2023 MOCK APPLIED ELECTRICITY 1
OBJECTIVE- FEBRUARY, 2023.
SUBJECT: APPLIED ELECTRICITY. **DURATION: 2 HOURS**

[100 MARKS]

Answer **all** *the questions.*
Circle the correct option

1. A solid-state device that has three pn junction is
   A. triac B. field effect transistor
   C. bipolar transistor. D. light emitting diode

2. A Zener diode is used as
   A. current reference diode
   B. voltage reference diode
   C. high power diode
   D. high frequency diode

3. A junction field effect transistor
   A. is a voltage-controlled device
   B. is a current – controlled device
   C. has a low input impedance
   D. has a high voltage gain

4. A component that is used to smooth d.c. output in rectifier circuit is
   A. capacitor B. resistor
   C. diode D. inductor

5. The function of a stabilizer circuit in a power supply unit is to
   A. step-up a.c. voltage B. step-down d.c. voltage
   C. reduce ripples D. provide a steady output

6. Triacs are used as
   A. capacitor discharging device
   B. full-wave power-controlled device
   C. half-wave power-controlled device
   D. voltage doubler device

7. Thyristors are mainly used for
   A. amplification B. inverting circuit
   C. limiting circuit D. speed control

8. The binary number 10001_2, converted into its decimal equivalent is
   A. 25 B. 15 C. 17 D. 5

9. A silicon-controlled rectifier is a
   A. three-layer, three terminal device
   B. two-layer, two terminal device
   C. three-layer, four terminal device
   D. four-layer, three terminal device

10. The binary equivalent of the hexadecimal number 2AC is
    A. 0101 0101 1000
    B. 0101 0101 0001
    C. 0010 0011 1000
    D. 0010 1010 1100

11. The sum of the binary numbers 10001_2 and 111_2 is
    A. 10010 B. 10011
    C. 11000 D. 11001

12. In a stabilized power supply block diagram, the rectifier block comes after the
    A. transformer B. voltage regulator
    C. d. c output D. rectifier block

13. The function of a voltage stabilizing circuit is to
    A. double the load resistor
    B. compensate for the voltage drop in the rectifying diode
    C. keep the load current constant
    D. keep the power dissipated in the load high

14. The total resistance of R_1 and R_2 resistors in parallel
    A. $R_1 + R_2$ B. $\frac{1}{R_1} - \frac{1}{R_2}$
    C. $\frac{R_{1+}R_2}{R_{1R_2}}$ D. $\frac{R_{1R_2}}{R_{1\,R_2}}$

15. A device that changes an a.c. input voltage into d.c. voltage is called
    A. a rectifier B. a stabilizer
    C. a transformer D. an inverter

16. A logic gate is an electronic circuit which
    A. does not work on binary numbers
    B. makes a logic decision
    C. does not alternate between 0 and 1
    D. allows electronic flow in one direction

17. The value of a resistor with brown and orange colour bands is
    A. 1000KΩ B. 100KΩ
    C. 10KΩ D. 1KΩ

18. The supply voltage to a load of 10Ω that consumes a power of 40W is
A. 4V B. 20V
C. 160V D. 400V

19. Which of the following effects of current is utilized in domestic pressing iron?
A. magnetic effect B. chemical effect
C. electrostatic effect D. heating effect

20. The truth table of a logic circuit shows the
A. input conditions only
B. output conditions only
C. maximum operating frequency of logic gates
D. state of the output with respect to the input

21. One process that is not present in a smoothed and stabilized d.c. power supply is
A. amplification B. filtration
C. rectification D. transformation

22. Which of the following binary numbers is equivalent to 21_{10}
A. 10101_2 B. 11010_2
C. 10100_2 D. 10011_2

23. Thermal runaway is caused in bipolar transistor when
A. only current increases
B. only temperature decreases
C. both current and temperature increases
D. both current and temperature decreases

24. The essential function of a p-n junction is
A. conduction B. insulation
C. amplification D. rectification

25. When an n-p-n transistor is operating in its active region its emitter-base and collector-base junctions are
A. Forward -biased and reverse- based
B. Reverse-biased and forward-biased
C. Forward-biased and forward-biased
D. Reversed-biased and reversed-biased

