ME1315

503

ELECTRICAL ENGINEERING

Paper - 2

Series **A**

Sl.No. : 413229

Duration : 150 Minutes *Max. Marks : 300*

INSTRUCTIONS TO CANDIDATES

1. Please check the Test Booklet immediately on opening and ensure that it contains all the 150 multiple choice questions printed on it.

2. Separate Optical Mark Reader (OMR) Answer Sheet is supplied to you along with the Question Paper Booklet. The OMR Answer sheet consists of two copies i.e., the Original Copy (Top Sheet) and Duplicate Copy (Bottom Sheet). The OMR sheet contains Registered Number/Hall Ticket Number, Subject/ Subject Code, Booklet Series, Name of the Examination Centre, Signature of the Candidate and Invigilator etc.,

3. If there is any defect in the Question Paper Booklet or OMR answer sheet, please ask the invigilator for replacement.

4. Since the answer sheets are to be scanned (valued) with Optical Mark Scanner system, the candidates have to USE BALL POINT PEN (BLUE/BLACK) ONLY for filling the relevant blocks in the OMR Sheet including bubbling the answers. Bubbling with Pencil / Ink Pen Gel Pen is not permitted in the examination.

5. The Test Booklet is printed in four (4) Series, viz. A or B or C or D. The Series A or B or C or D is printed on the right-hand corner of the cover page of the Test Booklet. Mark your Test Booklet Series in Part C on side 1 of the Answer Sheet by darkening the appropriate circle with Blue/Black Ball point pen.

Example to fill up the Booklet series

If your test Booklet Series is A, please fill as shown below :

● (B) (C) (D)

1) The algebraic sum of voltages in any closed path of network is equal to
(1) One (2) Zero
(3) Two (4) Infinity

2) The minimum number of wattmeters required to measure 3-phase power is
(1) 3 (2) 2
(3) 4 (4) 0

3) In a maximum power transfer theorem the internal resistance must be
(1) Equal to internal resistance
(2) Equal to zero
(3) Equal to load resistance
(4) Greater than internal resistance

4) Specific resistance of material is measured in
(1) Ω-m (2) Ω/m
(3) Ω-m^2 (4) m^2/Ω

5) At $t = 0^+$ an inductor with zero initial conditions acts as
(1) Open circuit (2) Short circuit
(3) Charging (4) Discharging

6) The Laplace transform of $t.e^{at}$ is
(1) $s/(s + a)$ (2) $1/(s^2 + a)$
(3) $1/(s - a)^2$ (4) $1/(s^2 - a)$

7) In two wattmeter method of power measurement when power factor is unity, the readings of two wattmeters W_1 and W_2 are
(1) $W_1 > W_2$
(2) $W_1 < W_2$
(3) $W_1 = W_2$
(4) W_1 or $W_2 = 0$

8) Let 'b' is a branch, 'n' is the node in the graph of network theory then the number of chords is equal to
(1) $b - n - 1$ (2) $b - n + 1$
(3) $b + n + 1$ (4) $b * n - 1$

9) The reciprocity theorem is applicable for
(1) Only multisource network
(2) Multisource with time varying elements
(3) Only single source network
(4) Single source with time varying elements

10) The frequency at which a series RLC circuit resonates is dependent on the values of
(1) R, L and C
(2) L and C
(3) R and L
(4) C and R

11) The phase angle between the inductor current and the applied voltage is
(1) 90°
(2) 0°
(3) 180°
(4) 45°

12) $P = \sqrt{3}\ V_L I_L \cos\varphi$ is the power expression for 3-phase system, then phase angle φ is the angle between
(1) Line voltage and line current
(2) Phase voltage and phase current
(3) Line voltage and phase current
(4) Phase voltage and line current

13) If the source is delivering maximum power to load, then the efficiency is
(1) 100%
(2) 0%
(3) 75%
(4) 50%

14) A 10 amp source is connected across two parallel resistors of 3Ω and 2Ω. The current flow in 2Ω resistor is
(1) 6 amps
(2) 4 amps
(3) 5 amps
(4) 2 amps

15) For a RL circuit, R = 3.14 Ω and L = 1H connected across 220v, 50Hz supply, the quality factor is
(1) 314.16
(2) 100
(3) 50.001
(4) 1

