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2018

TEST BOOKLET SERIES

B

TEST BOOKLET

ELECTRICAL ENGINEERING

Time allowed : 2 hours

Full marks : 200

Answer ***all*** the questions.

Questions are of equal value.

Serial No. ..... 015042 ***Roll No.***

Signature of the Candidate:

INSTRUCTIONS

Candidates should read the following instructions carefully before answering the questions:

1. This booklet consists of 16 pages including this front page, containing 100 questions. Verify the Page Nos. and Test Booklet Series on each page and bring at once to the Invigilator's notice any discrepancy.

2. Answers will have to be given in the Special Answer-Sheet supplied for the purpose.

3. Before you proceed to mark in the Answer-Sheet in response to various items in the Test Booklet, you have to fill in some particulars in the Answer-Sheet as per instructions sent to you in the Admit Card. ***Do not fold the Answer-Sheet as this will result in error in your marks.***

4. All questions are of multiple-choice answer-type. You will find ***four*** probable answers **(A), (B), (C)** and **(D)** against each question. Find out which of the four answers appears to you to be correct or the best. Now darken the circle corresponding to the letter of the selected answer in the Answer-Sheet with **Black Ball Point Pen** as per instructions printed on the reverse of the Admit Card and in the Answer-Sheet.

5. One and only one circle is to be fully blackened for answer. Any spot in any other circle (multiple circle) or in wrong circle will be considered as wrong answer. If more than one circle is encoded for a particular answer, it will be treated as a wrong answer.

6. ***There will be negative marking for wrong answers. 2/3 mark will be deducted for each wrong answer.***

7. ***There are blank pages at the end of this booklet for Rough Work.***

8. ***The Special Answer-Sheet should be handed over to the Invigilator before leaving the Examination Hall. You are permitted to take away the used Test Booklet after completion of the examination.***

Please Turn Over

1. One of the control springs of a permanent magnet moving coil ammeter is broken. If connected in a circuit, the meter would read

(A) zero
(B) half the correct value of the current
(C) twice the correct value of the current
(D) an indefinite figure

2. In squirrel-cage induction motors, the rotor slots are usually given slight skew in order to

(A) reduce windage losses.
(B) reduce eddy currents.
(C) to eliminate magnetic locking between stator and rotor and to reduce magnetic helm.
(D) to reduce accumulation of dirt and dust.

3. In case the air gap in an induction motor is increased,

(A) the magnetising current of the rotor will decrease.
(B) the power factor will decrease.
(C) the speed of motor will increase.
(D) the windage losses will increase.

4. "The mass of an ion liberated at an electrode is directly proportional to the quantity of electricity"—the above statement is associated with

(A) Newton's law
(B) Faraday's law of electromagnetic
(C) Faraday's law of electrolysis
(D) Gauss's law

5. In a lead-acid battery the energy is stored in the form of

(A) charged ions
(B) chemical energy
(C) electrostatic energy
(D) electromagnetic energy

6. When the pointer of an indicating instrument is in the final deflection position, at that time

(A) deflection torque is zero.
(B) controlling torque is zero.
(C) damping torque is zero.
(D) both deflecting and controlling torque are zero.

7. Two holes in the disc of energy meter are drilled at opposite sides of the spindle to

(A) improve its ventilation
(B) eleminate creeping at no load
(C) increase its deflecting torque
(D) increase its braking torque

8. The electrical power to a megger is provided by

(A) battery
(B) permanent magnet DC generator
(C) AC generator
(D) None of the above

9. The disc of an instrument using eddy current damping should be of

(A) conducting and magnetic material
(B) non-conducting and magnetic material
(C) conducting and non-magnetic material
(D) non-conducting and non-magnetic meterial

10. In a 3-phase power measurement by two wattmeter method, both the wattmeters had identical readings. The power factor of the load was

(A) Unity
(B) 0·8 lagging
(C) 0·8 leading
(D) Zero

11. For very sensitive and wide speed control, the preferable control method is

(A) armature control

(B) Ward–Leonard control

(C) multiple voltage control

(D) field control

12. If the load current of transformer decreases, then the power factor

(A) will also decrease

(B) will also increase

(C) will remain unchanged

(D) None of the above

13. The most suitable location for the power factor improvement device is

(A) near the electrical appliance which is responsible for the poor power factor.

(B) at the receiving end in case of transmission lines.

(C) at the sending end of the transmission lines.

