SG

Set - A

Duration : 2 Hours

No. of Questions : 100
Maximum Marks : 100

INSTRUCTIONS TO THE CANDIDATES

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10. Any candidate indulging in any mal-practice will be disqualified.

Hall Ticket No.

BOOKLET No. 11545

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1. The speed–torque characteristic of a series motor is a/an

   (a) Circle
   (b) Parabola
   (c) Ellipse
   (d) Hyperbola

2. In a d.c. generator, if the variable loss is equal to constant loss, then the efficiency is

   (a) Zero
   (b) Minimum
   (c) Maximum
   (d) 50%

3. The armature of a dc machine is laminated to reduce

   (a) Copper loss
   (b) Eddy current loss
   (c) Friction loss
   (d) Windage loss

4. The initial flux in dc generator is provided by

   (a) Initial voltage
   (b) Initial power
   (c) Initial current
   (d) Residual magnetism

5. For the operation of milling machine, the following motor is used

   (a) DC series motor
   (b) DC shunt motor
   (c) DC compound motor
   (d) DC short shunt compound motor

6. In a series motor, the torque is
   (a) proportional to armature current
   (b) proportional to square of the armature current
   (c) proportional to field current
   (d) constant

7. By conducting Swinburn's test on a DC machine, the following losses can be determined

   (a) Constant losses
   (b) Variable losses
   (c) Armature copper losses
   (d) Friction and windage losses

8. The series motors have a relatively

   (a) Zero starting torque
   (b) Low starting torque
   (c) High starting torque
   (d) Medium starting torque

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9. In a dc shunt motor, the torque developed is 15Nm at 10A of load current. If the load current is doubled, the new torque will be

(a) 0 Nm   (b) 15Nm   (c) 30Nm   (d) 60Nm

10. The internal characteristic of a dc shunt generator is a plot between

(a) Induced emf and armature current   (b) Terminal voltage and load current

(c) Induced emf and field current   (d) Terminal voltage and field current

11. The back emf of motor at the time of starting is

(a) zero   (b) maximum   (c) moderate   (d) infinite

12. At low flux densites, the flux in a d.c generator varies

(a) Linearly with the armature current   (b) Non-linearly with the armature current

(c) Linearly with the field current   (d) Non-linearly with the field current

13. Three resistances of R ohms each are connected in delta. Its equivalent resistances in star connection per phase is

(a) R/3 each   (b) R each   (c) 3 R each   (d) 3R, R & R/3

14. The RMS value of a triangular wave of alternating quantity having peak value 3 A is

(a) $\sqrt{3}$ Amps   (b) 3 Amps   (c) $2\sqrt{3}$ Amps   (d) 1 Amp

15. In a series RL circuit, the voltage across the resistance is 40V and voltage across inductance is 40V. Then the total voltage across the series circuit is

(a) 40 V   (b) 56.56 V   (c) 80 V   (d) 5.656 V

16. A transformer can have regulation closer to zero

(a) On lagging power factor   (b) On leading power factor

(c) On zero power factor   (d) On unity power factor

17. The full load copper loss of a transformer is 1600 watts. At half-load, the copper loss will be

(a) 400 watts   (b) 800 watts   (c) 1600 watts   (d) 6400 watts

18. A 440/110V, 1-phase Transformer has a primary resistance of 0.03Ω and secondary resistance of 0.02Ω. Its iron losses at normal input are 150 watts. The secondary current at which the maximum efficiency will occur is

(a) 63.56 A   (b) 70.28 A   (c) 82.80 A   (d) 46.39 A

19. Which of the following Transformers should never have the secondary open circuited while the primary is energized?

(a) Power transformer

(b) Potential transformer

(c) Current transformer

(d) Auto transformer

20. An Isolation Transformer has primary to secondary turn's ratio of

(a) 1:1

(b) 1:2

(c) 2:1

(d) 1:3

21. In a 50 KVA, 1-phase Transformer, the iron loss is 500W and full load copper loss is 800W. The efficiency of the Transformer at full load at 0.8 p.f lagging is (in %)

(a) 92

(b) 89.56

(c) 96.85

(d) 79.82

22. A synchronous motor can be used as a synchronous capacitor when it is

(a) Over loaded

(b) Under loaded

(c) Over excited

(d) Under excited

23. The harmonic component of the generated emf will be more in alternators with

(a) Full pitch coils

(b) Short pitch coils

(c) Long pitch coils

(d) None of the above

24. V-curves for a synchronous motor represent the relation between

(a) Armature current and field current

(b) Field current and speed

(c) Field current and power factor

(d) Power factor and speed

25. The crawling in an induction motor is caused by

(a) High loads

(b) Low supply voltages

(c) Improper design of machine

(d) Harmonics developed in the motor

26. The ratio of starting torque to normal torque in case of a star-delta starter will be

(a) 1/3

(b) $1/\sqrt{3}$

(c) 1.0

(d) $\sqrt{3}$

27. A 3-phase, 440V, 50Hz induction motor has 4% slip. The frequency of rotor emf will be

(a) 0.2Hz

(b) 2 Hz

(c) 50Hz

(d) 200Hz

28. In a tuned line

    (a) receiving end voltage and current are numerically equal to corresponding sending end values