16) A dielectric medium is said to be linear if
(1) The permitivity is not a function of the electric force
(2) The relative permitivity is same in all the directions
(3) The permitivity is a linear function of the electric force
(4) The permitivity is same everywhere

17) By saying that the electrostatic field is conservative, we donot mean that
(1) It is the gradient of a scalar potential
(2) Its circulation is identically zero
(3) The potential difference between any two points is zero
(4) Its curl is identically zero

18) ——— is the unit of magnetic charge
(1) Ampere-meter squared (2) Coulomb
(3) Ampere (4) Ampere - meter

19) As per the concept of analogy between electric and magnetic circuits, ——— is the analogy pair
(1) Conductivity - Permeability
(2) Field Density - Field intensity H
(3) Current - charge
(4) Conductivity - permitivity

20) Lightning may be regarded as
(1) Transient, high current electric discharge
(2) Transient, low current electric discharge
(3) Transient, high current magnetic discharge
(4) None of the above

21) ——— is the unit of electric dipole moment
(1) Coulomb/m (2) Coulomb-m
(3) Coulomb/m^2 (4) m/coulomb

22) If the electrical susceptibility of a particular material is 'Y', then its
(1) Relative permitivity is Y – 1
(2) Relative permeability is Y – 1
(3) Relative permitivity is Y + 1
(4) None of the above

23) Device employing the Hall effect is used to measure ———
(1) Electric flux density
(2) Magnetic flux density
(3) electric charge
(4) Magnetic flux

24) ——— relates the surface integral of the Curl of vector 'A' over the open surface enclosed by a given closed path
(1) Divergence theorem (2) Gradient theorem
(3) Stokes theorem (4) Poynting theorem

25) The electric field lines are ———
(1) Straight lines
(2) Smooth curved lines
(3) Either straight lines or smooth curved lines
(4) Closed lines

26) The power factor of an Induction motor at no load is around
(1) 0.2 lead (2) 0.2 lag
(3) 0.5 lag (4) 0.8 lag

27) A transformer has at full load, iron loss of 900 watts and copper loss of 1600 watts. Then the transformer will have a maximum efficiency at a load of
(1) 133% (2) 125%
(3) 75% (4) 66.6%

28) A DC generator will be flat compounded if
(1) Its terminal voltage remains constant irrespective of the load current supplied by the generator
(2) Generated voltage is in proportion to load current
(3) The generator is capable of producing higher voltage at light load
(4) Terminal voltage increases slightly with the load

29) A DC series motor develops a torque of 20 N-m at 3 amps of load current. If the current is increased to 6 amps, the torque developed will be
(1) 10 N-m (2) 20 N-m
(3) 40 N-m (4) 80 N-m

30) A transformer possesses a percentage resistance and a percentage reactance of 1% and 4% respectively. Its voltage regulation at power factor 0.8 lagging and 0.8 leading would be

(1) 2.4 % and –0.8%
(2) 3.2% and –1.6%
(3) 3.2% and –3.2%
(4) 4.8% and –1.6%

31) An induction motor has a starting torque of 320 N-m when started by direct switching. If starting through an auto transformer with 50% tapping, the starting torque will be

(1) 0.05 N-m
(2) 80N-m
(3) 160 N-m
(4) 640 N-m

32) Under short circuit conditions, the power factor of an alternator is

(1) Almost zero lagging
(2) Unity
(3) Almost 0.6 lagging
(4) Almost zero leading

33) I and T are the line current and torque respectively when DOL starter is used, these quantities when Y/Δ starter is used, are :

(1) $I/3, T/\sqrt{3}$
(2) $T/3, I/\sqrt{3}$
(3) $I/\sqrt{2}, T/\sqrt{2}$
(4) $I/2, T/4$

34) To reverse the phase sequence of voltage generated in the alternator, we should

(1) Reverse the connection of its field winding
(2) Interchange any two of its phase terminals
(3) Interchange all three of its phase terminals
(4) Not possible to change the phase sequence

35) In an alternator, the following method gives the voltage regulation more than the actual value

(1) Zero power factor method
(2) Synchronous impedance method
(3) mmf method
(4) No load method

36) The direction of rotation of a DC shunt motor is reversed by
(1) Reversing armature connections
(2) Interchanging the armature and field connections
(3) Adding resistance to the field circuit
(4) Reversing supply connections

