ISRO (Electrical) (2014)

1. A Meter has a full scale deflection of 90° at a current of 1A. The response of the meter is square law. Assuming spring control, the current for a deflection at 45° will be
   (A) 0.25 (B) 0.50
   (C) 0.707 (D) 0.67
2. A Single-phase Energy meter is operating on 230V, 50 Hz supply with a load of 20A for two hours at UPF. The meter makes 1380 revolutions in that period. The meter constant is
   (A) 695 rev/kWh **(B) 150 rev/kWh**
   (C) 0.15 rev/kWh (D) 1/150 rev/kWh
3. In case of power measurements by two wattmeter method in a balanced 3-phase system with pure inductive load
   (A) both wattmeters will indicates the same value but with opposite signs
   (B) both wattmeters will indicate zero
   (C) both the wattmeters will indicate the same value same sign
   (D) one wattmeter will indicate zero and the other will indicate some non-zero value
4. It is required to measure temperature in the range of 1300°C to 1500°C. The most suitable thermocouple to be used as transducer would be
   (A) Chromel - constantan
   (B) Iron-constantan
   (C) Chromel - alumel
   (D) Platinum-rhodium
5. Which dc motor will have highest percentage increase in input current for given percentage increase in torque
   (A) Series motor
   (B) shunt motor
   (C) cumulatively compound motor
   (D) separately excited motor
6. In a three phase delta transformer, one phase burns up. The transformer will supply
   (A) conduction process alone
   (B) induction process alone
   (C) both conduction and induction processes
   (D) at full output rating
7. In an auto transformer, power is transferred through
   (A) conduction process alone
   (B) induction process alone
   (C) both conduction and induction processes
   (D) mutual coupling
8. Buchholz relay is a
   (A) voltage sensitive device
   (B) current sensitive device
   (C) frequency sensitive device
   (D) gas actuated device
9. In Scott connection, if the ratio of the main transformer is k, then the teaser transformer has transformation ratio of
   (A) $2k/\sqrt{3}$ (B) $\sqrt{3}k/2$
   (C) $k/\sqrt{3}$ (D) K/2
10. With core type transformers, the limbs are stepped so as to
    (A) reduce the iron material and therefore iron loss
    (B) provide better cooling
    (C) reduce the conductor material and therefore I^2R loss
    (D) provide more mechanical strength to the core
11. In alternator, during hunting when the speed becomes super synchronous, the damper bars develop
    (A) reluctance torque
    (B) pseudo-stationary torque
    (C) eddy current torque
    (D) induction generator torque
12. It is never advisable to connect a stationary alternator to live bus-bar because it
    (A) is likely to run as a synchronous motor
    (B) will get short circuited
    (C) will decrease bus-bar voltage though momentarily
    (D) will disturbs generated emfs of other alternators connected in parallel
13. Under no load condition, the angle between the induced voltage and the supply voltage in synchronous motor is
    (A) zero (B) 45°
    (C) 90° (D) 180°

14. Synchronous motors are not self starting because
(A) Stator not used
(B) Startign winding not provided
(C) There is no slip
(D) The direction of instantaneous torque on the rotor reverses after half cycle

15. A three phase induction motor running at 1440 rpm on rated supply will run at the following rpm when fuse of one phase gets burnt
(A) 1440 **(B) 1380**
(C) 1500 (D) zero

16. Dispersion coefficient σ is the ratio of
(A) magnetizing current to supply
(B) open circuit voltage to short circuit current for the same excitement
(C) magnetizing current to ideal short circuit current
(D) short circuit current to magnetizing current

17. In the circle diagram for a 3-phase induction motor, the diameter of the circle is determined by
(A) total stator current
(B) exciting current
(C) rotor current
(D) rotor current referred to stator

18. While conducting short-circuit test on a transformer the following side is short circuited
(A) High voltage side
(B) low voltage side
(C) primary side
(D) secondary side

19. Thrust developed by a linear induction motor depends on
(A) synchronous speed
(B) rotor input
(C) rotor input and synchronous speed
(D) number of poles

20. 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

21. The main disadvantages of using short pitch winding in alternators is that it
(A) reduces harmonics in the generated voltage
(B) reduces the total voltage around the armature coils
(C) produces asymmetry in the three phase windings
(D) Increases Cu of end connections

22. Armature reaction in an alternator mainly affects
(A) rotor speed
(B) terminal voltage per phase
(C) frequency of armature current
(D) generated voltage per phase

23. A universal motor is one which
(A) is available universally
(B) can be marketed internationally
(C) can be operated either on dc or ac supply
(D) runs dangerously high speed on no load

24. If the field of a synchronous motor is under excited, the power factor will be
(A) lagging (B) leading
(C) Unity (D) more than unity

