of the following must also be divisible by 11? **4x - 9y**.

283. A group G In which (ab)2 = a2 b2 for all a, b, in G is necessarily: **abelian.**

284. If the finite group G contains a sub-group of order seven but no element (other than the identity) is its own inverse, the order of G could be: **35.**

285. In a game, two players take turns tossing a fair coin: the winner is the first one to toss ahead. The probability that the player who makes the first toss win the game is: **2/3.**

286. If a, b and c are constants, which of the following is a linear inequality? **abx + a2y ≥ 15.**

287. The equation $7x^7+14x^6 + 12x^5 + 3x^4 + 12x^3+ 10x^2 + 5x + 7 = 0$ has **at least one real root.**

288. Events A and B are mutually exclusive and have non-zero probabilities. Which of the following statement(s) are true? **P (AUB) = P (A) + P (B).**

289. A square matrix is singular whenever **the rows are linearly independent.**

290. The simplex method is so named because **it is based on the theory of algebraic complexes.**

291. Which of the following statements is true in respect of the convergence of the Newton Raphson procedure? **It does not converge to a root where the second differential coefficient changes sign.**

292. If f (x_i) f (x_{i+1}) < 0 then **there must be a root of f (x) between x_i, and X_i.**

The End