(D) Both (A) and (B)

14. Which tariff is most ideal for the consumer?

(A) Two part tariff

(B) Three part tariff

(C) Both (A) and (B)

(D) None of the above

15. A 125 km long transmission line is loaded at 110kV. If the loss of the line in 20 MW and the load is 175 MVA the resistance of the line is

(A) 7·9 Ω/phase

(B) 4·56 Ω/phase

(C) 13·68 Ω/phase

(D) 45·6 Ω/phase

16. Of the voltage and current in an AC circuit are given by $v = 200 \sin(\omega t + 30)$ and $i = 10 \sin(\omega t - 60)$ then the pf of the circuit is

(A) $\frac{\sqrt{3}}{2}$

(B) $\frac{1}{2}$

(C) 0

(D) $\frac{1}{\sqrt{2}}$

17. In the circuit shown in the figure-3, the current through resistance R_L is

(A) $\frac{2}{3}$A

(B) $\frac{3}{2}$A

(C) $\frac{4}{3}$A

(D) $\frac{1}{3}$A

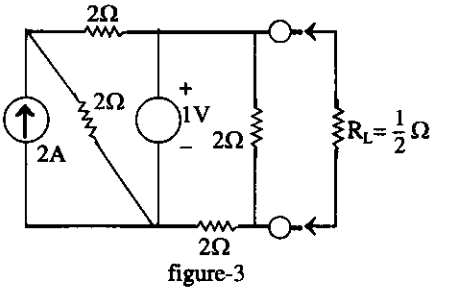


figure-3

18. Which type of insulators is used on 132kV transmission lines?

(A) Pin type

(B) Disc type

(C) Shackle type

(D) Pin and Shackle type

19. Which of the following distribution system is more reliable?

(A) Radial system

(B) Tree system

(C) Ring main system

(D) All are equally reliable

20. If two 300 V full-scale voltmeters V_1 and V_2 having sensitivity of 100kΩ/V and 150kΩ/V are connected to measure 500 V, as shown in fig-2, then

(A) V_1 and V_2 will read 250 V each.

(B) V_1 will read 200V and V_2 will read 300V.

(C) V_1 will read 300Vand V_2 will read 200 V.

(D) V_1 and V_2 will read 0 each.

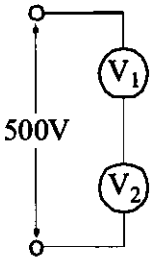


fig-2

21. A high frequency as signal is applied to a PMMC instrument. If the rms value of the ac signal is 2V, then the reading of the instrument will be

(A) zero

(B) 2V

(C) $\sqrt{2}$V

(D) $4\sqrt{2}$V

22. In the circuit shown in the figure-1, if the ammeter indicates 1A, and the voltmeter having an internal resistance of 1kΩ indicated 100V, then the value of R would be

(A) 111·11 Ω

(B) 105·2 Ω

(C) 100 Ω

(D) 90·9 Ω

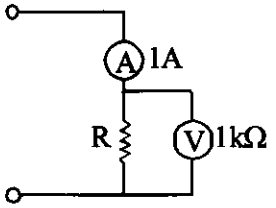


figure-1

23. When does the arc interruption in oil circuit breaker take place?

(A) Contact apart

(B) Voltage becomes zero

(C) Current goes through zero

(D) Current is at its peak

24. The ratio of making to breaking capacity for an extra high voltage circuit breaker is

(A) more than 1

(B) equal to 1

(C) less than 1

(D) None of the above

25. What is the major cause of the failure of the circuit beaker?

(A) Trip circuit open

(B) Trip latch defective

(C) Spring defective

(D) All of the above

26. To determine the polarity of the voltage drop across a resistor, it is necessary to know

(A) the value of current through the resistor.

(B) the direction of current through the resistor.

(C) the value of resistor.

(D) the e.m.f in the circuit.

27. Which type of earthing is used by transmission lines?

(A) Plate earthing

(B) Rod earthing

(C) Strip earthing

(D) All of the above

28. If P is the power of a star connected system, then what will be the power of an equivalent delta connected system?

(A) P

(B) 2P

(C) P/3

(D) 3P

29. Input resistance of a common emitter transistor of the order of

(A) 1 MΩ
(B) 1 kΩ
(C) 0·01Ω
(D) 0·0001Ω

30. The electrostatic stress in underground cable is

(A) same at the conductor and the sheath.
(B) minimum at the conductor and maximum at the sheath.
(C) maximum at the conductor surface and minimum at the sheath.
(D) zero at the conductor as well as sheath.

