Maximum : 100 marks

Time : 1 hour and 15 minutes

1. Cells are connected in parallel in order to :
   (A) increase the voltage available
   (B) reduce cost of wiring
   (C) increase the current available
   (D) reduce the time required to fully charge them after use

2. The combined resistance of two equal resistors connected in parallel is equal to :
   (A) one half the resistance of one resistor
   (B) twice the resistance of one resistor
   (C) four times the resistance of one resistor
   (D) one fourth the resistance of one resistor

3. Superposition theorem can be applicable only to circuits having ———— elements.
   (A) non-linear
   (B) passive
   (C) resistive
   (D) linear bilateral

4. The speed of an induction motor :
   (A) decreases too much with the increase of load
   (B) increases with the increase of load
   (C) decreases slightly with the increase of load
   (D) remains constant with the increase of load

5. Which DC motors has approximately constant speed?
   (A) Series motor
   (B) Shunt motor
   (C) Cumulatively compound motor
   (D) All of the above

6. Under the condition of resonance, RLC series circuit behaves as a :
   (A) purely resistive circuit
   (B) purely inductive circuit
   (C) capacitive circuit
   (D) reactive Circuit

7. A UJT contains :

(A) four pn junctions
(B) three pn junctions
(C) two pn junctions
(D) one pn junction

8. The ripple factor of a power supply is a measure of :

(A) its voltage regulation
(B) its diode rating
(C) purity of power output
(D) its filter efficiency

9. The synchronous speed for a 3 phase 6-pole induction motor is 1200 rpm. If the number of poles is now reduced to 4 with the frequency remaining constant, the rotor speed with a slip of 5% will be :

(A) 1690 rpm
(B) 1750 rpm
(C) 1500 rpm
(D) 1710 rpm

10. A device whose characteristics are very close to that of an ideal voltage source is :

(A) a vaccum diode
(B) a DIAC
(C) a zener diode
(D) a FET

11. When converting 7,000 nA to microamperes, the result is :

(A) 0.007 μA
(B) 0.7 μA
(C) 700 μA
(D) 7 μA

12. The 'sheath' is used in cable to :

(A) provide strength to the cable
(B) provide proper insulation
(C) prevent the moisture from entering the cable
(D) avoid chances of rust on strands

13. When the speed at which a conductor is moved through a magnetic field is increased, the induced voltage?

(A) increases
(B) decreases
(C) remains constant
(D) reaches zero

14. The induced voltage across a coil with 250 turns that is located in a magnetic field that is changing at a rate of 8 Wb/s is :

(A) 1,000 V
(B) 2,000 V
(C) 31.25 V
(D) 3,125 V

15. Slip of the induction machine is 0.02 and the stator supply frequency is 50 Hz. What will be the frequency of the rotor induced emf?

(A) 10 Hz (B) 50 Hz

(C) 1 Hz (D) 2500 Hz

16. The eddy current loss in an a-c electric motor is 100 watts at 50 Hz. Its loss at 100 Hz will be :

(A) 25 watts (B) 59 watts

(C) 100 watts (D) 400 watts

17. The armature of a dc machine is laminated to reduce :

(A) Eddy current loss (B) Hysteresis loss

(C) Copper losses (D) Friction and windage losses

18. A single phase Hysteresis motor :

(A) can run at synchronous speed only

(B) can run at sub synchronous speed only

(C) can run at synchronous and super synchronous speed

(D) run at synchronous and sub synchronous speed

19. The temperature of resistance furnaces can be controlled by changing the :

(A) applied voltage (B) number of heating elements

(C) circuit configuration (D) all of the above

20. For a line voltage V and regulation of a transmission line R :

(A) $R \propto V$ (B) $VR \propto 1$

(C) $2R \propto V$ (D) $2VR \propto 1$

21. The rotor frequency for a 3 phase 1000 RPM 6 pole induction motor with a slip of 0.04 is ————————Hz.

(A) 8 (B) 4

(C) 6 (D) 2

22. When two transformers are operating in parallel, they will share the load as under?

(A) proportional to their impedances

(B) inversely proportional to their impedances

(C) 50% – 50%

(D) 25% – 75%

23. A 3 – phase, 400 volts, 50Hz, 100 KW, 4 pole squirrel cage induction motor with a rated slip of 2% will have a rotor speed of :