26. The base of a number is also called RADIX. What is the radix in hexadecimal?
A. 10 B. 16 C. 2 D. 8

27. Convert the following binary pattern (1010 1100) and (00111011) into the equivalent hexadecimal code
A. 0F,AC B. AC,3B
C. 0F, 7E D. 3B, 7E

28. The BCD code for 73 is
A. 0111 0011 B. 0110 1100
C. 0101 0011 D. 1001 0111

29. The binary equivalent of the decimal number 63 is
A. 111001 B. 111110
C. 111111 D. 011101

30. The battery connection required to forward bias a PN junction are
A. + ve terminal to p, -ve terminal to N
B. – ve terminal to p, and + ve terminal to N
C. All of the above
D. None of the above

31. Addition of pentavalent impurity to a semiconductor creates many
A. free electrons B. holes
C. covalent electrons D. bound electrons

32. A semiconductor is formed by
A. covalent bonds B. electrovalent bonds
C. co-ordinate bonds D. none of the above

33. A triac is equivalent to two SCRs connected
A. in series B. in parallel
C. in series-parallel D. none of the above

34. A PN junction acts as
A. a controlled switch
B. bi-directional switch
C. uni-directional switch
D. none of the above

35. In the switch mode power supply (SMPS), which block comes after the input rectifier and filter block?
A. output filter block
B. control and feedback block
C. high frequency switch block
D. D none of the above

36. An SCR is turned off by
A. reducing anode voltage to zero
B. reducing gate voltage to zero
C. reversing biasing the gate
D. none of the above

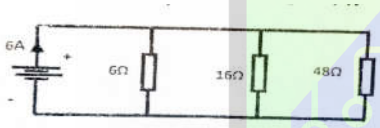
37. The random motion of holes and free electrons due to thermal agitation is called
A. diffusion B. ionization
C. crystallization D. none of the above

38. Which stage of a d.c. power supply uses a Zener diode as the main component?
A. rectifier B. regulator
C. filter D. transformer

39. The number of p-n junction within a bipolar transistor is
A. 1 B. 2 C. 3 D.

40. The nominal value of a resistor with brown, black, orange, and silver band is
A. 1000KΩ +- 10% B. 100KΩ+- 10%
C. 10KΩ +- 10% D. 1KΩ +- 10%

Use the figure below to answer questions 41 – 44



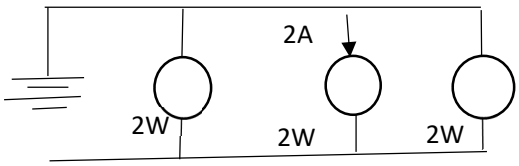
41. The total resistance of the circuit is
A. 0.25Ω B. 4.00Ω
C. 18.00Ω D. 70.00Ω

42. The current flowing through the 16Ω resistor is
A. 0.34A B. 1.35A C. 1.50A D. 6.00A

43. The power dissipated in the 6Ω resistor is
A. 144W B. 96W C. 36W D. 12W

44. The supply voltage to the circuit above is
A. 12V B. 24V
C. 36V D. 2.4V

Use the figure below to answer questions 45 – 46



45. The total power dissipated in the circuit is
A. 0.67W B. 2.00W
C. 6.00W D. 8.00W

46. The voltage drop across the parallel circuit is
A. 1V B. 3V
C. 4V D. 6V

47. The voltage across an appliance of Q coulombs of charge C, while dissipating W joules of energy is
A. $\frac{W}{Q}$ B. $\frac{W}{Q^2}$
C. $\frac{W^2}{Q}$ D. $\frac{Q}{W}$

48. The unit of the frequency of an alternating current signal is
A. Weber B. Coulomb C. Hertz D. Farad

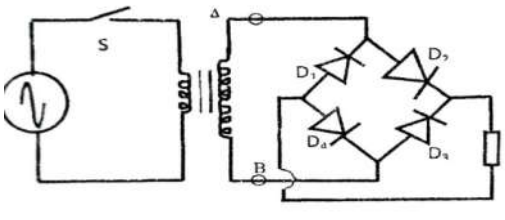
49. The rotating part of a d.c motor is the
A. Yoke B. Brush
C. Field D. Armature