31. Field effect transistor has

(A) large input impedance
(B) large output impedance
(C) large power gain
(D) small voltage gain

32. A parallel plate capacitor has capacitance of 10 μF. If the linear dimensions of the plates are doubled and the separation between them is also doubled, has the value of the capacitance would be

(A) 10 μF
(B) 20 μF
(C) 5 μF
(D) 40 μF

33. At NTP the breakdown strength of air is

(A) 30 kV–rms/cm
(B) 30 kV–peak/cm
(C) 40 kV–peak/cm
(D) 60 kV–peak/cm

34. Why is single core cables should have armour made of?

(A) Non-magnetic and non-conducting material
(B) Non-magnetic material
(C) Non-magnetic but conducting material
(D) Magnetic and conducting material

35. Which of the following theorems applicable for both linear and non-linear circuits?

(A) Superposition theorem
(B) Thevenin's theorem
(C) Norton's theorem
(D) None of the above

36. In a series RLC circuit that is operating above the resonant frequency, the current

(A) lags the applied voltage.
(B) leads the applied voltage.
(C) in phase with the applied voltage.
(D) is zero.

37. The maximum safe temperature of paper insulated cables is about

(A) 60°C
(B) 95°C
(C) 135°C
(D) 165°C

38. The isolators are used in the transmission lines are capable of breaking

(A) fault current
(B) no current
(C) charging current
(D) load current

39. What will happen if the current coil and potential coil of dynamometer type wattmeter is interchanged?

(A) Potential coil will get damaged.
(B) Current coil will get damaged.
(C) Both current coil and potential coil will get damaged.
(D) Meter will read as it is.

40. Which among these fuse is very fast in operation?

(A) Semiconductor fuse
(B) High rupturing capacity type fuse
(C) Cartridge type fuse
(D) Kitkat type fuse

41. In a permanent magnet moving coil instrument, the deflecting torque is

(A) directly proportional to both number of turns and flux density.
(B) directly proportional to the number of turns and inversely proportional to the flux density.
(C) inversely proportional to the number of turns and directly proportional to the flux density.
(D) inversely proportional to both number of turns and flux density.

42. In a series RL circuit, voltage across resistor and inductor are 3 V and 4 V respectively, then what is the applied voltage?

(A) 7 V
(B) 5 V
(C) 4 V
(D) 3 V

43. A spring controlled moving iron voltmeter with full scale deflection of 150 V draws a current of 2 mA. What will be the meter reading if it draws a current of 1 mA?

(A) 25·5 V
(B) 27·5 V
(C) 35·5 V
(D) 37·5 V

44. Two capacitance $C_1 = 150 \pm 2{\cdot}4\ \mu F$ and $C_2 = 120 \pm 1{\cdot}5\ \mu F$. What is the limiting error of the resultant capacitance C?

(A) 0·9 μF
(B) 1·9 μF
(C) 3·9 μF
(D) 4·8 μF

45. For symmetrical waveform average value of one full cycle is

(A) 1
(B) 1·11
(C) 2·22
(D) 0

46. Which of the following essential features is possessed by an indicating instrument?

(A) Deflecting device
(B) Controlling device
(C) Damping device
(D) All of the above

47. What quantity of charge must be delivered by a battery with a potential difference of 110 V to do 660 J of work?

(A) 0·6 C
(B) 6 C
(C) 60 C
(D) 600 C

48. A 0–25 Amp ammeter has guaranteed accuracy of 1% of full scale reading, the current measured by this ammeter is 10 Amp. The limiting error in percentage for this instrument is

(A) 2·5%
(B) 0·25%
(C) 0·025%
(D) 0·0025%

49. A thyrite type lightning arrestor
(A) blocks the surge voltage appearing in a line
(B) absorbs the surge voltage appearing in a line
(C) offers a low resistance path to the surge appearing in the line
(D) returns the surge back to the source

50. Where the voltages are high and current to be interrupted is low, the breaker preferred is
(A) air blast circuit breaker
(B) oil circuit breaker
(C) vacuum circuit breaker
(D) None of the above

51. A 5 kVA transformer has a turn ratio of $N_1/N_2 = 10$. The impedance of the primary winding is $3 + j\,5$ ohms while that of secondary winding is $0{\cdot}5 + j\,0{\cdot}8$ ohms. The impedance of the transformer when referred to the primary will be
(A) $3{\cdot}5 + j\,5{\cdot}8$ ohms
(B) $8{\cdot}0 + j\,13{\cdot}0$ ohms
(C) $53{\cdot}0 + j\,85$ ohms
(D) $3{\cdot}05 + j\,5{\cdot}08$ ohms

52. Directional induction type over current relay is used for protection of
(A) Long transmission line
(B) Large power transformer
(C) Ring main distribution line
(D) Radial distribution line

