Mock Test:

ELECTRICAL ENGINEERING
PAPER-2
TOTAL QUESTIONS=200

1. The electric current in a liquid is due to the flow of
(i) Electrons only
(ii) Positive ions only
(iii) Negative and positive ions both
(iv) Electrons and positive ions both
Ans:- (iii) Negative and positive ions both

2. Electric current is a
(i) Scalar quantity
(ii) Vector quantity
(iii) Sometimes scalar and sometimes vector
(iv) Number only
Ans:- (i) Scalar quantity

3. A pillion electrons pass through a cross- section of a conductor in 10^{-3} s. The current is
(i) 10^{-7} A (ii) 1.6×10^{-7} A
(iii) 2×10^{-4} A (iv) 2.6×10^{-3} A
Ans:- (ii) 1.6×10^{-7} A
Hints: $I = \frac{ne}{t} = \frac{10^9 \times 1.6 \times 10^{-19}}{10^{-3}}$
$= 1.6 \times 10^{-7} A$

4. The electric current in a discharge tube containing a gas is due to
(i) Electrons only
(ii) Positive ions only
(iii) Negative and positive ions both
(iv) Electrons and positive ions both
Ans:- (iv) Electrons and positive ions both

5. How long does it, take, 50 μC of charge to pass a point in a circuit if the current flow is 15 mA?
(i) $3.33 \times 10^{-3} s$ (ii) $6 \times 10^{2} s$
(iii) 2 s (iv) None of the above
Ans:- (i) $3.33 \times 10^{-3}\ s$
Hints: $t = \frac{q}{I} = \frac{50 \times 10^{-6}}{15 \times 10^{-3}}$
$= 3.33 \times 10^{-3}\ s.$

6. When cells are arranged in parallel
(i) The current capacity increases
(ii) The current capacity decreases
(iii) The e.m.f. increases
(iv) The e.m.f. decreases
Ans:- (i) The current capacity increases

7. When a number of resistances are connected in parallel, the total resistance is
(i) Greater than the smallest resistance
(ii) Between the smallest and greatest resistance.

(iii) Less than the smallest resistance
(iv) None of the above
Ans:- (iii) Less than the smallest resistance

8. A linear circuit is one whose parameters (e.g. resistances etc.)...........
(i) Change with change in current
(ii) Change with change in voltage
(iii) Do not change with voltage and current
(iv) None of the above
Ans:- (iii) Do not change with voltage and current

9. Three electric bulbs 40 W, 60 W and 100 W are designed to work on a 220 V mains. Which bulb will burn most brightly if they are connected in series across 220 V mains?
(i) 60 W
(ii) 40 W
(iii) 100 W
(iv) All bulbs will bum equally brightly
Ans:- (ii) 40 W

10. As one penetrates a uniformly charged sphere, the electric field strength
(i) Increases (ii) Decreases
(iii) Remains the same throughout the space
(iv) Is zero at all points inside the sphere
Ans:- (iv) Is zero at all points inside the sphere

11. Two charges 4 μC and 7 mC are placed 4.5 cm apart. What is the electric potential energy of the system?
(i) 5.6×10^4 J (ii) 4.2×10^6 J
(iii) 5.6×10^3 J (iv) None of the above
Ans:- (iii) 5.6×10^3 J
Hints:
$U = \frac{1}{4\pi\varepsilon_0} \times \frac{Q_1 Q_2}{d} = 9 \times 10^9 \times \frac{4\times10^{-6}\times7\times10^{-3}}{4.5\times10^{-2}} = 5.6 \times 10^3$J.

12. An electric dipole is placed in a non-uniform electric field. It experiences
(i) A force but no torque
(ii) A force and a torque
(iii) A torque but no force
(iv) Neither a force nor a torque
Ans:- (ii) A force and a torque

13. Two point charges are placed on x-axis. A 2 μC charge is at x = 10 cm and – 1 μC charge is at x = 40 cm. What is the potential at x = 100 cm from the origin?
(i) 5 V (ii) 50V
(iii) 250 V (iv) 5000 V
Ans:- (iv) 5000 V
Hints: $V^{100} = 9 \times 10^9 \left[\frac{2\times10^{-6}}{(100-10)\times10^{-2}} + \frac{-1\times10^{-6}}{(100-40)\times10^{-2}}\right]$
$= 5000\,V.$

14. Three charges each of +2 C are placed at the three comers of an-equilateral triangle. If the force between any two charges is F, then net force on any charge is

(i) $\sqrt{2}$F (ii) $\sqrt{3}$F (iii) 2 F (iv) 3 F

Ans:- (ii) $\sqrt{3}$F

Hints: On any charge, two forces, each of magnitude F, are acting. The angle between these equal forces is 60°. Therefore, net force on any charge = 2F cos 60°/2 = $\sqrt{3}$ F.

15. Electric lines of force about a negative point charge are

(i) Circular clockwise
(ii) Radial outward
(iii) Radial inward
(iv) Circular anticlockwise

Ans:- (iii) Radial inward

16. Three small sized insulated spheres each carrying a charge +*q* are placed at three points on the circumference of a circle so as to form an equilateral triangle. If R is the radius of the circle, what will be the force on charge +Q placed at the centre of the circle?

(i) Zero (ii) $\frac{Qq}{4\pi\varepsilon_0 R^2}$

(iii) $\frac{2Qq}{4\pi\varepsilon_0 R^2}$ (iv) $\frac{3Qq}{4\pi\varepsilon_0 R^2}$

Ans:- (i) Zero

Hints: The charge +Q will be under the action of three equal forces acting outward and displaced from each at angle of 120°. Therefore, the resultant of any two forces is equal and opposite to the third force. As a result, the resultant force on +Q will be zero.

17. Two charged conducting spheres have radii r_1 and r_2. The ratio of their charge densities if their potentials are the same is

(i) ${r_1}^2/{r_2}^2$ (ii) ${r_2}^2/{r_1}^2$

(iii) r_1 / r_2 (iv) r_2 / r_1

Ans:- (iv) r_2 / r_1

18. A charge of 6.75 μC in an electric field is acted upon by a force of 2.5 N. The potential gradient at that point is

(i) 4.2×10^6 V/m (ii) 3.71×10^5 V/m

(iii) 2.9×10^8 V/m (iv) None of the above

Ans:- (ii) 3.71×10^5 V/m

19. The potential at a certain point from a point charge is 600 V and the electric field is 200 NC^{-1}. The distance of the point of observation from the point charge is

(i) 30 m (ii) 0.3 m

(iii) 3 m (iv) 300 m

Ans:- (iii) 3 m

20. In the above question, the magnitude of point charge is

(i) 2×10^{-7} C (ii) 3.2×10^{-6} C

(iii) 2.9×10^{-8} C (iv) 4.2×10^{-6} C

Ans:- (i) 2×10^{-7} C

21. *n* drops each of radius r and carrying charge q are combined to form a bigger drop of radius R. What is the ratio of potentials of bigger to that of the smaller?