(A) 1500 rpm
(B) 1470 rpm
(C) 1530 rpm
(D) 1570 rpm

24. A 3 – phase, 400 volts, 50 Hz, 100 KW, 4 pole squirrel cage induction motor with a rated slip of 2% will have a rotor speed of :

(A) 1500 rpm
(B) 1470 rpm
(C) 1530 rpm
(D) 1570 rpm

25. The voltage at the two ends of a transmission line are 132 KV and its reactance is 40 ohm. The Capacity of the line is :

(A) 435.6 MW
(B) 217.8 MW
(C) 251.5 MW
(D) 500 MW

26. A synchronous motor is operating on no-load at unity power factor. If the field current is increased, power factor will become :

(A) lagging and current will decrease
(B) lagging and current will increase
(C) leading and current will decrease
(D) leading and current will increase

27. A d.c. shunt motor runs at no load speed of 1140 r.p.m. At full load, armature reaction weakens the main flux by 5% whereas the armature circuit voltage drops by 10%. The motor full load speed in r.p.m. is :

(A) 1200
(B) 1203
(C) 1000
(D) 1080

28. The most suitable servomotor for low power applications is :

(A) a dc series motor
(B) a dc shunt motor
(C) an ac two-phase induction motor
(D) an ac series motor

29. A 400 kw, 3-phase, 440 V, 50 Hz induction motor has a speed of 950 r.p.m. on full load. The machine has 6 poles. The slip of the machine will be :

(A) 0.06
(B) 0.10
(C) 0.04
(D) 0.05

30. In a salient pole synchronous machine (usual symbols are used) :

(A) $xq > xd$
(B) $xq = xd$
(C) $xq < xd$
(D) $xq = 0$

31. CRGO laminations in a transformer are used to minimise :

(A) eddy current loss
(B) hysteresis loss
(C) both (A) and (B)
(D) ohmic loss

32. An Air-core transformer, as compared to iron core transformer, has :

(A) less magnetic core loss
(B) more magnetic core loss
(C) no magnetic core loss
(D) less ohmic loss

33. Transformer maximum efficiency, for a constant load current, occurs at :

(A) 0.8 pf
(B) zero pf leading
(C) zero pf lagging
(D) unity power factor

34. A dc series motor is running at rated speed with rated excitation. The motor has two resistance R_1 and R_2 connected across the armature and the field respectively. Speeds above the rated speed can be achieved by :

(A) decreasing R_1 only
(B) increasing R_2 only
(C) decreasing R_1 and increasing R_2
(D) increasing R_1 and decreasing R_2

35. A dc series motor is running at rated speed without any additional resistance in series. If an additional resistance is placed in series, the speed of the motor :

(A) increases
(B) decreases
(C) remains unchanged
(D) oscillates around the rated speed

36. Plugging of dc motors is normally executed by :

(A) reversing the field polarity
(B) reversing the armature polarity
(C) reversing both armature and field polarity
(D) connecting a resistance across the armature

37. The direction of induced emf in an armature coil of a dc machine is :

(A) the same as that of the current for both the generator and the motor
(B) opposite to that of the current for the generator and the motor
(C) the same as that of current for the generator and opposite to that of the current for the motor
(D) none of these.

38. The wave form of the armature mmf in a dc machine is :

(A) square
(B) rectangular
(C) triangular
(D) sinusoidal

39. Mass of a proton is how many times greater than mass of an electron :

(A) 184000 (B) 18400

(C) 1840 (D) 184

40. Conductance of any conductor is expressed as :

(A) ampere/watt (B) mho

(C) volt/watt (D) watt/ampere^2

41. Two resistances R_1 and R_2 give combined resistances 4.5 Ω and 1Ω when they are connected in series and parallel respectively. What would be the values of these resistances?

