1. The energy stored in the magnetic field in a solenoid of length 30cm and diameter 3cm wound with 1000 turns of wire & carrying a current of 10A is

a) 0.015 joules.
b) 0.15 joules.
c) 0.5 joules.
d) 1.15 joules

2 . A network is said to be linear, if and only if

a) The response is proportional to the excitation function.
b) The principle of superposition applies.
c) The principle of homogeneity applies.
d) The principles of superposition and homogeneity apply.

3 . Kirchoff's law fails in the case of

a) Non-linear networks.
b) Linear networks.
c) Dual networks.
d) Distributed parameter networks

4. In a four branch parallel circuit, 50mA current flows in each branch. If one of the branches opens, the current in other branches

a) Increase, but not double.
b) Decrease.
c) Unaffected.
d) Double.

5. The wave length of a wave in a waveguide is

a) is greater than in free space
b) depends only on the waveguide dimensions and the free-space wavelength
c) is inversely proportional to the phase velocity
d) is directly proportional to the group velocity

6. Characteristic impedance of a quarter wave transformer connected in between a load of 100 ohm and a transmission line of characteristic impedance 225 ohms is

a) 100 ohm
b) 225 ohm
c) 600 ohm
d) 150 ohm

7. A transverse electromagnetic wave with circular polarization is received by a dipole antenna due to polarization mismatch. The power transfer efficiency from the wave to the antenna is reduced to about

a) 50%
b) 35.5%
c) 25%
d) 0%

8. The unit of displacement density of a magnetic circuit is

a) Coulomb / metre
b) Coulomb / sq. metre
c) Newton - cm
d) Amp / metre

9. The derivative of an ideal step function is

a) an impulse function
b) zero
c) sine function
d) undefined

10. An impulse function consists of

a) entire frequency range with same relative phase
b) infinite bandwidth with linear phase variation
c) pure DC
d) large DC with weak harmonics

11. The discrete time system described by $y(n) = x(n^2)$ is

a) causal, linear and time varying
b) causal, nonlinear and time varying
c) non-causal, linear and time invariant
d) non-causal, non linear and time variant

12. What does the transfer function of a system describe for the system?

a) only zero input response
b) only zero state response
c) both zero input and zero state response
d) neither zero input response nor zero state response

13. Which of the following measures cannot be effective in reducing the noise?

a) reduction in signaling rate
b) increase in transmitted power
c) increase in channel bandwidth
d) use of redundancy

14. Which among the following type of transformer have smallest size with same electrical specification ?

a) ONAN type transformer.
b) Dry type transformer.
c) ONAF type transformer.
d) OFWF type transformer.

15. Two transformers operating in parallel will share the load depending upon their ?

a) Ratings.
b) Leakage reactance.
c) Efficiency.
d) Per unit impendence.

16. Transformer core is laminated,

a) because it is difficult to fabricate solid core.
b) because laminated core provides high flux density.
c) to avoid eddy current and hysteresis losses.
d) to increase the main flux.

17. The eddy current losses in the transformer will be reduced if ?

a) The laminations are thick.
b) Number of turns in the primary winding is reduced.
c) The number of turns in the secondary winding is reduced.
d) The laminations are thin.

18. The Buchholz relay is used to protect the ?

a) Alternators against all internal faults.
b) Oil immersed transformers against all internal faults.
c) Synchronous motors against all internal faults.
d) Transmission lines against all short circuit faults.

19. Why are transformer stamping annealed before being used for the building?

a) to reduce eddy-current loss due to burning of edges
b) to reduce hysteresis loss due to burning of edges
c) to give mechanical strength to the core
d) to increase core permeability

20. As compared to Δ – Δ bank, the capacity of the V –V bank of transformers is ---- percent.

a) 57.7
b) 66.7
c) 50
d) 86.6

21. A transformer on no-load is switched on to a source of voltage. It will draw a current ---

a) which is the same as the steady-state magnetizing current
b) which is several times the steady-state magnetizing current, depending upon the initial state of the residual flux in the transformer core.
c) which is several times the steady-state magnetizing current, independent of the initial state of the residual flux in the transformer core.
d) which is twice the steady-state magnetizing current provided the core has no residual flux.