50. The purpose of a filter in a power supply system is to
A. obtain unidirectional but unstable output
B. increase ripples in output voltage and current
C. smoothen out ripples in output voltage and current
D. provide pulsating output

51. The waveforms displayed on the screen of an oscilloscope can be made sharp by adjusting the
A. intensity control
B. focus control
C. vertical gain control
D. sweep selector control

52. Voltage that causes currents in the rotor assembly of a split-phase motor are produced by electromagnetic
A. repulsion B. attraction
C. induction D. force

Use the figure below to answer questions 48 – 50



53. The name of the circuit is
A. diode circuit
B. centre-tapped rectifier circuit
C. bridge rectifier circuit
D. half-wave rectifier circuit

54. Which of the diodes will conduct when the voltage at **A** is positive with respect to **B**?
A. D_1 and D_3 B. D_2 and D_4
C. D_1 and D_2 D. D_1 and D_4

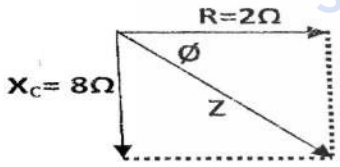
55. Which of the diodes will conduct when the voltage at **B** is positive with respect to **A**?
A. D_1 and D_3 B. D2 and D4
C. D1 and D2 D. D1 and D4

56. A material on which a transistor is mounted to prevent overheating is called
A. dissipater B. shield
C. heat sink D. thermal runaway

57. In an A.C circuit, the ratio of the power in kilowatts to the kilovolt ampere is the
A. power factor B. efficiency
C. reactive power D. form factor

58. Conductors carrying current meet at a point and the total current at that point is zero. This is
A. lenzs law B. ohms law
C. Kirchhoff's law D. faradays law

The figure below is a phasor diagram of an RC circuit. Use it to answer questions 58 and 59



59. The angle ϕ is
A. -75.90° B. -16.56°
C. -14.04° D. -8.25°

60. The total impedance z is
A. 68.00Ω B. 16.00Ω
C. 10.00Ω C. 8.25Ω

61. The principle of electromagnetic induction is used in the operation of
A. potentiometer B. rheostat
C. alternator D. electric iron

62. Earthing is employed in installation work in order to
A. prevent electric shock
B. prevent leakage current
C. insulate the electrical appliances
D. keep the current constant

63. The electrostatic distribution in a thermionic triode is done by
A. cathode B. glass envelop
C. anode D. grid

64. An electrical machine that has its field windings connected to the armature is said to be
A. separately-excited B. self – excited
C. synchronous D. polyphase

65. Convert 2_{10} to a binary number.
A. 01_2 B. 100_2 C. 11_2 D. 10_2

66. What is the sum of the binary numbers 1001111 and 11111?
A. 1100111_2 B. 1101110_2
C. 1011111_2 D.1001111_2

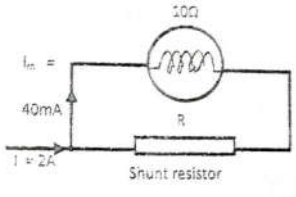
67. Which of the following is not true of a series RLC circuit at resonance?
A. $X_L=X_C$ B. $\omega=\sqrt{LC}$
C. Z=R D. $\omega=1/\sqrt{LC}$

68. The current at which a fuse melts is known as
A. current rating B. fusing factor
C. rating factor D. fusing current

69. In a series generator, the only current flowing in the field equals
A. armature current
B. half the armature current
C. twice the armature current
D. 0.7071 of armature current

70. Which of the following sets of switches are used to control a point of light from two remotes positions
A. Two, 2-way and one 2-way switches
B. Two,1-way and one intermediate switches
C. Two,2-way and one intermediate switches
D. Two-2-way switches only

The figure below is a moving -coil instrument, use it to answer question 70 to 72



71. The value of current flowing through the shunt resistor, R is
A. 2.040A B. 2.00A
C. 1.960A D. 0.004A

72. Calculate the voltage across the circuit
A. 0.04 V B. 0.40 V
C. 10.00 V D. 20.00 V

73. What is the value of the shunt resistor R?
A. 0.02 Ω B. 0.20 Ω
C.1.02 Ω D. 10.20 Ω

74. Which if the following converts electrical energy to mechanical energy?
A. Generator B. transformer
C. motor D. microphone