    (b) receiving end voltage and current are greater than corresponding sending end values

    (c) receiving end voltage is greater than sending end voltage, but the corresponding currents are equal

    (d) receiving end voltage and sending end voltages are equal, but the sending end current is less than receiving end current.

29. The maximum torque in an induction motor depends on

    (a) Frequency   (b) Rotor resistance

    (c) Supply current   (d) Stator Inductance

30. Which of the following motors will have relatively high power factor?

    (a) Capacitor – run motor   (b) Shaded pole motor

    (c) Capacitor –start motor   (d) Split – phase motor

31. Which of the following motors can be used for unity power factor

    (a) Schrage motor   (b) Hysterisis motor

    (c) Shaded pole motor   (d) Capacitor run motor

32. Which of the following tarbines will be used for heads from 500m to 200m

    (a) Kaplan   (b) Fixed vane propeller

    (c) Francis   (d) Pelton wheel

33. The sudden change of pressure in penstock pipes due to sudden reduction of load is avoided using

    (a) tail race   (b) water hammer

    (c) surge tank   (d) spill way

34. Which of the following heat exchangers is used to raise the temperature of steam from normal to supersaturation level

    (a) air pre heater   (b) economizer

    (c) superheater   (d) condenser

35. Which of the following treatments for water is used to remove non carbonate hardness

(a) Lime treatment (b) Soda treatment

(c) Distillation (d) Sedimentation

36. The hoppers in electrostatic precipitator are generally _____ in shape

(a) cylindrical (b) pyramidal (c) conical (d) rectangular

37. The purpose of cooling tower is

(a) to send cool water to boiler (b) to reduce the flue gas temperature

(c) to cool the air to be sent to furnace (d) to cool the steam in the condenser

38. The following is used to reduce the speed of the neutrons in a nuclear reactor

(a) moderator (b) control rods

(c) core (d) coolant

39. Which of the following is a cladding material in nuclear reactor

(a) Heavy water (b) Organic liquids

(c) Boron (d) Magnesium

40. In which of the following reactors, reactor control is achieved by varying moderator level

(a) P W R (b) B W R

(c) Liquid metal cooled reactor (d) CANDU

41. A generating station has a connected load of 450MW and a maximum demand of 250MW. The units generated are 615×10^6 per annum. The load factor of the station is

(a) 0.586 (b) 0.615 (c) 0.281 (d) 0.725

42. The plant capacity is determined by

(a) maximum demand of a consumer

(b) plant use factor

(c) simultaneous maximum demand of all consumers

(d) load factor

43. A power plant has a maximum demand of 15MW. The load factor is 50% and the plant factor is 40%. The operating reserve is

(a) 3 MW (b) 3.75 MW (c) 6.0 MW (d) 7.5 MW

44. A transformer is rated at 66 KV / 400 V, 1000 KVA, 5% reactance. The short circuit MVA of the transformer when connected to infinite bus is

   (a) 1 MVA   (b) 10 MVA   (c) 2 MVA   (d) 20 MVA

45. The power frequency rms voltage, that appears across the breaker contacts after the transient oscillatians die out and final extinction of arc that results in all the poles is called

   (a) recovery voltage   (b) restriking voltage

   (c) cut - in voltage   (d) race voltage

46. In resistance switching, the function of shunt resistor

   (a) in a multi break C.B., it helps to distribute currents uniformly

   (b) increases transient voltages during switching out inductive or capacitive loads

   (c) reduces the rate of rise of restriking voltage

   (d) deionizes the medium between contacts

47. The number of poles per phase of breaker is a function of

   (a) current to be chopped   (b) operating voltage

   (c) power frequency   (d) recovery voltage

48. The capacitor switching is easily done with

   (a) air blast C.B   (b) oil C.B

   (c) vacuum C.B   (d) SF_6 C.B

49. A distance relay is said to be inherently directional if its characteristic on R-X diagram is

   (a) a straight line off-set from origin   (b) a circle that encloses origin

   (c) a parabola whose focus is origin   (d) a circle that passes through origin

50. The most efficient torque producing actuating structure in an induction relay is

   (a) shaded pole structure   (b) watt-hour meter structure

   (c) single induction loop structure   (d) induction cup structure

51. The line trap unit employed in carrier current relaying

   (a) offers high impedance to 50HZ power frequency signals

   (b) offers high impedance to carrier frequency signals

   (c) offers low impedance to carrier frequency signals

   (d) acts as protective device

52. The protection relay used for low fault settings and high operating speeds in a transformer is

   (a) Merz-Price protection
   (b) harmonic restraint relay
   (c) Buccholz's relay
   (d) translay relay

