WBMSC
SAE

Previous Year Paper
(Electrical)
25 June, 2023

1. The 7912 regulator IC provides:
   (A) 12V
   (B) – 12V
   (C) 5V
   (D) – 5V

2. B-H curve can be used for determination of
   (A) hysteresis loss
   (B) Both iron loss and eddy current loss
   (C) iron loss
   (D) eddy current loss

3. A 4-Pole, 50 Hz single-phase induction motor has a slip of 5%. The speed of the motor will be
   (A) 1500 RPM
   (B) None of these
   (C) 1425 RPM
   (D) 1200 RPM

4. The static error band of an instrument does not include
   (A) hysteresis in the instrument
   (B) None of these
   (C) non-linearity
   (D) electric drift

5. Motor-generator set for DC arc welding has generator of
   (A) series type
   (B) level compound type
   (C) shunt type
   (D) differentially compound type

6. A voltage source having an open-circuit voltage of 100 V and internal resistance of 50 Ω is equivalent to a current source
   (A) 2A in parallel with 50 Ω
   (B) 2A in parallel with 100 Ω
   (C) 2A with 50 Ω in series
   (D) 0·5A in parallel with 50 Ω

7. The forbidden energy gap for germanium is
   (A) 0.3 *eV*
   (B) 1.12 *eV*
   (C) 3.5 *eV*
   (D) 0.7 *eV*

8. W_1 and W_2 are the readings of two wattmeters used to measure power of a balanced three-phase load. The reactive power drawn by the load is:
   (A) $W_1 + W_2$
   (B) $\sqrt{3}(W_1 + W_2)$
   (C) $W_1 - W_2$
   (D) $\sqrt{3}(W_1 - W_2)$

9. Light energy is a form of
   (A) Heat energy
   (B) None of these
   (C) Electrical energy
   (D) Electromagnetic radiation

10. A NAND circuit with positive logic will operate as
   (A) NOR with negative logic.
   (B) AND with negative logic output.
   (C) AND with negative logic.
   (D) OR with negative logic input.

11. For 600V-DC line for tram cars
   (A) track is connected to negative of the supply.
   (B) None of these
   (C) track is connected to positive of the supply.
   (D) track is connected to mid voltage of 300V.

12. The impedance of a circuit is given by $Z = 3 + 4j$ ohms. The value of its conductance is:
   (A) 1/3
   (B) 4/25
   (C) 1/5
   (D) 3/25

13. If percentage reactance of the system up to the fault point is 20% and base KVA is 10,000, then short-circuit KVA is

(A) 10,000 KVA
(B) 30,000 KVA
(C) 50,000 KVA
(D) 5,000 KVA

14. Two coils having inductances of 4H and 16H are placed nearby. If the coefficient of coupling between them is 0·5, then the mutual inductance (M) will be:

(A) 32H
(B) 4H
(C) 2·236H
(D) 20H

15. Which of the following is reduced by using stock bridge dampers on overhead power transmission lines?

(A) Conductor sag
(B) Conductor vibrations
(C) Line losses
(D) Mechanical tension

16. Light is produced in electric discharge lamps by

(A) magnetic effect of current.
(B) None of these
(C) heating effect of current.
(D) ionization in a gas or vapour.

17. An industrial consumer has a daily load pattern of 2000kW, 0.8 P.F. for first 12 hrs and 1000kW, U.P.F. for rest 12 hrs. The Load Factor is:

(A) 0.5
(B) 1.0
(C) 0.6
(D) 0.75

18. An electric circuit with 10 branches and 7 nodes will have _____ loop equations.

(A) 4
(B) 3
(C) 16
(D) 17

19. For a given power delivered, if the working voltage of a distributor line is increased to x times, the cross-sectional area A of the distributor line would be reduced to

(A) A/x
(B) $A/2x^2$
(C) A/x^2
(D) $A/2x$

20. The insulation resistance of a transformer winding can be easily measured with

(A) Wheatstone bridge
(B) Voltmeter
(C) Megger
(D) Kelvin bridge

21. The race around condition exists in J-K flip-flop if:

(A) J = 0; K = 1
(B) J = 1; K = 1
(C) J = 1; K = 0
(D) J = 0; K = 0

22. Swamping resistance is used to compensate error due to

(A) stray magnetic field
(B) None of these
(C) temperature variations
(D) large supply variations

23. If a three-phase induction motor runs at its synchronous speed, the induced voltage will be:

(A) maximum
(B) double the rated value
(C) zero
(D) rated value

24. If the frequency of a transmission system is changed from 50Hz to 100Hz, the string efficiency will:

(A) be same
(B) may be greater or lesser
(C) be greater
(D) be lesser

25. The diameter of wire is reduced to one half, keeping the length constant. The new resistance will be

(A) half of the original.
(B) one-fourth of the original.
(C) 4 times of the original.
(D) doubl of the original.