75. Which of the following converts sound energy to electrical energy?
A. Generator B. transformer
C. motor D. microphone

76. The maximum value attained by a waveform over half a cycle is known as its
A. r. m. s value B. peak value
C. average value D. form factor

77. In transistor amplifier circuits, the inter-stage capacitors are called
A. series capacitor B. coupling capacitors
C. decoupling capacitor D. mica capacitor

78. An auto transformer has
A. one coil B. two coil
C. three coil D. four coils

79. The phase difference between the starting and running windings in a single-phase induction motor is
A. 90^0 B. 120^0
B. 150^0 D. 240^0

80. Which of the following the starting and running windings in a single-phase induction motor is
A. trunking B. plug
C. conduit D. duct

81. A coil having an inductance of 0.4H is connected across a 230V,50Hz supply. The reactance of
the coil is
A. 314.3Ω B.125.6Ω
C. 62.8Ω D. 2.5Ω .

Note : reactance, $X_L = 2\pi fL$

82. The type of electrical machine used for bulk electricity generation is the
A. Single-phase a. c. generator
B. Single phase a.c. motor
C. Three Phase a.c. generator
D. d. c generator

83. Permanent magnets are used in
A. loud speakers B. relays
C. electric bells D. electric fans

84. The power station which uses water as a motive force is?
A. Hydro-power station
B. Coal-fired power station
C. Gas-fired power station
D. Oil-fired power station

85. The electrical quantity that opposes the flow of electricity is
A. Resistance B. Inductance
C. Capacitance D. Reluctance

86. The purpose of the carbon brushes in a d.c. generator is to
A. draw current from the armature coil
B. minimize the effect of eddy currents
C. increase the efficiency of the magnet
D. draw current from the commutator

87. The device which ensures that the reading of a measuring instrument is always the same for a given measured quantity?
A. operating devices
B. deflecting devices
C. controlling devices
D. damping devices

88. The device which allows a small signal to control a large signal is known as
A. diode B. capacitor
C. transistor D. resistor

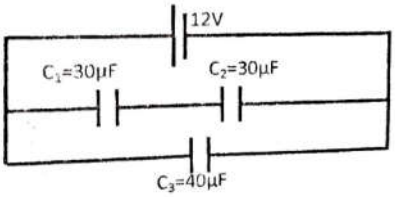
89. The generated voltage in a motor is called the
A. supply voltage B. terminal voltage
C. back emf D. source voltage

90. A socket outlet connected separately from the ring circuit is a
A. Special breaker B. final sub-circuit
C. main circuit D. spur

91. The power dissipated in a 9Ω resistor when a current of 5A flows through it is
A. 14W B. 45W
C. 225W D. 405W

92. The features of an alternator are
I. Armature II. Commutator
III. Exciter IV. Slip ring
A. I and II only B. I and III only
C. II and III only D. I, III and IV only.

The figure is a configuration of capacitor in a circuit. use it to answer questions 93 to 95



93. The equivalent capacitance of the two capacitors in series in the figure is
A. 15μF B. 30μF
C. 60μF D. 100μF

94. What is the charge on the 40μF capacitor in the circuit?
A. 3.0×10^{5} C B. 4.8×10^{2} C
C. 4.8×10^{-4}C D. 3.3×10^{-6} C

95. The voltage across C_2 is
A. 24V B. 12V
C. 9V D. 6V

96. In the iron-moving instrument, damping is by means of
A. Eddy-current B. oil film
C. air-dashpot D. hair-spring

97. The angular frequency of a signal that has a frequency of 50Hz is
A. 50.0rad/s B. 100.0rad/s
C. 314.2rad/s D. 628.4rad/s
Note: $\omega = 2\pi f$ rad/s

98. A metal which is most commonly used as circuit conductor is
A. Iron B. Silver
C. Zink D. Copper

99. The ability of a material to allow magnetic field to pass through it is known as
A. Permeability B. Conductivity
C. Permittivity D. Retentivity

100. The starter in a fluorescent lamp act as a/an
A. Resistor B. fuse
C. switch D. inductor

END OF THE PAPER