(i) $n^{3/2}$: 1 (ii) $n^{1/3}$: 1

(iii) $n^{3/4}$: 1 (iv) $n^{2/3}$: 1

Ans:- (iv) $n^{2/3} : 1$
Hints: $n \times \frac{4}{3}\pi r^3 = \frac{4}{3}\pi R^3$ or $R = r\, n^{2/3}$
Now, $V_1 \propto q/r$ and $V_2 \propto n\, q/R$
$\therefore \quad \frac{V_2}{V_1} = \frac{nr}{R} = \frac{nr}{n^{1/3 \times r}} = \frac{n^{2/3}}{1}$.

22. A hollow metallic sphere of radius 0.1 m is given a charge of 10 μC. The potential on the surface of sphere is
(i) 9×10^3 V (ii) 9×10^5 V
(iii) 4.5×10^6 V (iv) 3×10^8 V
Ans:- (ii) 9×10^5 V

23. A charge 3.2×10^{-19} C is placed in a uniform electric field of 100 V/m and moves a distance of 0.2 m parallel to and in the direction of field. The energy transformed is
(i) 500 J (ii) 250 J
(iii) 6.4×10^{-18} J (iv) 6.4×10^{-20} J
Ans:- (iii) 6.4×10^{-18} J
Hints: P.D., V = E × d = 100 × 0.2 = 20 V
Energy transformed = charge × p.d. = $3.2 \times 10^{-19} \times 20 = 6.4 \times 10^{-18}$ J.

24. The magnitude of electric field that will balance the weight of a-particle will be
(i) 2×10^{-7} N/C (ii) 10^{-12} N/C
(iii) 1.7×10^{-19} N/C (iv) 5×10^{-6} N/C
Ans:- (i) 2×10^{-7} N/C

25. The capacitance of a capacitor is……... relative permittivity.
(i) Directly proportional to
(ii) Inversely proportional to
(iii) Independent of
(iv) Directly proportional to square of
Ans:- (i) Directly proportional to

26. An air capacitor has the same dimensions as that of a mica capacitor. If the capacitance of mica capacitor is 6 times that of air capacitor, then relative permittivity of mica is
(i) 36 (ii) 12 (iii) 3 (iv) 6
Ans:- (iv) 6

27. When the relative permeability of a material is much greater than 1, it is called
(i) Diamagnetic material
(ii) Paramagnetic material
(iii) Ferromagnetic material
(iv) None of the above
Ans:- (iii) Ferromagnetic material

28. The magnetic flux density in an air-cored coil is 10^{-2} Wb/m². With a cast iron core of relative permeability 100 inserted, the flux density will become
(i) 10^{-4} Wb/m² (ii) 10^{4} Wb/m²
(iii) 10^{-2} Wb/m² (iv) 1 Wb/m²
Ans:- (iv) 1 Wb/m²
Hints: $\mu_r = \frac{B_{iron}}{B_{air}}$
or $B_{iron} = \mu_r \times B_{air} = 100 \times 10^{-2} = 1$ Wb/m².

29. Which of the following is more suitable for the core of an electromagnet?
(i) Soft iron (ii) Air
(iii) Steel (iv) Tungsten steel
Ans:- (i) Soft iron

30. The source of a magnetic field is
(i) An isolated magnetic pole
(ii) Static electric charge
(iii) Magnetic substances
(iv) Current loop
Ans:- (iv) Current loop

31. A magnetic needle is kept in a uniform magnetic field. It experiences
(i) A force and a torque
(ii) A force but not a torque
(iii) A torque but not a force
(iv) Neither a torque nor a force
Ans:- (iii) A torque but not a force

32. The unit of pole strength is
(i) A/m^2 (ii) Am (iii) Am^2 (iv) Wb/m^2
Ans:- (ii) Am

33. When the relative permeability of a material is slightly more than 1, it is called
(i) Diamagnetic material
(ii) Paramagnetic material
(iii) Ferromagnetic material
(iv) None of the above
Ans:- (ii) Paramagnetic material

34. AT/m is the unit of
(i) m.m.f.
(ii) Reluctance
(iii) Magnetising force
(iv) Magnetic flux density
Ans:- (iii) Magnetising force

35. The *B*-*H* curve of............. will not be a straight line.
(i) Air (ii) Copper (iii) Wood (iv) Soft iron
Ans:- (iv) Soft iron
Hints: For a magnetic material, $B = \mu_0\mu_r H$
Since μ_r is not a constant quantity, the relation between B and H is non-linear.

36. The *B*-*H* curve is used to find the m.m.f. of.............. in a magnetic circuit.
(i) Air gap
(ii) Iron part
(iii) Both air gap and iron part
(iv) None of the above
Ans:- (ii) Iron part

37. The saturation flux density for most magnetic materials is about................
(i) 0.5 Wb/m^2 (ii) 10 Wb/m^2
(iii) 2 Wb/m^2 (iv) 1 Wb/m^2

Ans:- (iii) 2 Wb/m^2

38. Hysteresis is the phenomenon of…………in a magnetic circuit.

(i) Lagging of *B* behind *H*
(ii) Lagging of *H* behind *B*
(iii) Setting up constant flux
(iv) None of the above
Ans:- (i) Lagging of *B* behind *H*

39. If a magnetic material is located within a coil through which alternating current (50 Hz frequency) flows, then.............. hysteresis loops will be formed every second.

(i) 50 (ii) 25 (iii) 100 (iv) 150
Ans:- (i) 50

40. Out of the following materials, the area of hysteresis loop will be least for………….

(i) Wrought iron (ii) Hard steel
(iii) Silicon steel (iv) Soft iron
Ans:- (iii) Silicon steel

41. The materials used for the core of a good relay should have……………. hysteresis loop.

(i) Large (ii) Very large
(iii) Narrow (iv) None of the above
Ans:- (iii) Narrow

42. The magnetic material used for………….. should have a large hysteresis loop.

(i) transformers (ii) d.c. generators
(iii) a.c. motors (iv) permanent magnets
Ans:- (iv) permanent magnets
Hints: A large hysteresis loop means high residual flux density and large coercive force. Both these features mean that demagnetising energy required is very large. Therefore, the answer is permanent magnets.