37) The internal characteristic of the DC generator is the curve between
(1) Armature current and the generated e.m.f.
(2) Load current and terminal voltage
(3) Field current and no load voltage
(4) Armature current and IR drop

38) The damping winding in a synchronous motor is generally used
(1) To provide starting torque only
(2) To reduce noise level
(3) To reduce eddy currents
(4) To prevent hunting and provide the starting torque

39) A 100v/10v, 50vA transformer is converted to 100v/110v auto transformer, the rating of the auto transformer is
(1) 550 vA (2) 500 vA
(3) 110 vA (4) 100vA

40) If the excitation of the synchronous generator fails, it acts as a
(1) Synchronous motor
(2) Synchronous generator
(3) Induction motor
(4) Induction generator

41) A cumulative compound dc motor runs at 1500 rpm on full load. If its series field is short circuited, its speed
(1) Becomes zero (2) Remains unchanged
(3) Increases (4) Decreases

42) If an induction motor with certain ratio of rotor to stator slots, runs at the 1/7th of the normal rated speed, the motor is said to be
(1) Hunting (2) Crawling
(3) Cogging (4) Jogging

43) In case of an Alternator, for a full pitch stator winding, the generated voltages in both coil sides are
(1) Exactly in phase
(2) In quadrature
(3) Exactly 180 degrees out of phase
(4) Approximately 180 degrees out of phase

44) Synchronous reactance of an alternator represents
(1) Armature reactance and leakage reactance
(2) Reactance operating at synchronous speed
(3) Field winding reactance
(4) A reactance connected in series with a synchronous generator

45) A transformer takes a current of 0.6 A and absorbs 64 W when the primary is connected to its normal supply of 200v, 50Hz, the secondary being on open circuit. The iron loss component of current is
(1) 0.2 A (2) 0.43 A
(3) 1 A (4) 0.32 A

46) A 250 v DC shunt motor takes a total current of 20A. Resistance of shunt field winding is 200 ohms and that of the armature is 0.3 ohm. Then the armature current is
(1) 9.65 A (2) 11.25 A
(3) 18.75 A (4) 16.62 A

47) The voltage regulation of an alternator depends on
(1) Load current only
(2) Power factor only
(3) Both load current and power factor
(4) No load current only

48) The distribution of load between two alternators operating in parallel can be changed by changing
(1) Phase sequence
(2) Field excitation of alternators
(3) Driving torques of prime movers
(4) Load currents of alternators

49) In case of power transformer, the no load current in terms of full load primary current is
(1) 3 to 5%
(2) 15 to 30%
(3) 30 to 40%
(4) 40 to 50%

50) The starting torque of an induction motor is maximum when
(1) Rotor resistance equals rotor reactance
(2) Rotor resistance is twice the rotor reactance
(3) Rotor resistance is half the rotar reactance
(4) Rotor resistance is 1.414 times rotor reactance

51) In an alternator for zero leading power factor, the effect of armature reaction is
(1) Magnetizing only
(2) Demagnetizing only
(3) Cross magnetizing only
(4) Zero effect

52) The 'v' curve of a synchronous motor shows the relation between the following quantities
(1) Armature current and field current
(2) Power factor and field current
(3) Armature current and power factor
(4) Armature voltage and power factor

53) Which of the following motors is suitable for high starting torque
(1) Shunt motor
(2) Cumulative compound motor
(3) Series motor
(4) Compound motor

54) In a DC generator with lap connected winding, the number of brushes required is equal to
(1) Number of poles
(2) Number of pairs of poles
(3) Half the number of poles
(4) Always equal to zero

55) The field winding of an alternator is excited by
(1) DC supply (2) AC supply
(3) Both DC and AC (4) Universal supply

56) A 3-phase transformer rated for 33 kv/ 6.6 kv is connected in star/delta and the protecting current transformer on the low voltage side has a ratio of 400/5. Then the suitable CT ratio on the HV side
(1) 80:5 (2) $80: 5\sqrt{3}$
(3) $80:5/\sqrt{3}$ (4) $160 : 5\sqrt{3}$

57) For complete protection of a 3-phase line:
(1) Three phase and three-earth fault relays are required
(2) Three phase and two-earth fault relays are required
(3) Two phase and two-earth fault relays are required
(4) Two phase and one-earth fault relays are required