53. The deflecting torque of a moving iron instrument is
(A) $I^2\frac{dL}{d\theta}$
(B) $\frac{1}{2}I^2\frac{dL}{d\theta}$
(C) $I\frac{dL}{d\theta}$
(D) $\frac{1}{2}I\frac{dL}{d\theta}$

54. In a PMMC instrument, the torque weight ratio is
(A) high
(B) low
(C) zero
(D) infinity

55. The advantage of neutral earthing is
(A) safety of personnel
(B) reduction of earth fault current
(C) elimination of arcing ground
(D) None of the above

56. Two charges of equal magnitude are separated by some distance. If the charges are increased by 10%, to get the same force between them, their separation must be
(A) increased by 21%
(B) increased by 10%
(C) decreased by 10%
(D) None of the above

57. A DC motor is running with a certain load. The effect of adding an external resistance in the shunt field circuit is
(A) to increase the motor speed.
(B) to reduce the motor speed.
(C) to reduce the armature current motor.
(D) to stop the motor.

58. While performing short-circuit test on transformer the impressed voltage magnitude is kept constant but the frequency is increased. The short-circuit current will
(A) increase
(B) decrease
(C) remains same
(D) None of the above

59. A choke coil of inductance L and series resistance R is shunted by a capacitor C. The dynamic impedance of the resonant circuit would be

(A) $\frac{R}{LC}$

(B) $\frac{C}{LR}$

(C) $\frac{L}{RC}$

(D) $\frac{1}{RLC}$

60. Two Capacitors each having capacitance C and breakdown voltage V are joined in series. The capacitance and breakdown voltage of the combination will be

(A) 2C and 2V

(B) $\frac{C}{2}$ and $\frac{V}{2}$

(C) 2C and $\frac{V}{2}$

(D) $\frac{C}{2}$ and 2V

61. The sag of conductors of a transmission line is 2·5m when the span is 250m. If the height of supporting towers is increased by 25%, the sag will be

(A) reduced by 25%

(B) increased by 25%

(C) reduced by 12·5%

(D) remain unchanged

62. Transposition of transmission line is done to

(A) reduce line loss

(B) balance line voltage drop

(C) reduce skin effect

(D) reduce corona

63. As the transmission voltage increases, the percentage resistance drop

(A) increases

(B) decreases

(C) remains same

(D) None of the above

64. The voltage across a 500Ω input circuit of an amplifier is 6V and the output is 30V across a 500Ω load. What is the dB gain of the amplifier?

(A) 13·98 dB

(B) 17·98 dB

(C) 15·98 dB

(D) 11·98 dB

65. The type of single-phase induction motor having highest power factor at full load is

(A) split-phase type

(B) shaded-pole type

(C) capacitor-start type

(D) capacitor-run type

66. A 10 mA ammeter has a resistance of 50Ω. It has to be converted to 1A ammeter. The value of shunt resistance is

(A) 5Ω

(B) 0·05Ω

(C) 0·5Ω

(D) 50Ω

67. A (0 – 5)A PMMC ammeter does not have any controlling mechanism. Now if a current of 2A(DC) is passed through the coil, the reading shown by the Meter would be (frictional opposition is overcome by torque produced)

(A) 2A

(B) 5A

(C) pointer rotates continuously

(D) pointer does not rotate

68. Absorption of solar radiations on earth's surface occurs due to presence of

(A) Ozone

(B) Water vapours

(C) Carbon dioxide

(D) All of the above

69. The output of solar cell is of the order of

(A) 1 W

(B) 5 W

(C) 10 W

(D) 20 W

70. An instrument used for measuring total solar radiation is called

(A) hygrometer

(B) pyranometer

(C) anemometer

(D) pyrheliometer

71. If the capacitance between two conductors of a 3 phase line is 6 μF, the capacitance of each conductor to neutral will be

(A) 3 μF

(B) 12 μF

(C) 6 μF

(D) 1·5 μF

72. For which of reason mentioned below does the electric supply company want to improve the power factor?

(A) To reduce the effective current

(B) To reduce the reactive current

(C) To reduce the apparent current

(D) To reduce the voltage drop at the generating station

73. Sensitivity of a voltmeter is expressed as

(A) volt/ohms

(B) ohms/volt

(C) ohms volt

(D) 1/ohms volt

74. Which of the following meters has the best accuracy?

(A) Moving-iron meter

(B) Moving-coil meter

(C) Rectifier-type meter

(D) Thermocouple meter

75. An ideal filter is one which

(A) zero attenuates in the pass band.

(B) infinite attenuation in the pass band.