22. On the two sides of a star/delta transformer ----

a) the voltage and current are both in phase
b) the voltage and current both differ in phase by 30°
c) the voltage differ in phase by 30° but currents are in phase
d) the current differ in phase by 30° but voltages are in phase.

23. In a Scott-connected transformer the number of primary and teaser turns respectively are ----

a) N, $2/\sqrt{3}N$
b) N/2, N
c) $\sqrt{3}N/2$, N
d) N, $\sqrt{3}N/2$

24. The use of higher flux density in the transformer design ---

a) decreases the total weight / kVA
b) increases the total weight / kVA
c) decreases the weight of iron / kVA but increases that of copper
d) decreases the weight of copper / kVA but increases that of iron

25. The applied voltage of a certain transformer is increased by 50% while the frequency is reduced by 50%. The maximum core flux density will become ---

a) three times
b) 1.5 times
c) 0.5 times
d) will remain the same.

26.Power input to a transformer on no-load at rated voltage comprises predominantly of

a) Copper loss
b) Hysterisis loss
c) Core loss
d) Eddy current loss.

27. Distribution transformers have core loss

a) More than full load copper loss
b) Equal to full load copper loss
c) Less than full load copper loss
d) Negligible compared to full load copper loss

28. Non loading heat run test on transformers is performed by means of -

a) SC test.
b) OC test.
c) Half time on SC and half time on OC.
d) Sumpner's test.

29. In power lines, series capacitors are used to----

a) Improve line frequency.
b) Compensate inductive reactance.
c) Compensate capacitive reactance
d) Balance harmonics.

30. The starting torque of a slip ring induction motor can be increased by

a) Adding external resistance to rotor
b) Adding external inductance to rotor
c) Adding external capacitance to rotor
d) Adding external RLC circuit to rotor

31. The synchronous speed of a four-pole induction motor operating at 50Hz is

a) 25rps
b) 1560 rpm
c) 3000rpm
d) 1000rpm

32. A shunt generator has a critical field resistance of 200 ohm at a speed of 800r.p.m. If the speed of the generator is increased to 1000r.p.m., what is the change in critical field resistance of the generator?

a) Decrease to 160 ohm
b) Remains the same at 200 ohm
c) Increases to 250 ohm
d) Increases to 312.5 ohm

33. A three-phase slip ring induction motor is fed from the rotor side with stator winding short circuited. The frequency of currents flowing in short circuited stator is

a) Slip frequency
b) Supply frequency
c) Frequency corresponding to rotor speed
d) Zero

34. When the supply voltage to an induction motor is reduced by 10%, the maximum torque decreased by approximately

a) 5%
b) 10%
c) 20%
d) 40%

35. A 3-phase induction motor is driving full-load torque which is independent of speed. If line voltage drops to 90% of the rated value, percentage increase in motor copper losses

a) 23%
b) -18%
c) 123%
d) 25%

36. The injected e.m.f in the rotor of an induction motor is of

a) The same frequency as slip frequency
b) The same phase as the rotor e.m.f
c) A high value for satisfactory speed control
d) The same phase as rotor e.m.f and a high value for satisfactory speed control.

37. If the full-load speed of a 3-phase, 50Hz induction motor is 950 r.p.m, what is its half load speed nearly equal to?

a) 100 r.p.m
b) 450 r.p.m
c) 1900 r.p.m
d) 975 r.p.m

38. For controlling the speed of an induction motor the frequency of supply is increased by 10%. For magnetizing current to remain the same, the supply voltage must

a) Be reduced by 10%
b) Remain constant
c) Be increased by 10%
d) Be reduced or increased by 20%

39. The speed of an induction motor is controlled by varying the supply frequency keeping V/f constant, then

a) Breakdown torque and magnetizing current would both remain constant
b) Breakdown torque would remain constant but magnetizing current would increase.
c) Breakdown torque would decrease but magnetizing current would remain constant.
d) Breakdown torque and magnetizing current both would decrease.