25. Synchronous capacitor is
(A) An over excited synchronous motor running without mechanical load
(B) An over excited synchronous motor driving mechanical load
(C) An ordinary static capacitor bank
(D) A rotating dynamic capacitor bank

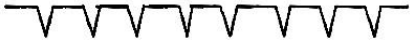
26. Two bulbs, one 250V, 100 W and second 250V, 25 W are connected in series and 440V AC, 50Hz is applied across the two bulbs. Which of the following will happen,
(A) 100 W bulb glows bright compare to 25 W bulb
(B) both 100 W bulb & 25 W bulb will glow normal
(C) 25W bulb will burn-out
(D) 25 W bulb glows bright compare to 100 W bulb

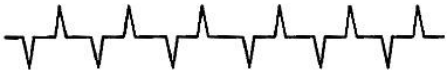
27. A wave form shown as Input is applied across primary of a pulse transformer which has 1:1 turns ratio. The output on the secondary side will be as shown in the Figure ----

Input 

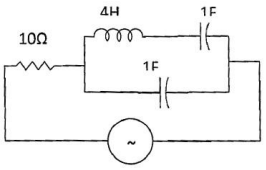
(A) 

(B) 

(C) 

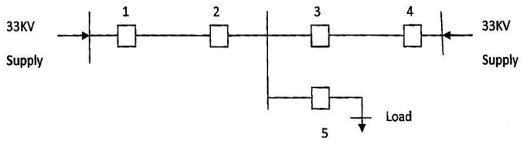
(D) 

28. The following circuit (shown in Figure) resonates at



(A) all frequencies
(B) 0.5 rad/sec
(C) 5 rad/sec
(D) 1 rad/sec

29. The distribution system shown in Figure is to be protected by over current system of protection



For proper fault discrimination directional over current relays will be required at locations

(A) 1 and 4 **(B) 2 and 3**
(C) 1, 4 and 5 (D) 2, 3 and 5

30. A 50 Hz bar primary CT has a secondary with 500 turns. The seconadary supplies 5 A current into a purely resistive burden of 1 Ω. The phase angle between the primary and secondary current is

(A) 4.6° (B) 85.4°
(C) 94.6° (D) 175.4°

31. The moving coil in a dynamometer wattmeter is connected

(A) in series with the fixed coil
(B) in series with the load
(C) across the supply
(D) across the load

32. For an unbalanced fault with paths for zero sequence currents, at the point of fault

(A) the negative & zero sequence voltages are minimum
(B) the negative sequence voltage in maximum & zero sequence voltage is minimum
(C) the netagive sequence voltage in minimum & zero sequence voltage is maximum
(D) the negative & zero sequence voltages are maximum

33. An ideal OPAMP is used to make an inverting amplifier. The two input terminals of the OPAMP are at the same potential because,

(A) the two input terminals are directly shorted internally
(B) the open loop gain of the OPAMP is infinity and CMRR is infinity
(C) the input impedance of the OPAMP is infinity
(D) slew rate is very high

34. What is the "swamping" resistance which is connected in series with the working coil of a voltmeter to drastically reduce the error in measurement caused due to variation in temperature is made up of?

(A) Constantan (B) Eureka
(C) Manganin (D) Nichrome

35. If the poles of a system lie on the imaginary axis, the system will be:

(A) Stable
(B) Conditionally stable
(C) Marginally stable
(D) Unstable

36. Which one of the following is the most likely reason for large overshoot in a control system

(A) High gain in a system
(B) Presence of dead time delay in a system
(C) High positive correcting torque
(D) High retarding torque

37. Which of the following correctly represents the sequence of operations of isolator circuit breaker and earthing switch while opening a circuit.

(A) Open circuit breaker - open isolator - close earthing switch
(B) Open isolator - close circuit breaker - open earthing switch
(C) Close earthing switch - open circuit breaker open isolator
(D) Close circuit breaker - close isolator - open earthing switch

38. A comparator circuit is used to

(A) Mark the instant when an arbitrary
(B) Mark the-instant when the input voltage becomes constant
(C) Switch ON and OFF a circuit alternately at a particular rate
(D) Switch OFF a circuit when output becomes zero

39. Out of the following methods of heating the one which is independent of supply frequency is
(A) electric arc heating
(B) induction heating
(C) electric resistance
(D) dielectric heating

40. An SCR triggered by current pulse applied to gate-cathode can be turned OFF
(A) by applying a pulse to cathode
(B) by applying a pulse to the anode
(C) by applying another pulse of opposite polarity to the gate-cathode
(D) by reversing the polarity of the anode and cathode voltage