58) For a 20 bus power system with one voltage controlled bus, the size of the Jacobian matrix is
(1) 16 x 16 (2) 32 x 32
(3) 19 x 19 (4) 38 x 38

59) The Severity of line to ground and three phase faults at the terminals of an unloaded synchronous generator is to be same, If the terminal voltage is 1.0 p.u, $Z_1 = Z_2 = j\,0.1$ p.u and $Z_0 = j\,0.05$ p.u. for the alternator, then the required inductance reactance for neutral grounding is
(1) 0.0166 p.u (2) 0.05 p.u.
(3) 0.10 p.u (4) 0.15 p.u

60) Two insulator discs of identical capacitance value 'C' make up a string for a 22 kv, 50Hz, single phase overhead line insulation system. If the pin to earth capacitance is also C, then the string efficiency is
(1) 50% (2) 75%
(3) 90% (4) 86%

61) For accurate load flow calculations on large power systems, the best method is
(1) Newton-Raphson method (2) Gauss-siedal method
(3) Decoupled method (4) FDLF method

62) A short circuit occurs in a transmission line (neglect line capacitance) when the voltage wave is going through zero, the maximum possible momentary short circuit current corresponds to

(1) Twice the maximum of symmetrical short circuit current

(2) The maximum of symmetrical short circuit current

(3) Thrice the maximum of symmetrical short circuit current

(4) Four times the maximum of symmetrical short circuit current

63) For a Power Transformer

(1) Positive sequence impedance is more than negative sequence and zero sequence impedances

(2) Positive, negative and zero sequence impedances are equal

(3) Positive and negative sequence impedances sum is equal to zero sequence impedance

(4) Positive sequence impedance is less than negative sequence and zero sequence impedances

64) The rate of rise of restriking voltage depends upon

(1) The type of circuit breaker

(2) The inductance of the system only

(3) The capacitance of the system only

(4) The inductance and capacitance of the system

65) For protection of parallel feeders fed from one end the relays required are:

(1) Non-directional relays at the source end and directional relays at the load end

(2) Non-directional relays at both the ends

(3) Directional relays at the source end and non-directional relays at the load end

(4) Directional relays at both the ends

66) A generator is connected to a synchronous motor. From stability point of view it is preferable to have
(1) Generator neutral reactance grounded and motor neutral resistance grounded
(2) Generator and motor neutrals resistance grounded
(3) Generator and motor neutrals reactance grounded
(4) Generator neutral resistance and motor neutral reactance grounded

67) In EHV Transmission lines, efficiency of Transmission can be increased by decreasing the corona loss. This is achieved by
(1) Increasing the distance between the line conductors
(2) Using bundled conductors
(3) Using thick conductors
(4) Using thin conductors

68) If the penality factor of a Power plant is unity, its incremental transmission loss is
(1) 1.0 (2) –1.0
(3) zero (4) 0.5

69) If the loading of the transmission line corresponds to the surge impedance loading then the voltage at the receiving end is
(1) Greater than sending end voltage
(2) Less than sending end voltage
(3) Equal to the sending end voltage
(4) Does not depend on the loading

70) A three phase transmission line conductors were arranged in horizontal spacing, with 'd' as the distance between the adjacent conductors. If these conductors are rearranged to form an equilateral triangle with sides equal to 'd', then the
(1) Capacitance and the inductance will decrease
(2) Capacitance will increase and the inductance will decrease
(3) Capacitance and the inductance will remain the same
(4) Capacitance will decrease and the inductance will increase

71) The advantage of corona in a power system is
(1) Power loss is less
(2) Increase the flow of charging currents
(3) Reduces the magnitude of high voltage waves due to lightning
(4) Power loss is more

72) Load flow study is carried out for
(1) Fault calculations (2) Stability studies
(3) System planning (4) Load Frequency control

73) The presence of earth in case of overhead lines
(1) Increases the capacitance
(2) Increases the inductance
(3) Decreases the capacitance and increases the inductance
(4) Does not affect any of the line constants

74) Steady state stability of a power system is improved by
(1) Reducing fault clearing time
(2) Using double circuit line instead of single circuit line
(3) Single pole switching
(4) Decreasing generator inertia