43. When transformer primary is fed from a.c., its core heats up due to……………….

(i) permeability of core
(ii) reluctance of core
(iii) ferromagnetism
(iv) hysteresis loss
Ans:- (iv) hysteresis loss

44. Hysteresis loss can be reduced by…………..

(i) laminating the magnetic circuit
(ii) using material of narrow hysteresis loop
(iii) increasing m.m.f. of the circuit
(iv) none of the above
Ans:- (ii) using material of narrow hysteresis loop

45. The hysteresis loop for materials having high retentivity is

(i) Wide
(ii) Narrow
(iii) Straight line passing through origin
(iv) Data insufficient
Ans:- (i) Wide

46. Fringing effect is ignored in a magnetic circuit if air-gap is
(i) Large (ii) Small
(iii) Very large (iv) None of the above
Ans:- (ii) Small

47. An air-cored coil carries steady current. If air-core is replaced by a ferromagnetic material, the flux density in the core will
(i) Remain same (ii) Decrease
(iii) Increase (iv) None of the above
Ans:- (iii) Increase

48. Two pure inductors, each of self induc- tance *L*, are connected in parallel but are well separated from each other. Then total inductance is
(i) L (ii) 2 L (iii) $L/4$ (iv) $L/2$
Ans:- (iv) $L/2$

49. Two series - opposing inductors have values of 1 H and 1.7 H. What is the total inductance if their mutual inductance is 300 mH?
(i) 1 H (ii) 2 H (iii) 2.1 H (iv) 0.5 H
Ans:- (iii) 2.1 H

50. In the above question, what is the confident of coupling?
(i) 0.5 (ii) 0.1 (iii) 0.26 (iv) 0.23
Ans:- (iv) 0.23

51. A 100 mH coil carries a current of 1A. Energy stored in the magnetic field is
(i) 1 J (ii) 0.05 J (iii) 1.5 J (iv) 2.5 J
Ans:- (ii) 0.05 J

52. The mutual inductance between two coils depends upon
(i) Medium between the coils only
(ii) Separation between the coils only
(iii) Both (i) and (ii)
(iv) None of above
Ans:- (iii) Both (i) and (ii)

53. When magnet is in motion relative to a coil, an induced e.m.f. is produced. It does not depend upon
(i) Resistance of the coil
(ii) Pole strength of the pole
(iii) Motion of the magnet
(iv) Number of turns of the coil
Ans:- (i) Resistance of the coil

54. A metallic ring is attached to the wall of a room. When the north pole of a magnet is brought near the ring, the induced current in the ring is
(i) Anticlockwise (ii) Clockwise
(iii) Zero (iv) Infinite
Ans:- (i) Anticlockwise

55. The normal drawn to the surface of a conductor makes an angle θ with the direction of field *B*. The flux ϕ passing through area *A* is
(i) ϕ = BA (ii) ϕ= B/A

(iii) $\phi = AB \sin\theta$ (iv) $\phi = AB \cos\theta$
Ans:- (iv) $\phi = AB \cos\theta$

56. When a magnet is moved with its N-pole towards a closed coil, the nearer end of the coil acts as
(i) N-pole
(ii) S-pole
(iii) Sometimes N-pole and sometimes S-pole
(iv) None of the above
Ans:- (i) *N*-pole

57. Reactive power in an a.c. circuit is
(i) measured by a wattmeter
(ii) the useful power
(iii) consumed in the circuit
(iv) a liability on the circuit
Ans:- (iv) a liability on the circuit

58. A 200V, 50Hz inductive circuit takes a current of 10 A, lagging 30^0. The inductive reactance of the circuit is…………
(i) 20Ω (ii) 10 Ω (iii) 17.32 Ω (iv)16 Ω
Ans:- (ii) 10 Ω
Hints: Z = 200/10 = 20 Ω ;
$X_L = Z \sin\phi = 20 \times \sin 30^0 = 10\ \Omega.$

59. In an R-L series circuit is a…………..
(i) R and X_L (ii) R and Z
(iii) Z and X_L (iv) none of the above
Ans:- (ii) R and Z

60. Impedance of a.c. circuit is a…………..
(i) Phasor (ii) Vector quantity
(iii) Scalar quantity (iv) none of the above
Ans:- (iii) Scalar quantity

61. In a parallel a.c. circuit, if the supply frequency is less than the resonant frequency, then the circuit is………..
(i) Inductive (ii) Capacitive
(iii) Resistive (iv) None of the above
Ans:- (i) Inductive

62. The *Q*-actor of a parallel tuned circuit can be increased by………………..
(i) Increasing circuit resistance
(ii) Decreasing circuit resistance
(iii) Decreasing inductance of the circuit
(iv) None of the above
Ans:- (ii) Decreasing circuit resistance
Hints: $Q = \frac{1}{R}\sqrt{\frac{L}{C}}$
Clearly, Q of the circuit can be increased by decreasing R in the inductive branch.

63. If a parallel resonant circuit is shunted by a resistance, then...........
(i) Circuit impedance is decreased
(ii) Q of the circuit is increased
(iii) The gain of the circuit is increased
(iv) None of the above
Ans:- (i) Circuit impedance is decreased

64. If the resistance in the inductive branch of a parallel resonant circuit is increased, then,................
(i) The circuit impedance is increased
(ii) Q of the circuit is increased
(iii) Selectivity of the circuit is increased
(iv) Impedance of the circuit is decreased
Ans:- (iv) Impedance of the circuit is decreased
Hints: At parallel resonance, circuit impedance = L/CR. If the resistance R in the inductive branch is increased, circuit impedance will be decreased.

65. In a parallel RC circuit with $R > X_C$, the phase angle will be.......................
(i) 45^0 (ii) Greater than 45^0
(iii) 90^0 (iv) Insufficient data
Ans:- (ii) Greater than 45^0

66. In a parallel RC circuit, the phase angle is
(i) $cos^{-1}\frac{R}{Z}$ (ii) $sin^{-1}\frac{Z}{R}$
(iii) $cos^{-1}\frac{R^2}{Z}$ (iv) $cos^{-1}\frac{Z}{R}$
Ans:- (iv) $cos^{-1}\frac{Z}{R}$

67. In a parallel RL circuit, I_R = 20 mA and line current I = 18 mA. The statement is
(i) Correct (ii) Incorrect
(iii) Lacking data (iv) None of the
Ans:- (ii) Incorrect
Hints: The statement is incorrect because in a parallel RL circuit, the line current I is given by;

$$I = \sqrt{I_R^2 + I_L^2}$$

Therefore, value of I will be more than I_R or I_L.

68. When it is not appropriate to use the formula $f_r = 1/2\pi\sqrt{LC}$ for a practical parallel LC circuit?
(i) When Q of inductor is less than 10
(ii) When Q of inductor is more than 10
(iii) When Q of inductor is less than 100
(iv) None of the above
Ans:- (i) When Q of inductor is less than 10

69. In a practical parallel resonant circuit,
(i) $I_L = I_C$ (ii) $I_L > I_C$
(iii) $I_L < I_C$ (iv) $I_L = 100\ I_C$
Ans:- (ii) $I_L > I_C$

70. In a parallel resonant LC circuit, the current is
(i) Equal to I_L or I_C
(ii) Much greater than I_L or I_C

(iii) Much less than I_L or I_C
(iv) None of the above
Ans:- (iii) Much less than I_L or I_C
Hints: In a parallel LC circuit, the current I_C or I_L at resonance is much greater than the line current but I_C and I_L are in phase opposition. Therefore, line current is much less than I_L or I_C.

71. The difference between the two half-power frequencies is called………
(i) Resonant frequency (ii) Quality factor
(iii) Mid-frequency (iv) Bandwidth
Ans:- (iv) Bandwidth

72. At parallel resonance, the circuit susceptance is
(i) Zero (ii) Maximum
(iii) 1 (iv) Cannot say
Ans:- (i) Zero
Hints: Resonance is defined as a circuit condition of unity power factor. Under this condition, the circuit admittance is a pure conductance i.e., circuit susceptance is zero.