53. The wattmetric relay with directional characteristic is used for the protection of generator against

   (a) loss of excitation
   (b) over speed
   (c) failure of prime mover
   (d) earth fault

54. The best suited relay for 3-zone protection scheme is

   (a) impedance relay
   (b) reactance relay
   (c) mho relay
   (d) over current relay

55. The Rule 77 of Indian electricity Rules (1956) for over head lines gives information about

   (a) materials and strength
   (b) Maximum stress and factor of safety
   (c) earthing
   (d) clearance above ground of lowest conductor

56. The stringing charts are used to calculate

   (a) string efficiency
   (b) A,B,C,D parameters
   (c) Carona
   (d) tension and sag at any temperature

57. Due to proximity effect, the effective internal reactance of the conductor

   (a) decreases
   (b) increases
   (c) does not change
   (d) becomes infinity

58. The inductance of a single phase two wire transmission line per kilometer gets doubled when the

   (a) distance between the two wires is doubled
   (b) distance between the wires is increased fourfold
   (c) distance between the wires is increased as square of the original distance
   (d) radious of the wire is doubled.

59. A transmission line of 210 km length has certain values for A,B,C and D parameters. If the length of line is made 100 km then

   (a) A increases and B decreases
   (b) A and B both decrease
   (c) A and B both increase
   (d) A decreases and B increases

60. The surge impedance loading of a line is proportional to

    (a) $\sqrt{V}$ (b) V   (c) V^2 (d) V^3

61. Under no load conditions the current in a transmission line is due to

    (a) Corona effect   (b) Capacitance of the line

    (c) Spinning reserve   (d) Back flow from earth

62. For a transmission line, the no load receiving end voltage is more than the sending end voltage. This is called

    (a) Ferranti effect   (b) skin effect   (c) proximity effect   (d) carona

63. Carona loss can be reduced by the use of hollow conductor, because

    (a) the current density is reduced

    (b) the eddy current in the conductor is eliminated

    (c) for a given cross section, the radius of the conductor is increased

    (d) of better ventilation in the conductor

64. The non shielding method of over voltage protection is based on the principle of

    (a) allowing arc path between ground and conductor

    (b) insulation break down

    (c) switching capacitor banks

    (d) none of the above

65. The valve elements of non linear resistance in valve type lightning arrester are made up of

    (a) porcelain   (b) stainless steel

    (c) zeolite   (d) silicon carbide

66. Which of the following lightning arresters, can discharge currents, between 65,000 to 1,00,000 A

    (a) station type   (b) line type

    (c) distribution type   (d) rod gaps

67. Which of the following is used to reduce tower footing resistance

    (a) ground rods   (b) counter poise

    (c) horn gap   (d) surge absorber

68.	In the case of rigid bus arrangement, the size of alluminium pipe used for voltage level of 66KV is

(a) 40 mm	(b) 65 mm	(c) 80 mm	(d) 100 mm

69.	In substations, the breaker maintenance facility is provided in the

(a) double busbar scheme	(b) single busbar scheme

(c) main and transfer bus scheme	(d) all of these

70.	For low voltage applications up to 11 KV, which of the following insulators is preferred.

(a) Pin type	(b) Suspension type	(c) Strain type	(d) None of these

71.	In a 5 insulator disc, string capacitance between each unit and earth is 1/6 th of the mutual capacitance. The voltage distribution across the middle unit as % of voltage applied is

(a) 11.15	(b) 13.1	(c) 17.1	(d) 34.85

72.	An electric train taking of constant current of 600 A moves on a section of line between two substations 8 km apart maintained at 575 V and 590 V respectively. The track resistance is 0.04 Ohm per km both go and return. The point of minimum potential along the track is at a distance from 575 V substation is

(a) 6 km	(b) 3.67 km	(c) 3.97 km	(d) 3.77 km

73.	Which of the following is the most economical a-c distribution system

(a) a.c 2 phase 4 wire	(b) a.c 2 phase 3 wire

(c) a.c 3 phase 4 wire	(d) a.c 3 phase 3 wire

74.	For a distributor design, if the voltage rating is increased by 'n' times, the conductor size reduces to _____ of the original