26. The burden of current transformer (CT) is expressed in

(A) volt-ampere rating
(B) watt rating
(C) current rating of secondary winding
(D) current and voltage of secondary

27. A unit ramp function when integrated yields

(A) unit parabolic function
(B) unit ramp function
(C) unit step function
(D) unit impulse function

28. _____ of ABCD parameters has the unit 'Siemens'.

(A) A
(B) D
(C) B
(D) C

29. A DC series motor must not be started on no load because it would

(A) not develop starting torque.
(B) draw more current without producing sufficient torque.
(C) fail to start without load.
(D) run at dangerously high speed.

30. The value of shunt resistance required to convert an ammeter of 1mA with 100Ω internal resistance into 0–100mA ammeter is:

(A) 2·20Ω
(B) 1·20Ω
(C) 1·01Ω
(D) 1·10Ω

31. Three resistances each of value 3 Ω are connected in delta. Their value in each branch of equivalent star connection will be

(A) 9 Ω
(B) 1 Ω
(C) 6 Ω
(D) 3 Ω

32. Inside a hollow spherical conductor

(A) electric field is zero.
(B) electric field changes with distance from the centre of the sphere.
(C) electric field is constant.
(D) electric field changes with the magnitude of the changes given to the conductor.

33. If a synchronous motor is switched on to 3-phase supply with its rotor winding short circuited, it will

(A) start
(B) start and continue to run as synchronous motor
(C) not start
(D) start and continue to run as induction motor

34. Q factor of an inductive coil is given by

(A) R/Z
(B) $(2\pi f R)/L$
(C) Z/R
(D) $(2\pi f L)/R$

35. An energy meter having a meter constant of 1200 revolutions per kWh is found to make 5 revolutions in 75 sec. The load power is:

(A) 500 W
(B) 1000 W
(C) 100 W
(D) 200 W

36. Which of the following types of instrument is an integrating instrument?

(A) Power factor meter
(B) Frequency meter
(C) Energy meter
(D) Wattmeter

37. The sag of a transmission line conductor in summer is:
(A) less than that in winter
(B) zero
(C) greater than that in winter
(D) same for both

38. The rate of rise of restriking voltage depends upon
(A) the type of circuit breaker.
(B) the inductance and capacitance of the system.
(C) the inductance of the system only.
(D) the capacitance of the system only.

39. For normal SCRs, turn-on time is
(A) less than turn-off time.
(B) None of these
(C) more than turn-off time.
(D) equal to turn-off time.

40. In Kando System of railway track electrification
(A) single phase AC is converted into DC.
(B) three phase AC is converted into single phase AC.
(C) single phase AC is converted into three phase AC.
(D) three phase AC is converted into DC.

41. In eddy current damping system, the disc employed should be of
(A) conducting and magnetic material.
(B) non-conducting and non-magnetic material.
(C) conducting but non-magnetic material.
(D) magnetic but non-conducting material.

42. An 8-pole, 50Hz single-phase induction motor is running at 690 rpm. Its slip (p.u.) with respect to the backward field is:
(A) 1·92
(B) 1
(C) 0·08
(D) 1·08

43. A circuit with resistor, inductor, capacitor in series is resonant at f_0 Hz. If all the values of the elements are now doubled, the new resonant frequency is
(A) $f_0/2$
(B) f_0
(C) $f_0/4$
(D) $2 f_0$

44. When a sodium vapour lamp is switched on, initially the colour of the light is:
(A) pink
(B) yellow
(C) green
(D) blue

45. If d is the distance of a surface from a source, the illumination of the surface will vary as
(A) d
(B) $1/d^2$
(C) d^2
(D) 1/d

46. The time period of an alternating quantity is 0·02 second. Its frequency will be
(A) 25 Hz
(B) 0·02 Hz
(C) 50 Hz
(D) 100 Hz

47. In a double revolving field theory of single-phase induction motor, the slip in the forward direction is S. Then slip in the backward direction is

(A) $2S$
(B) $S-2$
(C) S
(D) $2-S$

48. In parallel resonance condition, there is

(A) voltage magnification
(B) None of these
(C) current magnification
(D) Both voltage magnification and current magnification

49. The main advantage of CMOS over TTL devices is its

(A) much reduced power dissipation
(B) high operating speed
(C) extremely low cost
(D) very small physical size

50. A resistance of 10 k-ohms with a tolerance of 5% is connected with a 5 k-ohms resistor of 10% tolerance. What is the tolerance limit for the parallel network?

(A) 5%
(B) 8.33%
(C) 10%
(D) 6.67%

51. If the fault occurs near an impedance relay, the V/I ratio will be

(A) constant for all distance.
(B) None of these
(C) higher than the value if the fault occurs away from the relay.
(D) lower than the value if the fault occurs away from the relay.