(A) 3Ω and 6Ω (B) 6Ω and 9Ω

(C) 3Ω and 9Ω (D) 1.5 Ω and 3Ω

42. Kirchhoffs second law is based on law of conservation of :

(A) charge (B) energy

(C) momentum (D) mass

43. Ampere second is the unit of :

(A) conductance (B) power

(C) energy (D) charge

44. An electric current of 6 A is same as :

(A) 6 joule/second (B) 6 coulomb/second

(C) 6 watt/second (D) none of the above

45. The colour band sequence of a resistor is Yellow, Violet, Orange and Gold. The range in which its value must lie so as to satisfy the tolerance specified is between :

(A) 44.66 KW and 49.35 KW (B) 44.65 KW and 49.35 KW

(C) 44.65 KW and 49.36 KW (D) 45 KW and 49.34 KW

46. The Secondary line voltage is maximum for which of the following connections :

(A) Delta – Delta (B) Star – Star

(C) Delta – Star (D) Star – Delta

47. The crawling in an Induction Motor is caused by :

(A) Improper Design of Machine (B) Low voltage supply

(C) High Loads (D) Harmonics Developed in the motor

48. Speed variations of a squirrel cage Induction motor are essentially similar to those of :

(A) DC Shunt motor
(B) DC Series motor
(C) Synchronous motor
(D) Differential compound

49. The no-load ratio of a 50 Hz single phase transformer is 6000/250 V .The maximum flux in the core is 0.06 Wb. What is the number of primary turns?

(A) 450
(B) 900
(C) 350
(D) 210

50. A 23/2300 V transformer takes no load current of 5 A at 0.25 power factor lagging. The core loss is :

(A) 300.2 W
(B) 192.5 W
(C) 287.5 W
(D) 212.6 W

51. The power taken by a 3-phase load is given by the expression :

(A) $3V_L I_L \cos\phi$
(B) $\sqrt{3} V_L I_L \cos\phi$
(C) $\sqrt{3} V_L I_L \sin\phi$
(D) $3V_L I_L \sin\phi$

52. A semiconductor is formed by ———— bonds.

(A) Covalent
(B) Electrovalent
(C) Co-Ordinate
(D) None of the above

53. After firing an SCR, the gating pulse is removed. The current in the SCR will :

(A) Remains the same
(B) Immediately fall to zero
(C) Rise up
(D) Rise a little and then fall to zero

54. The majority carriers in a semiconductor are produced by :

(A) Bound Electrons
(B) Electron – Hole pairs
(C) Doping
(D) None of the above

55. The leakage current in a crystal diode is due to :

(A) Junction Capacitance
(B) Majority Carriers
(C) Minority and Majority Carriers
(D) Minority Carriers

56. A series resistance is connected in the zener circuit to :

(A) properly reverse bias the zener
(B) protect the zener
(C) properly forward bias the zener
(D) current amplifier

57. Stray losses in an induction motor generally are :

(A) proportional to the square of the stator current

(B) proportional to the square of the rotor current

(C) proportional to the rotor current

(D) inversely proportional to the square of rotor current

58. What determines the thermal loading on the motor?

(A) Duty/Load cycle

(B) Temperature of the winding

(C) Age of the motor

(D) Ambient conditions

59. The speed of an AC motor depends on :

(A) Frequency

(B) No. of poles

(C) Both (A) and (B)

(D) None of the above

60. Reduction in supply voltage by 10% will change the torque of the motor by :

(A) 38%

(B) 19%

(C) 9.5%

(D) no change

61. Output power requirements of constant torque loads vary with :

(A) speed

(B) voltage

(C) current

(D) power factor

62. A crystal diode is a ———— device.

(A) non-linear

(B) linear

(C) amplifying

(D) none of the above

63. A pn junction acts as a :

(A) unidirectional switch

(B) bidirectional switch

(C) controlled switch

(D) none of the above

64. The rotor power output of a 3-phase induction motor is 15 KW and corresponding slip is 4%. The rotor copper loss will be :

(A) 600 W

(B) 625 W

(C) 650 W

(D) 700 W

65. The busbar protection means protection of :

(A) Busbar

(B) Isolating switches

(C) Circuit breakers

(D) All above