73. At parallel resonance, the circuit, admitance is equal to circuit…………..
(i) Resistance (ii) Conductance
(iii) Susceptance (iv) Inductance
Ans:- (ii) Conductance

74. At resonant frequency, the power dissipated in a parallel resonant circuit is *P*. The power dissipated at half-power frequencies is
(i) 2P (ii) 1.5P (iii) P/2 (iv) P/$\sqrt{2}$
Ans:- (iii) P/2
Hints: At half-power frequencies, the power dissipated in the resonant circuit is one-half that dissipated at the resonant frequency.

75. If f_1 and f_2 are the half-power frequencies in a parallel resonant circuit, then resonant frequency is
(i) f_2/f_1 (ii) f_1/f_2
(iii) $\frac{f_1/f_2}{2}$ (iv) $\sqrt{f_1/f_2}$
Ans:- (iv) $\sqrt{f_1/f_2}$

76. The instrument in which springs provide the controlling torque as well as serve to lead current into and out of the operating coil is ………..instrument.
(i) moving-iron
(ii) hot-wire
(iii) permanent-magnet moving coil
(iv) none of the above
Ans:- (iii) permanent-magnet moving coil

77. If current through the operating coil of a moving-iron-instrument is doubled, the operating force becomes…………..
(i) two times (ii) four times
(iii) one-half time (iv) three times
Ans:- (ii) four times
Hints: In a moving-iron instrument, the deflecting torque is $T_d \propto I^2 \ldots\ldots for\ d.c$
$\propto I^2{}_{r.m.s.} \ldots\ldots for\ a.c$
If current is doubled, operating torque is increased four times.

78. The full-scale deflection current of a moving coil instrument is about…………..
(i) 50 m A (ii) 1 A (iii) 3 A (iv) 2 A
Ans:- (i) 50 m A

79. For measuring high values of alternating current with a dynamometer ammeter, we use a …………..
(i) Shunt (ii) Multiplier
(iii) Potential transformer (iv) Current transform
Ans:- (iv) Current transform
Hints: For measuring alternating currents larger than 5 A, shunts are not practicable with a dynamometer ammeter. It is because the division of current between the shunt and the coils varies with frequency (since reactance of coils depends upon frequency). Therefore, the instrument will be accurate only at the frequency at which it is calibrated. Instead we use current transformer.

80. Hot-wire instrument have ……………. scale.
(i) Uniform (ii) Log
(iii) Square (iv) None of the above
Ans:- (iii) Square

81. The full-scale voltage across a moving coil voltmeter is about…………..
(i) 10 V (ii) 5 V (iii) 100 V (iv) 50 mV
Ans:- (iv) 50 mV

82. Moving-iron instruments have……... scale.
(i) uniform (ii) squared
(iii) log (iv) none of the above
Ans:- (ii) squared

83. The range of a moving-iron a.c. ammeter is extended by…………..
(i) a shunt
(ii) a multiplier
(iii) Changing number of turns of operating coil
(iv) none of the above
Ans:- (iii) Changing number of turns of operating coil

84. To measure high-frequency currents, we mostly use……………. ammeter.
(i) Hot-wire (ii) Dynamometer
(iii) Moving-iron (iv) Thermocouple
Ans:- (iv) Thermocouple

85. For the measurement of high direct voltage (say 10 kV), one would use………….. voltmeter.
(i) Permanent-magnet moving coil
(ii) Electrostatic
(iii) Hot-wire
(iv) Moving iron
Ans:- (ii) Electrostatic

86…………….. movement is most expensive.
(i) D' Arsonval (ii) Moving-iron
(iii) Dynamometer (iv) None of the above
Ans:- (iii) Dynamometer

87. Electrostatic instruments are used as………………
(i) voltmeters only
(ii) ammeters only
(iii) both ammeters and voltmeters
(iv) wattmeters only
Ans:- (i) voltmeters only

88. An electric pyrometer is an instrument used to measure……………….
(i) phase (ii) frequency
(iii) high temperatures (iv) none of the above
Ans:- (iii) high temperatures

89. The best type of meter movement is .... movement.
(i) iron-vane (ii) D' Arsonval
(iii) dynamometer (iv) none of the above
Ans:- (ii) D' Arsonval
Hints: Because it is very light and accurate. Moreover, the sensitivity of the instrument can be greatly increased by increasing the number of turns of the operating coil.

90. ……………instruments are most sensitive.
(i) Moving-iron
(ii) Hot-wire
(iii) dynamometer
(iv) Permanent-magnet moving coil
Ans:- (iv) Permanent-magnet moving coil

91. In induction type ammeter,……….. damping is provided.
(i) air friction (ii) eddy current
(iii) fluid friction (iv) none of the above
Ans:- (ii) eddy current

92. The most commonly used induction type instrument is……………………
(i) induction voltmeter
(ii) induction wattmeter
(iii) induction watt-hour meter
(iv) induction ammeter
Ans:- (iii) induction watt-hour meter
Hints: The single phase energy meter used in homes is the induction watt-hour meter.

93. A d.c. compound generator having full-load terminal voltage equal to the no-load voltage is called……… generator.
(i) under-compounded (ii) over-compounded
(iii) flat-compounded (iv) none of the above
Ans:- (iii)flat-compounded

94. The main drawback of a d.c. shunt generator is that………
(i) terminal voltage drops considerably with load
(ii) shunt field circuit has high resistance
(iii) generated voltage is small
(iv) it is expensive
Ans:- (i) terminal voltage drops considerably with load

95. The terminal voltage of a …… generator varies widely with changes in load current.

(i) series (ii) shunt

(iii) flat-compounded (iv) none of the above

Ans:- (i) series

96. The effect of armature reaction is to ……..

(i) decrease the total flux

(ii) increase the total flux

(iii) make the air-gap flux uniform

(iv) none of the above

Ans:- (i) decrease the total flux

97. In a d.c. generator, armature reaction ………pole tip.

(i)weakens the flux at the trailing

(ii)weakens the flux at the leading

(iii) strengthens the flux at the leading

(iv) none of the above

Ans:- (ii)weakens the flux at the leading

98. The greatest percentage of heat loss in a d.c machine is due to……..

(i) eddy current loss (ii) hysteresis loss

(iii) copper loss (iv) frictional loss

Ans:- (iii) copper loss

Hint: The armature current of a d.c. machine is very large. Since **copper loss** is proportional to the square of current, hence a greater part of power loss occurs in the armature.

99. The size of a d.c. generator can be reduced by using ….

(i) lap winding

(ii) high- resistance winding material

(iii) iron commutator

(iv) magnetic material of high permeability

Ans:- (iv) magnetic material of high permeability

100. Hysteresis loss in a d.c machine is directly proportional to……..

(i) speed (ii)$(speed)^2$

(iii)$(speed)^{1.6}$ (iv) none of the above

Ans:- (i) speed

Hints: Hysteresis power loss, $P_h \propto B_{max}^{1.6} f$

Now=NP/120 so that $f \propto N$(speed).Therefore, $P_h \propto N$.