52. A 4-pole DC machine has lap winding. The winding is removed and then a wave winding is put. The induced emf will

(A) increase
(B) None of these
(C) decrease
(D) remain the same

53. The current through a branch in a linear network is 2A when the input source voltage is 10V. If now, the voltage is reduced to 1V and the polarity is reversed, the current through the branch is:

(A) 2A
(B) – 2A
(C) 0.2A
(D) – 0.2A

54. _____ rectifier has the lowest forward resistance.

(A) Vacuum tube
(B) None of these
(C) Solid state
(D) Gas tube

55. A diesel power station spends 0·25 kg/kWh of fuel. If the calorific value is 10,000 kcal/kg, then the overall efficiency of the station is:

(A) 40%
(B) 22·6%
(C) 72·3%
(D) 34·4%

56. A practical current source is usually represented by

(A) a resistance in series with an ideal current source.
(B) a resistance in parallel with an ideal voltage source.
(C) a resistance in parallel with an ideal current source.
(D) a resistance in series with an ideal voltage source.

57. A three-phase synchronous motor driving a constant load torque draws power from the infinite bus at a leading power factor. If the excitation increases,

(A) the power angle decreases while power factor increases.

(B) both the power angle and power factor decrease.

(C) the power angle increases while power factor decreases.

(D) both the power angle and power factor increase.

58. Choose the correct statement:

(A) 1 VA relay is less sensitive than 5 VA relay.

(B) Sensitivity does not depend on the relay rating.

(C) 1 VA relay is more sensitive than 5 VA relay.

(D) 1 VA relay and 5 VA relay both are equally sensitive.

59. A DC generator delivers 210 volts on no load and 200 volts on full load. The voltage regulation of the DC generator is

(A) 95%

(B) 4·5%

(C) 5%

(D) 10%

60. The rotor of a stepper motor has

(A) no windings

(B) All of these

(C) no brushes

(D) no commutators

61. The Dimensions of Power are

(A) ML^2T^{-3}

(B) M^2LT^{-2}

(C) $M^2L^2T^{-3}$

(D) M^2LT^{-3}

62. Meter accuracy is determined by

(A) half-scale deflection

(B) one-tenth of full-scale deflection

(C) full-scale deflection

(D) one-fourth of full-scale deflection

63. With which of the following types of capacitors care should be taken about the correct polarity, while connecting it on a circuit?

(A) Paper capacitor

(B) Electrolytic capacitor

(C) Mica capacitor

(D) Ceramic capacitor

64. When a transistor is driven to saturation region, its output voltage is ideally:

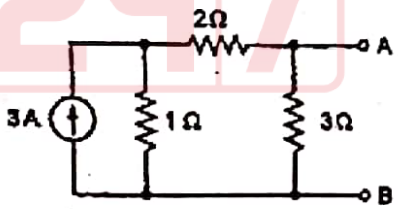
(A) V_{CC}

(B) 0

(C) $V_{CC}/2$

(D) $2V_{CC}$

65. The Thevenin's equivalent of the given circuit is:



(A) 0·75V, 0·75Ω

(B) 1·5V, 1·5Ω

(C) 0·75V, 1·5Ω

(D) 1·5V, 0·75Ω

66. Which of the following is a digital transducer?

(A) Strain gauge

(B) LVDT

(C) Encoder

(D) Thermistor

KSEE

67. The astable multivibrator has
(A) no stable state.
(B) None of these
(C) one stable state.
(D) one stable state and one quasi stable state.

68. The core of a DC machine is laminated to minimise which type of loss?
(A) Copper loss
(B) Both Eddy current loss and Hysteresis loss
(C) Eddy current loss
(D) Hysteresis loss

69. Malfunctioning of the Buchholz relay may be caused by
(A) excessive overheating of the transformer.
(B) improper breathing action.
(C) heavy external short circuit.
(D) dropping of the oil level below the relay level during operation.

70. In an induction motor the rotor resistance is equal to stand-still reactance then the maximum torque is
(A) less than starting torque.
(B) None of these
(C) equal to starting torque.
(D) more than starting torque.