75) Diversity factor is always
(1) Equal to one (2) Less than one
(3) Greater than one (4) Zero

76) The open loop transfer function of a control system is $G(s)H(s)=\frac{10(s+1)}{s(s-1)}$

which of the following is the gain margin of the system
(1) + 20 dB (2) –20 dB
(3) – 10 dB (4) + 10 dB

77) Characteristic equation of a control system is $s^4 + 2s^3 + 6s^2 + 8s + 8 = 0$ which of the following is the symmetric root pair of the system
(1) $\pm j1$ (2) $\pm j\sqrt{2}$
(3) $\pm j2$ (4) $\pm j3$

78) The system $x(t) = A\,\dot{x}(t) + Bu(t)$ with $A = \begin{bmatrix} -1 & 2 \\ 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ is

(1) Stable and controllable
(2) Stable but uncontrollable
(3) Unstable but controllable
(4) Unstable and uncontrollable

79) A unity feedback system has a open loop transfer function $G(s) = \frac{s+2}{(s+1).(s-1)}$, number of encirclements of the point (–1, j 0) in Nyquist plot and its closed loop system is

(1) One counter clock encirclement, stable
(2) One clockwise encirclement, unstable
(3) Two counter clockwise encirclements, unstable
(4) No encirclements, unstable

80) The open loop transfer function of a unity feedback system is given by $G(s) = k/s(1+sT)$. By what factor the gain 'k' should be multiplied so that the damping ratio is increased from 0.3 to 0.6

(1) 0.5 (2) 2.0
(3) 4.0 (4) 0.25

81) The phase angle at w = infinity for the transfer function, $G(jw) = \frac{90(1+j0.5w)}{jw(1+jw)(1+j2w)}$ is

(1) 90° (2) –180°
(3) 270° (4) –90°

82) The number of roots of the characteristic equation $s^4 + 4s^3 + s^2 + 8s + 1 = 0$ lie on the right side of the s-plane

(1) 1 (2) 2
(3) 0 (4) 3

83) The system $\dot{x}(t)=Ax(t)+Bu(t)$ with $A=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$, its state transition matrix is

(1) $\begin{bmatrix}e^t & te^t\\ 0 & e^t\end{bmatrix}$

(2) $\begin{bmatrix}e^t & 0\\ te^t & e^t\end{bmatrix}$

(3) $\begin{bmatrix}e^t & 0\\ e^t & e^t\end{bmatrix}$

(4) $\begin{bmatrix}e^t & e^t\\ 0 & e^t\end{bmatrix}$

84) The effect of phase lead compensator on rise time and band width

(1) Both increase

(2) Both decrease

(3) Rise time increases and band width decreases

(4) Rise time decreases and band width increases

85) The first two rows of routh tabulation of a third order system are as follows :

s^3	1	1
s^2	2	2

This means there are

(1) Two roots at $s=\pm j$ and one root in right half s-plane

(2) Two roots at $s=\pm j2$ and one root in right half s-plane

(3) Two roots at $s=\pm j$ and one root in left half s-plane

(4) Two roots at $s=\pm j2$ and one root in left half s-plane

86) Which one of the following variables cannot be taken as a state variable

(1) Current passing through an inductor

(2) Voltage across a capacitor

(3) Current passing through a resistor

(4) Output of the integrator

87) Which of the following compensators is used to increase the speed of the response
(1) Lead compensator (2) Lag compensator
(3) Lead lag compensator (4) None of the above

88) Which of the following is not true?
(1) State model of the system is unique
(2) In transfer function model, initial conditions are taken as zero
(3) Transfer function is applicable only for linear time invariant systems
(4) In state model, initial conditions are taken in to consideration.

89) The Initial slope of the bode plot gives an indication of
(1) Type of the system (2) Stability of the system
(3) Nature of system time response (4) Gain margin

90) A rough measure of band width of a system is
(1) Phase crossover frequency (2) Gain crossover frequency
(3) Resonant frequency (4) Undamped natural frequency

91) A meter has a full scale angle of 90° at a current of 1A. This meter has perfect square law response. Assuming spring control, the current for a deflection angle 45° will be
(1) 0.5 A (2) 0.25A (3) 0.707A (4) 0.67A