101. The physical size of 100 kW , 2000 r.p.m. generator is ……….. that of 10 kW, 200 r.p.m generator.

(i) more than (ii) less than

(iii) about the same as (iv) none of the above

Ans:- (iii) about the same as

102. ....together are called stray loses.
(i) Copper and iron losses
(ii) Iron and mechanical losses
(iii) Field copper loss and iron loss
(iv) Frictional loss and copper loss
Ans:- (ii)Iron and mechanical losses

103. The armature conductors of a 6-pole, lap-wound d.c. generator are divided into.
(i) 2 parallel paths (ii) 4 parallel paths
(iii) 3 parallel paths (iv) 6 parallel paths
Ans:- (iv) 6 parallel paths

104. The efficiency of a d.c. generator is maximum when its variable loss is
(i) equal to constant loss
(ii) equal to half of constant loss
(iii) equal to double the constant loss
(iv) none of the above
Ans:- (i) equal to constant loss

105. A shunt generator delivers 195 A at a terminal p.d. of 250 V. The armature resistance and shunt field resistance are 0.02 Ω 50 Ω respectively. What is the value of generated e.m.f.?
(i) 246 V (ii) 270 V
(iii) 254 V (iv) 282 V
Ans:- (iii) 254 V
Hints: I_{sh}=250/50=5 A ∴ $I_a = I_{sh} + I_L = 5 + 195 = 200A$
Armature drop =$I_a R_a = 200 \times 0.02 = 4$ V
∴ Generated e.m.f =$V + I_a R_a = 250 + 4 = \mathbf{254V}$

106. In the above question, what is the value of copper losses?
(i) 825 W (ii) 2050 W
(iii) 1025 W (iv) 960 W
Ans:- (ii) 2050 W
Hints: Armature
Cu loss = $I_a^2 R_a = (200)^2 \times 0.02 = 800$ W
Shunt Cu loss = $VI_{sh} = 250 \times 5 = 1250$ W
Total Cu loss =1250 + 800 = **2050 W**

107. If W_C is the constant loss and R_a is the armature resistance of a d.c. generator, then load current I_L corresponding to maximum efficiency is
(i) $I_L = \sqrt{\frac{R_a}{W_C}}$ (ii) $I_L = \frac{W_c}{\sqrt{R_a}}$
(iii) $I_L = \frac{R_a}{\sqrt{W_C}}$ (iv) $I_L = \sqrt{\frac{W_C}{R_a}}$
Ans:- (iv) $I_L = \sqrt{\frac{W_C}{R_a}}$
Hints: The efficiency of a d.c. generator is maximum when Variable loss = Constant loss
Or $I_L^2 R_a = W_C$ Or $I_L = \sqrt{\frac{W_C}{R_a}}$

108. If the flux per pole of a d.c. generator is halved but its speed is doubled, its generated e.m.f. will
(i) be halved (ii) remain the same
(iii) be doubled (iv) be quadrupled
Ans:- (ii) remain the same

109. In very large d.c. motors with severe heavy duty, armature reaction effects are corrected by............
(i) using interpoles only
(ii) using compensatory windings in addition to interpoles
(iii) shifting the brush position
(iv) none of the above
Ans:- (ii) using compensatory windings in addition to interpoles
Hints: Some large d.c. motors employed in steel mills perform a series of heavy-duty operations. They accelerate, decelerate, stop, reverse all in a matter of seconds. The corresponding armature current increases, decreases, reverses in stepwise fashion, producing very sudden changes in armature reaction. For such motors, interpoles do not adequately neutralise the armature m.m.f. To eliminate this problem, additional compensating windings are connected in series with the armature. They are distributed in slots, cut into the pole faces of the main field poles. Like interpoles, these windings produce an m.m.f equal and opposite to the m.m.f. of the armature.

110. The speed of a ....motor is practically constant.
(i) cumulatively compounded
(ii) series
(iii) differentially compounded
(iv) shunt
Ans:- (iv) shunt

111. ....motor is variable speed motor.
(i) series
(ii) Shunt
(iii) Cumulatively compounded
(iv) Differentially compounded
Ans:- (i) series

112. The most commonly used method of speed control of a d.c. motor is by varying...............
(i) voltage applied to the motor
(ii) field strength
(iii) effective number of conductors in series
(iv) armature circuit resistance
Ans:- (ii) field strength
Hints: The fad that the speed of a d.c. motor varies with field excitation provides a convenient means for controlling the speed of shunt and compound motors.

113. The running speed of a d.c. series motor is basically determined by.................
(i) field excitation
(ii) load
(iii) armature resistance
(iv) none of the above
Ans:- (ii) load

114. After a shunt motor is up to speed, the speed may be increased considerably by ……………..
(i) increasing field circuit resistance
(ii) decreasing field circuit resistance
(iii) increasing armature circuit resistance
(iv) reducing the load
Ans:- (ii) decreasing field circuit resistance

115…………motor has the best speed regulation.
(i) Series
(ii) Cumulatively compounded
(iii) Shunt
(iv) Differentially compounded
Ans:- (iii) Shunt

116. The deciding factor in the selection of a d.c. motor for a particular application is its ……………..characteristic.
(i) speed-torque
(ii) speed-armature current
(iii) torque-armature current
(iv) none of the above
Ans:- (i) speed-torque

117. The demand for a large increase in torque of a d.c. shunt motor is met by a……………..
(i) large decrease in speed
(ii) large increase in speed
(iii) large increase in current
(iv) small increase in current
Ans:- (iii) large increase in current
Hints: For a d.c. motor, $T_a \propto \phi I_a$. But in a shunt motor, ϕ is practically constant so that $T_a \propto I_a$. If torque is doubled, armature current is also doubled.

118. A series motor will over speed when …………….
(i) the load is increased
(ii) the field is opened
(iii) the armature circuit is opened
(iv) the load is removed
Ans:- (iv) the load is removed

119. A transformer will work on……………..
(i) a.c. only (ii) d.c. only
(iii) a.c. as well as d.c (iv) none of the above
Ans:- (i) a.c. only
Hints: Transformer action demands only the existence of alternating flux linking the two windings. Since alternating flux can be produced by a.c a transformer will work only on a.c.

120. The primary and secondary of a transformer are ……………..coupled.
(i) electrically
(ii) magnetically
(iii) electrically and magnetically
(iv) none of the above
Ans:- (ii) magnetically

121. A transformer is an efficient device because it…………….
(i) is a static device
(ii) uses inductive coupling
(iii) uses capacitive coupling
(iv) uses electric coupling
Ans:- (i) is a static device
Hints: Since transformer is a static device, the friction and wind age losses are absent.

122. A transformer transfers electrical energy from primary to secondary usually with a change in…………..
(i) frequency (ii) power
(iii) voltage (iv) time period
Ans:- (iii) voltage

123. The voltage per turn of the primary of a transformer is………… the voltage per turn of the secondary.
(i) more than (ii) less than
(iii) the same as (iv) none of the above
Ans:- (iii) the same as
Hints: Since the same mutual flux links both the windings, the voltage per turn of the primary is the same as the voltage per turn of the secondary.