40. A synchronous generator connected to an infinite bus is overexcited. Consider the only reactive power, from the point of view of the system, the machine acts as

a) a capacitor
b) an inductor
c) a resistor
d) none of these

41. The voltage stress will be maximum in an underground cable at

a) The surface of the sheath
b) The surface of the conductor
c) The surface o the insulation.
d) The surface of the armour.

42. The dielectric strength of air at a barometric pressure of 76cm and 25 degree centigrade is

a) 30kv/ metre.
b) 21.1kv rms / cm.
c) 21.1kv rms / mm.
d) 110kv / metre.

43. The positive sequence current of a transmission line is

a) always zero
b) one-third of negative sequence current
c) three times the negative sequence current
d) equal to negative sequence current

44. For the fault at the terminals of a synchronous generator, the fault current is maximum for a

a) 3-phase fault
b) 3-phase to ground fault
c) Line-to-ground fault
d) Line-to-line fault

45. The earth transformer is used to

a) Avoid the harmonics in the transformers
b) Provide artificial neutral earthing where neutral point is not accessible
c) Improve stability of the system
d) Measure the voltage

46. For differential protection of power transformer (delta-delta) the current transformers will have

a) Delta-delta connection
b) Star-delta connection
c) Star-star connection
d) Delta-star connection

47. For the protection of a very long extra high voltage line, the protective relay used is

a) Over current with extremely inverse characteristics
b) Percentage differential relay
c) Reactance type distance relay
d) Mho type distance relay

48. Resistance switching is normally employed in

a) All breakers
b) Bulk oil breaker
c) Minimum oil breaker
d) Air-blast circuit breaker

49. Symmetrical breaking capacity of ACB is

a) Greater than asymmetrical breaking capacity
b) Less than asymmetrical breaking capacity
c) Equal to asymmetrical breaking capacity
d) not related to asymmetrical breaking capacity

50. By which material the fuse element is generally made

a) Copper
b) Nickel
c) Iron alloy
d) Silver

51. Grounding is generally done in transmission line at

a) The supply end
b) The receiving end
c) Middle of the line
d) Anywhere

52. What is the approximate value of the surge impedance loading of a 400kV , 3-phase 50Hz overhead single circuit transmission line

a) 230 MW
b) 400 MW
c) 1000 MW
d) 1600 MW

53. When two identical first order systems have been cascaded non-interactively the unit step response of the system will be

a) Over damped
b) Under damped
c) Un-damped
d) Critically damped

54. Which of the following methods is most strong tool to determine the stability and the transient response of the system ?

a) Routh-Hurwitz criterion.
b) Bode plot.
c) Nyquist plot.
d) Root locus.

55. If the gain of a critically damped system is increased, it will become

a) Under damped system
b) Over damped system
c) Oscillatory system
d) Critically damped system

56. Phase margin of a system is used to specify

a) Relative stability
b) Absolute stability
c) Time response
d) Frequency response

57. The rms value of an alternating current is given by steady DC current which when flowing through a given circuit for a given time produces,

a) The same heat as produced by AC when flowing through the same circuit.
b) The less heat than produced by AC when flowing through the same circuit.
c) The more heat than produced by AC when flowing through the same circuit.
d) 14.4 calories.