41. In the loaded-frequency control system with tree governor action, the increase in load demand under steady condition is met,
(A) only by decrease of load demand due to drop in system frequency
(B) only by increased generation due to opening of steam valve
(C) partly by increased generation and partly by decrease of load demand
(D) partly by increased generation and partly by increased generator excitation

42. Power transmission lines are transposed to reduce
(A) skin effect
(B) Ferranti effect
(C) Transmission loss
(D) Interference with neighboring communication lines

43. The current carrying capacity of cables in DC is more than that in AC mainly due to
(A) Absence of harmonics
(B) non-existence of any stability limit
(C) smaller dielectric loss
(D) absence of ripple

44. The fact that a conductor carries more current on the surface as compared to core, is known as
(A) skin effect (B) corona
(C) permeability (D) unsymmetrical fault

45. In Gauss-Sidel load flow method, the number of iterations may be reduced if the correction in voltage at each bus is multiplied by,
(A) Gauss constant
(B) Accelaration factor
(C) Blocking factor
(D) Lagrange multiplier

46. For a fault in a power system, the term critical clearing time is related to,
(A) Transient stability limit
(B) Reactive power limit
(C) Short circuit current limit
(D) Steady state stability limit

47. The rate of rise of re-striking voltage (RRRV) is dependent upon,
(A) Resistance of the system only
(B) Inductance of the system only
(C) capacitance of the system only
(D) Inductance and capacitance of the system

48. One of the main advantages of Swinburne's test is that it,
(A) is applicable both to shunt and compound
(B) Needs one running test
(C) is very economical and convenient
(D) ignores any change in iron loss

49. A 6 pole, 50 Hz, 3-Φ induction motor is running at 950 rpm and has rotor Cu loss of 5kW. Its rotor input is _____ kW
(A) 100 (B) 10
(C) 95 (D) 5.3

50. In the shaded pole squirrel cage induction motor the flux in the shaded part always
(A) Leads the flux in the un-shaded pole
(B) lags the flux in the un-shaded pole segment
(C) is in out of phase with the flux in the un-shaded pole segment
(D) is in phase with the flux in the un-shaded pole segment

51. A saturable core reactor is basically a
(A) variable resistor
(B) step down transformer
(C) thermal relay
(D) variable impedance

52. If a body reflects entire radiation incident on it then it is known as,
(A) Black body
(B) Grey body
(C) White body
(D) Transparent body

53. 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
(A) Planck's law
(B) Macbeth's law of illumination
(C) Bunsen's law of illumination
(D) Lambert's cosine law

54. The concentration of minority carriers in an extrinsic semiconductor under equillibrium is
(A) Directly proportional to the doping concentration
(B) Inversely proportional to the doping concentration
(C) Directly proportional to the intrinsic concentration
(D) Inversely proportional to the intrinsic concentration

55. Reactance relay is normally preferred for protection against
(A) Over load currents only
(B) Phase faults only
(C) Earth faults only
(D) High voltage protection only

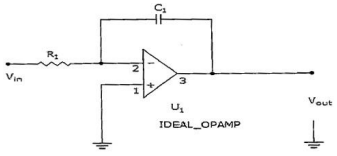
56. If a combination of HRC fuse and circuit breaker is used, the C.B. operates for
(A) Low overload currents
(B) short circuit current
(C) Under all abnormal current
(D) The combination is nver used in practice

57. Lightning arrestor should be located
(A) away from the circuit breaker
(B) near the circuit breaker
(C) near the transformer
(D) away from the transformer

58. Ferranti effect on long overhead lines is experienced when it is
(A) Lightly loaded
(B) On full load at unity p.f.
(C) On full load at 0.8 p.f. lag
(D) overloaded condition

59. In a nuclear power station, moderator is used to,
(A) absorb neutrons
(B) reduce the speed of neutrons
(C) accelerate the speed of neutrons
(D) stop chain reactions

60. What is the output waveform when V_{in} is given square wave?



(A) Square wave (B) Sine wave
(C) triangle wave **(D) Saw tooth wave**

61. A pony motor is used for the starting of which of the following motor
(A) Squirrel cage Induction motor
(B) Schrage Motor
(C) Synchronous Motor
(D) Hysteresis Motor

62. A PWM switching scheme is used with three phase inverter to
(A) reduce low order harmonics and increase high order harmonics
(B) minimize the load on the DC side
(C) increase the life of the batteries
(D) reduce the total harmonic distortion with modest filtering

63. The earth wire should not be thinner than a
(A) 20 SWG wire
(B) 16 SWG wire
(C) 10 SWG wire
(D) 8 SWG wire

64. The ripple factor of a full-wave rectifier circuit compared to that of a half wave rectifier circuit without filter is
(A) half of that for a half 'wave rectifier
(B) less than half that for a half-wave rectifier circuit
(C) equal to that of a half wave rectifier
(D) more than half that for a half-wave rectifier circuit