124. The winding of the transformer with greater number of turns will be……………..
(i) high-voltage winding
(ii) low-voltage winding
(iii) either high or low voltage winding
(iv) none of the above
Ans:- (i) high-voltage winding

125. A transformer does not posses ……….changing property.
(i) impedance (ii) voltage
(iii) current (iv) power
Ans:- (iv) power
Hints: A transformer is not a source of energy; it merely transfers power from primary to secondary with a change of voltage /current.

126. The iron-core is used to ………………. of the transformer.
(i) increase the weight
(ii) provide tight magnetic coupling
(iii) reduce core losses
(iv) none of the above
Ans:- (ii) provide tight magnetic coupling
Hints: Iron core ensures tight magnetic coupling between the two windings. The co-efficient of coupling between the winding of a practical transformer may be as high as 0.99

127. If a transformer core has air gaps, then…………...
(i) reluctance of magnetic path is decreased
(ii) hysteresis loss is decreased
(iii) magnetising current is greatly increased
(iv) eddy current is increased
Ans:- (iii) magnetising current is greatly increased

128. The maximum flux produced in the core a transformer is …………

(i) directly proportional to supply frequency
(ii) inversely proportional to supply frequency
(iii) inversely proportional to primary voltage
(iv) none of the above

Ans:- (ii) inversely proportional to supply frequency

Hints: The voltage equation of a transformer is given by;

$V_1 = 4.44\ N_1\ \phi_{max} f$

where V_1 = applied primary voltage;

N_1 = number of primary turns

$\phi_{max} = \frac{V_1}{4.44\ N_1\ f}$

Clearly, maximum flux produced in a core is inversely proportional to supply frequency.

129. The flux in. the core of a single-phase transformer is ……………

(i) purely alternating one
(ii) purely rotating one
(iii) partly alternating and partly rotating
(iv) none of the above

Ans:- (i) purely alternating one

130. A transformer is so designed that primary and secondary have …………..

(i) high leakage reactance
(ii) large resistance
(iii) tight magnetic coupling
(iv) good electric coupling

Ans:- (iii) tight magnetic coupling

131. When the primary of a transformer is connected to a d.c. supply, …………

(i) primary draws small current
(ii) primary leakage reactance is increased
(iii) core losses are increased
(iv) primary may burn out

Ans:- (iv) primary may burn out

132. The resistance split-phase induction motor are the most popular single-phase motors because of ___________

(i) their low cost (ii) their high starting torque
(iii) the long starting period
(iv) none of the above

Ans:- (i) their low cost

133. At starting, the-line current of a capacitor-start induction motors is _______ the normal full-load current.

(i) 8 to 10 times (ii) 4 to 5 times
(iii) equal to (iv) 7 to 8 times

Ans:- (ii) 4 to 5 times

134. In a capacitor-start, capacitor-run motor, _____ winding is cut out after starting.

(i) starting (ii) main
(iii) neither starting nor main
(iv) none of the above

Ans:- (iii) neither starting nor main

135. A capacitor-start, capacitor-run motor has _____
(i))low power factor
(ii) high power factor
(iii) low efficiency
(iv) high starting torque
Ans:- (ii) high power factor
Hints: The capacitor-start, capacitor-run motor is similar to the capacitor-start type except that the starting winding remains in the circuit after the motor is started. Consequently, such a motor operates at a highly power factor.

136. The capacitor-start, capacitor-run induction motor acts as a true 2-phase motor at ________.
(i) starting (ii) no-load
(iii) all loads (iv) full-load
Ans:- (iv) full-load

137. The capacitor-start, capacitor-run motor is used in those applications where ___________.
(i) high starting torque is required
(ii) silence is important
(iii) noisy operation is not important
(iv) none of the above
Ans:- (ii) silence is important

138. The capacitor-start, capacitor-run motor has _______.
(i) no centrifugal switch (ii) low power factor
(iii) noisy operation (iv) low efficiency
Ans:- (i) no centrifugal switch

139. Capacitor motors ______resistance split-phase induction motors.
(i) are costlier than
(ii) are less costly than
(iii) cost about the same as
(iv) have poor starting torque than
Ans:- (i) are costlier than

140. Most of the troubles of single phase induction motors are traceable to the ________.
(i) rotor bars (ii) main winding
(iii) shaft bearings (iv) starting switch
Ans:- (iv) starting switch

141. The single phase shaded pole motor has ___________
(i) squirrel cage rotor (ii) wound rotor
(iii) high power factor
(iv) high starting torque
Ans:- (i) squirrel cage rotor

142. The direction of rotation of shaded-poll motor depends upon ________.
(i) supply frequency
(ii) number of poles on the stator
(iii) which half of the pole is shaded
(iv) supply voltage

Ans:- (iii) which half of the pole is shaded

143. The full-load efficiency of a shaded pole motor is about ________.
(i) 70 to 80% (ii) 60 to 70%
(iii) 30 to 35% (iv) 5 to 10%
Ans:- (iii) 30 to 35%
Hints: The shading coils are not opened after the motor is running at normal speed. Therefore, considerable power loss takes place in the shading coils. For this reason, the efficiency of such a motor is very low, 30 to 35%.

144. The single phase series motor can operate on _____.
(i) a.c. only (ii) d.c. only
(iii) both a.c. and d.c. (iv) none of the above
Ans:- (iii) both a.c. and d.c.

145. For the same rating, a d.c. series motor ________ costs single phase series motor.
(i) about the same as (ii) more than
(iii) less than (iv) none of the above
Ans:- (iii) less than
Hints: The sparking at the brushes of an a.c. series motor is caused by the voltage induced by the alternating main field in the coils short-circuit by the brushes during commutation period. To reduce sparking in an a.c. series motor, the number of turns in each armature coil is kept small and high-resistance leads connect each coil to the commutator segments. As a result, the armature winding of an a.c. series motor has more coils and, therefore, more commutator segments than a comparable d.c. series motor. For this reason, a d.c. series motor costs less than the comparable a.c. series motor.

146. A vacuum cleaner employs ________motor.
(i) resistance split-phase
(ii) capacitor-start
(iii) shaded-pole
(iv) single-phase, series
Ans:- (iv) single-phase, series

147. An alternator is sometimes called _________ generator.
(i) synchronous (ii) asynchronous
(iii) Rosenberg (iv) none of the above
Ans:- (i) synchronous

148. A turbo-alternatoruses _________
(i) salient -pole field structure
(ii) nonsalient – pole field structure
(iii) rotating a.c. armature winding
(iv) none of the above
Ans:- (ii) nonsalient – pole field structure
Hints:- High-speed or turbo-alternators have non salient – pole (i.e. cylindrical rotor) rotor to withstand the stresses at high speeds. Because the rotar is driven at a high speed, we require a small number of poles.

149. The non salient-pole field construction is used for __________ alternator.
(i) low-speed (ii) medium-speed
(iii)high-speed (iv) none of the above

Ans:- (iii)high-speed

150. The a.c. armature winding of an alternator is ________

(i) always star-connected .
(ii) generally delta-connected
(iii) star-delta connected
(iv) none of the above
Ans:- (i) always star-connected

151. Low-speed alternators are driven by ________

(i) hydraulic turbines
(ii) steam engines
(iii) steam turbines
(iv) none of the above
Ans:- (i) hydraulic turbines

152. High-speed alternators are driven by ________

(i) diesel engines
(ii) hydraulic turbines
(iii) steam turbines
(iv) none of the above
Ans:- (iii) steam turbines
Hints:- Steam turbines are smaller and more efficient when they turn at high speed. The same is true of alternators.