58. AC current cannot be measured directly by

a) Hot wire ammeter
b) Moving iron ammeter
c) Moving coil ammeter
d) Thermocouple type ammeter

59. The internal resistance of a voltmeter should be very high in order to have

a) High voltage range
b) Maximum current through the meter
c) Minimum current through the meter
d) More current from the voltage source

60. The resistance of a thermistor

a) Increases with the increase of temperature
b) Decreases with the increase of temperature
c) Remains constant with the increase of temperature
d) Remains constant with the decrease of temperature

61. The early effect in a bipolar junction transistor is caused by

a) Fast turn on
b) Fast turn off
c) Large collector-base reverse bias
d) Large emitter-base reverse bias

62. Fermi level for an n-type semiconductor lies

a) Near valence band
b) Near conduction band
c) In valence band
d) In conduction band

63. For a forward biased pn-junction diode diffusion capacitance varies

a) Linearly with current
b) Square of current
c) Inversely with current
d) Does not vary with current

64. In a multi-stage R-C coupled amplifier, the coupling capacitor

a) Limits the low frequency response
b) Limits the high frequency response
c) Does not affect the frequency response
d) Block the d.c. component without affecting the frequency response

65. An operation amplifier should preferably have

a) Low out put impedance
b) High out put impedance
c) Infinite impedance
d) Impedance is insignificant

66. The output voltage of an operational amplifier is ?

a) 90 degree out of phase from the input.
b) 180 degree out of phase from the input.
c) 45 degree out of phase from the input.
d) –90 degree out of phase from the input.

67. A class-A transformer coupled, transistor power amplifier is required to deliver a power output of 10 Watts. The maximum power rating of the transistor should be less than

a) 5 W
b) 10 W
c) 20 W
d) 40 W

68. Which of the following Boolean algebra rules is correct?

a) $A.\bar{A} = 1$
b) $A+AB = A+B$
c) $A+\bar{A}B = A+B$
d) $A(A+B) = B$

69. In an all NOR gate realization of a combinational circuit all EVEN and ODD level gates behave like

a) OR and AND
b) AND and OR
c) OR and NOT
d) NOR and AND

70. Use of a reverse conducting thyristor in place of antiparallel combination of thyristor and feedback diode in an inverter:

a) Effectively minimizes the peak commutating current
b) Decreases the operating frequency of operation
c) Minimizes the effects of load inductance on the commutation performance
d) Causes deterioration in the commutation performance

71. In a resonance pulse inverter:

a) DC output voltage variation is wide
b) The frequency is low
c) The output voltage is never sinusoidal
d) DC saturation of transformer core is minimized

72. The vectors $x_1 = (1,2,4)$, $x_2 = (2,-1,3)$, $x_3 = (0,1,2)$, $x_4 = (-3,7,2)$ are

a) Linearly independent
b) Linearly dependent
c) No relation
d) Exponentially dependent

73. Characteristic roots of matrix A and A^T will be

a) Different
b) Same
c) Cannot say about roots
d) None of these

74. The minimum point of the function $(x^3/3) - x$ is at

a) $x = 1$
b) $x = -1$
c) $x = 0$
d) $x = 1/\sqrt{3}$

75. The area bounded by the curves $y^2 = 9x$, $x - y + 2 = 0$ is given by

a) 1
b) ½
c) 3/2
d) 5/4

76. The integrating factor of equation $\sec^2 y \, dy/dx + x \tan y = x^3$ is

a) $[e]^{x^2/2}$
b) $[e]^{-x^2/2}$
c) $[e]^{x/2}$
d) $[e]^{-x/2}$

77. An urn contains 5 black and 5 white balls. The probability of drawing two balls of the same colour

a) 2/9
b) 4/9
c) 1/9
d) 5/9

78. Ten percent of screws produced in a certain factory turn out to be defective. Find the probability that in a sample of 10 screws chosen at random, exactly two will be defective.

a) 0.2
b) 0.25
c) 0.8
d) 0.3

79. The equation $x^3 - x^2 + 4x - 4 = 0$ is to be solved using the Newton-Raphson method. If $x = 2$ is taken as the initial approximation of the solution, then the next approximation using the method will be

a) 2/3
b) 4/3
c) 1/3
d) 5/3

80. The unique polynomial P(x) of degree 2 such that:
$P(1) = 1$, $P(3) = 27$, $P(4) = 64$ is

a) $8x^2 - 19x + 12$
b) $8x^2 + 19x + 12$
c) $-8x^2 - 19x + 12$
d) $-8x^2 - 19x - 12$

End of questions