71. Most commonly used AC bridge circuit for the measurement of capacitance is
(A) Maxwell Wien bridge
(B) None of these
(C) Kelvin's bridge
(D) Schering bridge

72. 8051 is a _____ bit microcontroller.
(A) 16
(B) 8
(C) 32
(D) 4

73. In a simple series R-L circuit, voltages across the resistor and the inductor are 3V and 4V respectively, then what is the applied voltage to the circuit?
(A) – 1V
(B) 7V
(C) 1V
(D) 5V

74. Which starter is used for starting slip-ring induction motors of high ratings?
(A) DOL starter
(B) All of these
(C) Rotor resistance starter
(D) Autotransformer starter

75. An overcurrent relay having a current setting of 125% is connected to a supply circuit through a current transformer of ratio 400/5. The pick-up value is
(A) 6.25 amps
(B) 15 amps
(C) 10 amps
(D) 12.5 amps

76. A voltage source supplies a signal of constant amplitude, from 0 to 40 kHz, to an RC lowpass filter. The load resistor experiences the maximum voltage at:
(A) 40 kHz
(B) 20 kHz
(C) DC
(D) 50 Hz

77. The power gain of a transistor is the highest for which arrangement?
(A) Common emitter
(B) None of these
(C) Common base
(D) Common collector

78. Which among these tests is a DC test?
(A) Switching voltage impulse
(B) Polarisation index
(C) Lightning impulse
(D) Induced voltage tests

79. Armouring is provided to protect the cable from
(A) rusting of strands
(B) None of these
(C) entry of moisture
(D) mechanical injury

80. The decimal equivalent of hexadecimal number of '2A0F' is:
(A) 17670
(B) 10767
(C) 17607
(D) 17067

81. The heat dissipation capacity of the transformers of rating exceeding 50kVA is increased by using:
(A) fins and tubes
(B) All of these
(C) radiator tanks
(D) corrugations

82. The binary equivalent of decimal number 19 is
(A) 10011
(B) 10010
(C) 10110
(D) 10001

83. In force-current analogy, displacement is analogous to
(A) magnetic flux linkage
(B) inductance
(C) capacitance
(D) voltage

84. In railways, schedule speed is always _____ average speed.
(A) greater than
(B) having no relation with
(C) equal to
(D) lesser than

85. The final stage of a multistage amplifier uses
(A) RC coupling
(B) impedance coupling
(C) transformer coupling
(D) direct coupling

86. A 10 pole, 25 Hz alternator is directly coupled to, and is driven by a 60 Hz synchronous motor. Then the number of poles in the synchronous motor are
(A) 48
(B) None of these
(C) 12
(D) 24

87. In the measurement of 3-phase power by two wattmeter method, if the two wattmeter readings are equal, the power factor of the circuit is

(A) 0·8 lagging
(B) unity ✓
(C) 0·8 leading
(D) zero

88. The presence of earth wire in case of overhead lines

(A) increase the capacitance. ✓
(B) decrease the inductance.
(C) increase the inductance.
(D) decrease the capacitance.

89. Electrical fire is a type of _____ fire.

(A) class C
(B) None of these
(C) class A
(D) class B

90. The controlling torque in gravity controlled meter is proportional to

(A) Cos θ
(B) θ
(C) Sin θ ✓
(D) Tan θ

91. Which power plant cannot have a single unit of 100MW capacity?

(A) Diesel power plant ✓
(B) Nuclear power plant
(C) Coal fired thermal power plant
(D) Hydro power plant

92. For controlling the vibration of the disc of AC energy meter, damping torque is produced by

(A) eddy current ✓
(B) magnetic effect
(C) chemical effect
(D) electro static force

93. Schmitt trigger can be used as a

(A) comparator
(B) All of these ✓
(C) square-wave generator
(D) flip-flop

94. The capacitance of a transmission line is neglected upto about

(A) 80 km ✓
(B) 200 km
(C) 120 km
(D) 180 km

95. For low head and high discharge, the hydraulic turbine used is

(A) Kaplan turbine
(B) None of these
(C) Francis turbine
(D) Pelton wheel

96. A high frequency AC signal is applied to a PMMC voltmeter. If the RMS value of the signal is 2V, the reading of the voltmeter will be:

(A) 2V
(B) 0V ✓
(C) $2\sqrt{2}$V
(D) $4\sqrt{2}$V

97. The surge impedance of a 400km long overhead transmission line is 400 Ω. For a 200km length of the same line, the impedance will be:

(A) 200Ω
(B) 100Ω
(C) 800Ω
(D) 400Ω

98. The direction of rotation of a DC shunt motor can be reversed by interchanging

(A) the supply terminals
(B) either field or armature terminals
(C) the field terminals only
(D) the armature terminals only

99. The interpole winding of DC machine consists of

(A) a large number of turns of thin wire.
(B) a large number of turns of thick wire.
(C) a small number of turns of thick wire.
(D) a small number of turns of thin wire.

100. A current of 4A flows in an AC circuit when 100 V DC is applied to it, whereas it takes 250 V AC to produce the same current. The power factor of the circuit is

(A) 0·4
(B) 0·85
(C) 10
(D) 1

$R = 25\Omega$

$Z = \frac{250}{4} = 62.5$

$\frac{25}{62.5} = \frac{25 \times V}{625} \frac{2}{5}$

$\Rightarrow 0.4$