153. The air-gap in an alternator is ________ in an induction machine.

(i) much shorter than
(ii) much longer than
(iii) about the same as
(iv) none of the above
Ans:- (ii) much longer than

154. The stator of an alternator is wound for ________ on the rotor.

(i) more number of poles than
(ii) less number of poles than
(iii) the same number of poles as
(iv) none of the above
Ans:- (iii) the same number of poles as

155. The synchronous reactance of an alternator ______ as the iron is saturated.

(i) decreases
(ii) increases
(iii) remains unchanged
(iv) none of the above
Ans:- (i) decreases

156. In an alternator, the effect of armature reaction is minimum at power factor of ________

(i) 0.866 lagging
(ii) 0.866 leading
(iii) 0.5 lagging
(iv) unity
Ans:- (iv) unity

157. The lagging load p.f. of an alternator is decreased, the demagnetising effect of armature reaction ______

(i) remains the same
(ii) is decreased
(iii) is increased
(iv) none of the above
Ans:- (iii) is increased

158. When load on an alternator is increased, the terminal voltage increases if the load p.f. is ____________

(i) unity (ii) lagging.
(iii) leading (iv) zero
Ans:- (iii) leading

159. The rotor of a synchronous motor is..............

(i) Salient-pole type
(ii) Nonsalient-pole type
(iii) Identical to that of a d.c. motor
(iv) None of the above
Ans:- (i) Salient-pole type

160. Damper winding in a synchronous motor ________

(i) reduces windage losses
(ii) serves to reduce motor speed
(iii)improves p.f. of the motor
(iv) increases hunting of the motor
Ans:- (ii) serves to reduce motor speed

161. Small synchronous motors are started by ________

(i) pony motor
(ii) damper winding
(iii) variable-frequency source
(iv) none of the above
Ans:- (ii) damper winding

162. A synchronous motor runs at speeds ranging from _______

(i) 1800 to 3600 r.p.m.
(ii) 3600 to 6000 r.p.m.
(iii)150 to 1800 r.p.m.
(iv) none of the above
Ans:- (iii)150 to 1800 r.p.m.
Hints:- Most synchronous motors are rated between 150 kW (200 h.p.) and 15 MW (20,000 h.p.) and turn at speeds ranging from 150 to 1800 r.p.m. Consequently, these machines are used in heavy industry.

163. The full-load slip of a synchronous motor is _______

(i) 5% (ii) 1% (iii) 2% (iv) zero
Ans:- (iv) zero
Hints:- A synchronous motor runs at one speed only i.e. synchronous speed. Consequently, slip is zero.

164. A 50 Hz synchronous motor runs at 200 r.p.m. The number of salient poles on the rotor are _______

(i) 36 (ii) 16
(iii) 30 (iv) none of the above
Ans:- (iii) 30

165. If the supply frequency of synchronous motors is 60 cycles/second, then the rotor must revolve at __________
(i) 25 cycles/second
(ii) 60 cycles/second
(iii) 100 cycles/second
(iv) none of the above
Ans:- (ii) 60 cycles/second
Hints:- The primary requirement is that frequency of rotation of the rotor should be such that stator and rotor fields are stationary with respect to each other. For this to happen, obviously, the rotor must revolve at 60 cycles/second.

166. A synchronous motor is a ________ motor.
(i) variable p.f. (ii) variable speed
(iii) singly fed (iv) none of the above
Ans:- (i) variable p.f.

167. The rotor of a synchronous motor is excited with direct current when the motor ________
(i) is at standstill (i.e. at starting)
(ii) approaches synchronous speed
(iii) approaches half synchronous speed
(iv) none of the above
Ans:- (ii) approaches synchronous speed

168. When the synchronous motor runs at synchronous speed, the voltage induced in the damper winding is ________
(i) maximum (ii) minimum
(iii) zero (iv) none of the above
Ans:- (iii) zero
Hints:- When the motor runs at synchronous speed, there is no relative motion between rotor and revolving flux produced by stator currents. Hence e.m.f. in the damper winding placed on the rotor is zero.

169. In order to reverse the direction of a synchronous motor, ___________
(i) interchange any two stator lines
(ii) reduce d.c. field excitation to zero
(iii) change supply frequency
(iv) none of the above
Ans:- (i) interchange any two stator lines

170. A synchronous motor runs at only one speed (i.e. synchronous speed) because it _____________
(i)has no losses
(ii)is a doubly fed machine
(iii) has a damper winding
(iv) none of the above
Ans:- (ii)is a doubly fed machine
Hints:- The significant and distinguishing feature of synchronous motors in contrast to induction motors is that they are doubly fed. Electrical energy is supplied both to the field and the armature windings. When this is done, torque can only be developed at one speed-the synchronous speed. At any other speed, the torque is zero. In fact, it is this characteristic (i.e. doubly fed) which enables the synchronous motor to develop non-zero torque at only one speed (i.e. synchronous speed) and hence the name synchronous motor.

171. A thermal station has a maximum demand of 20,000. kW and a load factor of 40%. Units generated per annum will be

(i) 525×10^4 kWh (ii) 105×10^5 kWh (iii) $7O08 \times 10^4$ kWh (iv) 62×10^6 kWh

Ans:- (iii) $7O08 \times 10^4$ kWh

Hints: Units generated/annum

$= \text{Max.demand} \times \text{L.F.} \times \text{Hours in a year}$

$= 20{,}000 \times 0.4 \times 8760 = 7008 \times 10^4 \text{kWh}$

172. The highest point on the daily load curve represents

(i) average demand

(ii) maximum demand

(iii) load factor

(iv) none of the above

Ans:- (ii) maximum demand

173. The load factor (L.F.), maximum demand (M.D.), average load (A.L.) are related as:

(i) L.F. = $\frac{A.L.}{M.D.}$ (ii) L.F. = A.L. x M.D.

(iii) L.F. = $\frac{M.D.}{A.L.}$ (iv) L.F. = M.D.

Ans:-(i) L.F. = $\frac{A.L.}{M.D.}$

174. A generating station has a connected load of 43 MW and a maximum demand of 20 MW; the units generated being 61.5×10^6 kWh per annum. The demand factor is

(i) 0.823 (ii) 0.756

(iii) 0.465 (iv) 0.356

Ans:- (iii) 0.465

Hints: Demand factor = $\frac{Max.\ demand}{Connected\ load}$

$= \frac{20}{43} = 0.465.$

175. In the above question, what is the load factor?

(i) 35.1% (ii) 46.5% (iii) 78.2% (iv) 69.5%

Ans:- (i) 35.1%

Hints: Average demand = $\frac{Units\ generated/annum}{Hours\ in\ a\ year}$

$= \frac{61.5 \times 10^6}{8760} = 7020$ kW

$\therefore$ Load factor = $\frac{Average\ demand}{Max.\ demand} = \frac{7020}{20 \times 10^3}$

$= 0.351$ or 35.1%

176. A generating station has an average demand of 15 MW. If the plant capacity factor is 50%, what is the plant capacity?