(C) zero attenuation in the attenuation band.

(D) None of the above

76. Circuit breakers usually operate under

(A) steady short circuit current.

(B) sub-transient state of short circuit current.

(C) transient state of short circuit current.

(D) Both (A) and (B)

77. A three phase circuit breaker is rated 2000 MVA 33kV. What will be the making current?

(A) 35kA

(B) 49kA

(C) 70kA

(D) 89kA

78. Which of the following instruments is used for the comparison of candle powers of different sources?

(A) Radio meter

(B) Bunsen meter

(C) Photo meter

(D) Candle meter

79. For precision work, the illumination level required is of the order of

(A) 500–1000 lumen/m^2

(B) 200–400 lumen/m^2

(C) 50–100 lumen/m^2

(D) 10–25 lumen/m^2

80. Output of tungsten filament lamp depends on

(A) size of lamp

(B) size of shell

(C) temperature of filament

(D) All of the above

81. Luminous efficiency of a fluorescent lamp is

(A) 70 lumen/watt

(B) 60 lumen/watt

(C) 40 lumen/watt

(D) 30 lumen/watt

82. Wavelength for red colour is

(A) 4000 Å

(B) 5000 Å

(C) 6000 Å

(D) 7000 Å

83. 200 candle power lamp is hung 4m above the centre of circular area of 5m diameter. The Illumination at centre of the area is

(A) 13·5 lux

(B) 12·5 lux

(C) 17·5 lux

(D) 18·5 lux

84. From a uniform light source of 300 C.P. there exists a plane surface 15m below the value of illumination on the plane surface when the luminous flux rays are inclined at an angle of 30° to the surface is

(A) 2·87 lumens

(B) 1·53 lumens

(C) 5 lumens

(D) 4·06 lumens

85. Which of the following is a non-renewable source of energy?

(A) Wood

(B) Sun

(C) Fossil fuels

(D) Wind

86. Fuel cells are

(A) Carbon cell

(B) Hydrogen battery

(C) Nuclear cell

(D) Chromium cell

87. The function of steel wire in an ACSR conductor is to

(A) compensate skin effect.

(B) take care of surges.

(C) provide additional mechanical strength.

(D) reduce inductance.

88. If the terminals of armature of DC motor are interchanged, this action will offer following kind of braking:

(A) Regenerative braking

(B) Plugging braking

(C) Dynamic braking

(D) None of the above

89. Starters are used with DC motors because
(A) these motors have high starting torque.
(B) these motors are not self-starting.
(C) back emf of these motors is initially opposing.
(D) to restrict armature current as there is no back emf while starting.

90. Auto-transformer makes effective saving on copper and copper losses, when its transformation ratio is
(A) approximately equal to one
(B) less than one
(C) greater than one
(D) None of the above

91. Two transformers operating in parallel will share the load depending upon their
(A) leakage impedance
(B) per unit impedance
(C) efficiencies
(D) ratings

92. No load current of a transformer has
(A) high magnitude and low power factor.
(B) high magnitude and high power factor.
(C) small magnitude and high power factor.
(D) small magnitude and low power factor.

93. A common method of cooling a power transformer is:
(A) natural air cooling
(B) air blast cooling
(C) oil cooling
(D) None of the above

94. In case of a transformer,
(A) volts/turn of high and low voltage windings are different.
(B) volts/turn of high voltage winding is greater than low voltage winding.
(C) volts/turn of low voltage winding is greater than high voltage winding.
(D) volts/turn of both low and high voltage windings are equal.

95. In the transformer following winding has got more cross-sectional area:
(A) Low voltage winding
(B) High voltage winding
(C) Primary winding
(D) Secondary winding

96. The efficiency of the transformer will be maximum when
(A) iron losses is equal to the twice of the copper losses.
(B) copper losses is equal to the twice of the iron losses.
(C) iron losses is equal to the copper losses.
(D) iron losses is equal to the half of the copper losses.

97. Transformer cores are laminated with
(A) low carbon steel
(B) silicon sheet steel
(C) nickel alloy steel
(D) chromium sheet steel

98. The critical temperature above which the ferromagnetic materials lose their magnetic property is known as
(A) Curie point
(B) Transition temperature
(C) Standard temperature
(D) None of the above

99. In n-type semiconductor added impurity is

(A) pentavalent

(B) divalent

(C) tetravalent

(D) trivalent

100. The reistance of a conductor of diameter 'd' and length '*l*' is RΩ. If the diameter of the conductor is halved and its length is doubled, the resistance will be

(A) RΩ

(B) 2RΩ

(C) 4R

(D) 8R