(a) 1/n	(b) $1/n^2$	(c) $1/n^4$	(d) $1/\sqrt{n}$

75.	The pointer of an indicating instrument is generally made of

(a) Copper	(b) Aluminum	(c) Silver	(d) Soft steel

76.	Electrostatic Instruments are used as—— only

(a) Ammeters	(b) Voltmeters	(c) Wattmeters	(d) Energy meters

77. In a dynamometer wattmeter, the moving coil is the

    (a) Current coil   (b) Low p.f coil   (c) potential coil   (d) compensating coil

78. A 50 V range Voltmeter has a sensitivity of 20 kΩ/V. The total resistance of the voltmeter is

    (a) 2.5 kΩ (b) 0.4 kΩ (c) 10 kΩ (d) 1MΩ

79. An R-L-C series resonant circuit has a Q of 15 and a source voltage of 50V. The voltage across the Capacitor at resonance is ——

    (a) 750V   (b) 50V   (c) 15V   (d) 375V

80. At Parallel resonance conditions the power factor is

    (a) Zero lagging   (b) Unity   (c) 0.8 lagging   (d) 0.8 leading

81. In an A.C circuit, V and I are given by:

    V=100 sin (100t) Volts and I=100 sin (100t +Π / 3) mA. The power dissipated in the circuit is

    (a) 2.5 W   (b) 10W   (c) 2500W   (d) 10000W

82. In the measurement of 3-phase power by two wattmeter method, the two wattmeters indicate equal readings if the power factor is

    (a) Zero lagging   (b) Unity   (c) 0.5 lagging   (d) 0.8 lagging

83. In a parallel RLC circuit, below resonance frequency, the circuit behaves as

    (a) Inductive   (b) Resistive   (c) Capacitive   (d) Suceptive

84. In a balanced 3-phase star connected system, the phase difference between line & phase voltages is

    (a) 30^0 (b) 90^0 (c) 120^0 (d) 60^0

85. The electric Heater draws 10 A from a 230 V line. The resistance of the heater is

    (a) 230 Ω (b) 2300 Ω (c) 23 Ω (d) 2.3 Ω

86. A wire has a resistance of 12 ohms. It is bent in the form of an equilateral triangle. The effective resistance between any two corners of the triangle is

    (a) 8/3 Ω (b) 12/3 Ω (c) 2 Ω (d) 10/3 Ω

87. ACSR stands for

(a) Aluminium Copper Steel Reinforced

(b) Aluminium Copper Stranded Reinforced

(c) Aluminium Conductor Steel Reinforced

(d) Aluminium Conductor Stranded Reinforced

88. In house wiring, the total connected load per sub-circuit can be

(a) 400 W   (b) 800 W   (c) 1500 W   (d) 2000 W

89. Which of the following motors is used for intermittent high torque load and for rolling mills?

(a) DC series motor

(b) DC shunt motor

(c) DC cumulative compound wound motor

(d) DC differential compound wound motor

90. In plugging of dc motors

(a) Connections to armature are reversed

(b) Connections to field are reversed

(c) Connections to both armature and field are reversed

(d) Connections to supply are reversed

91. The motor enclosure used in wood-working industry is

(a) Protected type   (b) totally enclosed fan cooled type

(c) Flame-proof type   (d) splash proof type

92. The least expensive drive is

(a) belt drive   (b) rope drive

(c) chain drive   (d) gear drive

93. The unit of luminous flux is

(a) webers   (b) lux   (c) lumens   (d) Candela

94. The illumination at a surface due to a source of light placed at a distance 'd' from the surface varies as

(a) $1/d^2$ (b) $1/d$ (c) d   (d) d^2

95. Reduction factor is the ratio of

(a) M.S.C.P / M.H.S.C.P

(b) M.H.C.P / M.S.C.P

(c) M.S.C.P x M.H.S.C.P

(d) 1 / M.H.S.C.P

96. Power factor is the highest in case of

(a) sodium vapour lamp

(b) mercury vapour lamp

(c) incandescent lamp

(d) neon lamp

97. In carbon arc welding

(a) Electrode is positive with respect to work in case of dc supply

(b) Electrode is negative with respect to work in case of dc supply

(c) Electrode is connected to neutral in case of ac supply

(d) Electrodes are not required

98. Rolling electrodes are specifically used for

(a) Projection welding

(b) seam welding

(c) spot welding

(d) flash butt welding

99. In a resistance furnace, the atmosphere is

(a) Oxidizing

(b) deoxidizing

(c) reducing

(d) neutral

100. In core type furnace the secondary winding has

(a) No turns

(b) More number of turns

(c) Less number of turns

(d) Equal to primary turns

Rough Work

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