(i) 20 MW (ii) 10 MW

(iii) 25 MW (iv) 30 MW

Ans:- (iv) 30 MW

Hints: Plant capacity factor = $\frac{Average\ demand}{Plant\ capacity}$

$\therefore$ Plant capacity = $\frac{Average\ demand}{Plant\ capacity\ factor}$

$= \frac{15}{0.5} = 30$ MW

177. In the above question if the load factor is 60%, what is the reserve capacity of the plant?

(i) 30 MW (ii) 5 MW

(iii) 27.5 MW (iv) 12 MW

Ans:- (ii) 5 MW

Hints: Maximum demand = $\frac{Average\ demand}{Load\ factor}$

$= \frac{15}{0.6} = 25$ MW

∴ Reserve capacity of plant

= Plant capacity – Max. demand

= 30–25 = 5 MW.

178. The demand factor is generally

(i) less than 1 (ii) more than 1

(iii) equal to 1 (iv) none of the above

Ans:- (i) less than 1

Hints: The value of demand factor is usually less than 1. It is expected because maximum demand power station is generally less than the connected load.

179. The load factor is generally

(i) more than 1 (ii) less than 1

(iii) equal to 1 (iv) none of the above

Ans:- (ii) less than 1

Hints: Load factor = $\frac{Average\ demand}{Max.\ demand}$

The load factor is always less than 1 because the average load is smaller than the maximum demand.

180. The diversity factor is always

(i) equal to 1 (ii) less than 1

(iii) greater than 1 (iv) none of the above

Ans:- (iii) greater than 1

Hints: Diversity factor = $\frac{Sum\ of\ individual\ max.demands}{Max.demand\ on\ power\ station}$

A power station load to various types of consumers whose maximum demands generally do not occur at the same time. Therefore, the maximum demand on the power station is always less than the sum of individual maximum demands of the consumers. For this reason, diversity factor is always greater than 1.

181. If the maximum demand on the plant is equal to the plant capacity, then the value of load factor

(i) equal to plant capacity factor

(ii) is less than plant capacity factor

(iii) is more than plant capacity factor

(iv) none of the above

Ans:- (i) equal to plant capacity factor

182. If the load factor of a power station increases, the cost per unit generated will

(i) increase (ii) decrease

(iii) remain same (iv) data incomplete

Ans:- (ii) decrease

183. If the diversity factor increases, the maximum demand on power station

(i) remains same (ii) increases
(iii) decreases (iv) none of the above
Ans:- (iii) decreases

184. When the load factor of a power station increases, the units (kWh) generated

(i) Are increased (ii) Are decreased
(iii) Remain the same (iv) None of above
Ans:- (i) Are increased
Hint:- Units generated/day = Max.demand (kW) × L.F × 24 hours
The higher the load factor (L.F), the greater is the number of units generated.

185. The fixed cost of energy generated

(i) Depends on maximum demand
(ii) Depends on units generated
(iii) Is independent of (i) and (ii)
(iv) None of the above
Ans:- (iii) Is independent of (i) and (ii)

186. A consumer who consumes more electrical energy should pay

(i) More fixed charges per unit
(ii) Less fixed charges per unit
(iii) Less running charges per unit
(iv) None of the above
Ans:- (ii) Less fixed charges per unit

187. The drawback of diminishing value method for calculating depreciation is that depreciation charges

(i) Are small in early years
(ii) Are high in later years
(iii) Are independent of rate of interest
(iv) None of the above
Ans:- (iii) Are independent of rate of interest

188. The most fundamental method for calculating the depreciation of equipment is

(i) Straight line method
(ii) Diminishing value method
(iii) Sinking fund method
(iv) None of the above
Ans:- (iii) Sinking fund method

189. An ideal value of power factor is

(i) 1 (ii) 0.5 (iii) 0.8 (iv) 0.75
Ans:- (i) 1

190. The lagging reactive power drawn load is zero. The power factor of the load is,

(i) 0.5 (ii) 0.75 (iii) 1 (iv) None of the
Ans:- (iii) 1

191. Alternators and transformers are rated in

(i) kVA (ii) kW (iii) kVAR (iv) none of the above
Ans:- (i) kVA

192.The most economical power factor for a consumer is generally
(i) 0.95 lagging (ii) 1
(iii) 0.6 lagging (iv) 0.75 lagging
Ans:- (i) 0.95 lagging

193. The correct relation in the following is:
(i) kVAR = kW sin ∅ (ii) kVAR = kW tan ∅
(iii) kVAR = kW cos ∅ (iv) None of the above
Ans:- (ii) kVAR = kW tan ∅
Hint:-kVAR = V1 sin ∅ =KVA sin ∅
kW = V1 cos ∅ = kVA cos ∅
$\therefore \frac{kVAR}{KW}$ = tan ∅ or kVAR = **kW tan** ∅

194. When the power factor is increased,
(i) Active power increases
(ii) Active power decreases
(iii) Line current increases
(iv) Line current decreases
Ans:- (iv) Line current decreases
Hint:- $I_L = \frac{P}{V_L cos\emptyset}$ …. For single-phase supply
$I_L = \frac{P}{\sqrt{3}\, V_L cos\emptyset}$ … For 3-phase supply
For fixed P and V_L, the line current is inversely proportional to the power factor.

195. Improving the power factor means making it
(i) Close to unity (ii) Zero
(iii) Less than 0.5 (iv)None of the above
Ans:- (i) Close to unity

196. When power factor is improved, the lagging kVAR drawn from the supply will
(i) Increase (ii) Decrease
(iii) Remain the same (iv) None of the above
Ans:- (ii) Decrease

197. A load takes a current of *I* at a p.f. of cos ∅. The wattless component of current is
(i) *I* cos ∅ (ii) *I* sin ∅
(iii) *I* tan ∅ (iv) None of the above
Ans:- (ii) *I* sin ∅

198. In order to improve p.f. in case of 3-phase loads, the capacitors are connected in
(i) Star (ii) Delta
(iii) Star or delta (iv) None of the above
Ans:- (ii) Delta
Hint:-Capacitors are always connected in **delta** since the capacitors of the capacitor required is one-third of that required for star connection.

199. In a 3-phase system, the line losses are
(i) Directly proportional to cos ∅
(ii) Inversely proportional to cos ∅
(iii) Inversely proportional to cos^2∅
(iv) None of the above
Ans:- (iii) Inversely proportional to cos^2 ∅

Hint:-Line current $I_L = \frac{P}{\sqrt{3}V_L cos\emptyset}$
Since the losses are proportional to the square of I_L, it follows that line losses are proportional to $1/cos^2\emptyset$

200. A synchronous condenser improves p.f. by taking

(i) Lagging kVAR (ii) Leading kVAR
(iii) Both (i) and (ii) (iv)None of the above

Ans:- (ii) Leading kVAR