65. In a highly inductive circuit, a small capacitance is added in series. Then the angle between applied voltage and resultant current will be
(A) increase
(B) decrease
(C) remains absolutely unaltered
(D) alter insignificantly

66. The inertia constant of the two machines which are not swinging together are M1 and M2. The equivalent inertia constant of the system is:
(A) M1-M2
(B) M1+M2
(C) M1M2/(M1+M2)
(D) M1M2/(M1-M2)

67. A voltage source inverter is used to control the speed of a three-phase, 50 Hz squirrel cage induction motor. Its slip for rated torque is 4%. The flux is maintained at rated value. If the stator resistance and rotational losses are neglected, then the impressed voltage to obtain twice the rated torque at starting should be

(A) 10Hz (B) 5Hz

(C) 2Hz **(D) 4Hz**

68. The charge on an electron is known to be $1{:}6 \times 10^{-19}$ coulomb. In a circuit the current flowing is 1 A. How many electrons will be flowing through the circuit in a second?

(A) 1.6×10^{19} (B) 1.6×10^{-19}

(C) 0.625×10^{19} (D) 0.625×10^{12}

69. A thermal protection switch is used to provide protection against:

(A) Over load (B) Temperature

(C) Short circuit (D) Over voltage

70. With V/F ratio keeping constant, if the frequency is decreased below the base value and the voltage is decreased proportionally, is fed to an Induction motor, its starting torque and the peak torque for variable frequency & voltages will be

(A) both startign torque and peak torque will remain constant

(B) Starting torque will increase and the peak torque remains constant

(C) starting torque will remain constant and peak torque will vary and the

(D) both starting torque adn peak torque will decrease

71. A function f from the set of natural numbers to integers defined by

$$f(n) = \begin{cases} \frac{n-1}{2}, & \text{when } n \text{ is odd} \\ -\frac{n}{2}, & \text{when } n \text{ is even} \end{cases}$$ is

(A) one-one and but not on to

(B) onto but not one-one

(C) one-one and onto both

(D) neither one-one nor onto

72. If the sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to the sum of the squares of their reciprocals, then and are in

(A) arithmetic progression

(B) geometric progression

(C) arithmetic-geometric-progression

(D) harmonci progression

73. If $\left(\frac{1+i}{1-i}\right)^x = 1$, then

(A) x = 2n + 1, where n is any positive integer

(B) x = 2n, where n is any positive integer

(C) x = 4n + 1, where n is any positve integer

(D) x = 4n, where n is any positive integer

74. If a vertex of a triangle is (1, 1) and the mid-points of two sides through this vertex are (-1, 2) and (3, 2), then the centroid of the triangle is

(A) (-1, 7/3) (B) (-1/3, 7/3)

(C) (1, 7/3) (D) (1/3, 7/3)

75. Let $A = \begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$. The only correct statement about the matrix A is

(A) A is a zero matrix

(B) $A^2 = 1$

(C) A^{-1} does not exist

(D) A = (–1), where I is a unit matrix

76. If one root of the equation $x^2 + px + 12 = 0$ is 4, whiel the equation $x^2 + px + q = 0$ has equal roots, then the value of 'q' is

(A) $\frac{49}{4}$

(B) 4

(C) 3

(D) 12

77. A person standing on the bank of a river observes that the angle of elevation of the top of a tree on the opposite bank of the river is 60° and when he retires 40 meter away from the tree the angle fo the elevation becomes 30°. The breadth of the river is

(A) 60 m (B) 30 m

(C) 40 m **(D) 20 m**

78. A particle moves towards east from a point A to a point B at the rate of 4 km/h and then towards north from B to C at the rate of 5 km/h. If AB = 12 km and BC = 5 km, then its average speed for its journey from A to C and resultant average velocity direct from A to C are respectively

(A) $\frac{17}{4}$ km/h and $\frac{13}{4}$ km/h

(B) $\frac{13}{4}$ km/h and $\frac{17}{4}$ km/h

(C) $\frac{17}{9}$ km/h and $\frac{13}{9}$ km/h

(D) $\frac{13}{9}$ km/h and $\frac{17}{9}$ km/h

79. If tan = 8/15 and is acute, then cosec

(A) 8/17 (B) 8/15

(C) 17/8 (D) 17/15

80. A student is to answer 10 out of 13 question in an examination such that he must choose at least 4 from the first five questions. The number of choices available to him is

(A) 140 **(B) 196**

(C) 280 (D) 346