92) Two ammeters, one will full scale current of 1 mA and internal resistance of $100\,\Omega$, and the other with a full scale current of 10mA and internal resistance of $25\,\Omega$, are connected in parallel. What is the total current these two meters can carry without any meter reading out of scale?
(1) 1 mA (2) 10 mA (3) 11 mA (4) 5 mA

93) The resistance of a circuit is found by measuring current flowing and the power fed into the circuit. If the limiting errors in the measurement in power and current are $\pm 1.5\%$ and $\pm 1\%$ respectively, the limiting error in the measurement of resistance will be
(1) 1% (2) 1.5% (3) 2.5% (4) 3.5%

94) Error due to change in frequency in moving iron instrument is reduced by connecting a capacitor 'c' across the series resistance 'r'. If 'L' is the inductance of the coil, the readings of the instrument will be independent of frequency only when

(1) $c = L/r^2$ (2) $c = L^2 r$ (3) $c = \sqrt{L} r^2$ (4) $c = L/r$

95) If two 300v full scale voltmeters v_1 and v_2 having sensitivities of 100kΩ/v and 150kΩ/v are connected in series to measure 500 v, then

(1) v_1 and v_2 will read 250v each
(2) v_1 will read 200v and v_2 will read 300v
(3) v_1 will read 300v and v_2 will read 200v
(4) v_1 and v_2 will read 0v each.

96) In current transformers turns compensation is provided mainly to reduce the

(1) Power losses
(2) Phase angle error
(3) Ratio error
(4) Both ratio and phase angle errors

97) PMMC type instrument normally use

(1) Air-friction damping (2) Fluid-friction damping
(3) Eddy current damping (4) No damping is required

98) The inductance of a high quality factor inductor can be measured by a

(1) Schering bridge (2) Wien's bridge
(3) Maxwell's bridge (4) Hay's bridge

99) What will happen if a voltmeter is connected like an ammeter in series to the load

(1) The meter will burn out
(2) The measurement will be too high
(3) An inadmissably high current will flow
(4) There will be almost no current in the circuit

100) The best material use for standard resistor is

(1) Manganin (2) Aluminium (3) Nichrome (4) Platinum

101) The functioning of compensating binding in the dynamometer type wattmeter is to neutralize the error due to
(1) Power loss in the current coil circuit
(2) Power loss in the pressure coil circuit
(3) The current in the current coil circuit
(4) Voltage in the pressure coil circuit

102) A standard cell of 1.02 v used with a simple potentiometer balances at 50 cm. Then the emf of the cell that balances at 100 cm
(1) 2.04 v (2) 0.51 v (3) 4.08 v (4) 3.06 v

103) The y - input of a CRO is 10 sin 100t and the x-input is 10 cos 100 t. The gain for both x - channel and y - channel is the same. The nature of lissajous pattern on screen shows
(1) Sinusoidal signal (2) A straight line
(3) an eclipse (4) A circle

104) Schering bridge is used to
(1) Determine dissipation factor of a capacitor
(2) Determine inductance
(3) Measure low resistance
(4) Measure mutual inductance

105) Moving iron instruments can be used on
(1) A.C. only (2) D.C. only
(3) Both A.C. and D.C. (4) High frequency supply

106) An ideal op-amp slew rate is
(1) Very slow (2) Slow (3) Fast (4) Infinitely fast

107) In 2's complement representation the number 11100101 represents the decimal number
(1) + 37 (2) – 31 (3) + 27 (4) – 27

108) The number of comparators required in a 3-bit comparator type ADC is
(1) 2 (2) 3 (3) 7 (4) 8

109) The number of unused states in a 4-bit Johnson counter is
(1) 2 (2) 4 (3) 8 (4) 12

110) Which of the following is not a characteristic of a flip-flop?
(1) It is a bistable device
(2) It has two outputs
(3) It has two outputs which are complement of each other
(4) It has one input terminal

111) Addressing capacity of 8085 microprocessor is
(1) 8 kB (2) 64 kB (3) 128 kB (4) 16 kB

112) In a flash A/D converter, the priority encoder is used to
(1) Select the first input (2) Select the highest value input
(3) Select the lowest value input (4) Select the last input

113) On the drain characteristic curve of a JFET for VGS = 0, the pinch-off voltage is
(1) Below the ohmic area
(2) Between the ohmic area and the constant current area
(3) Between the constant current area and the break down region
(4) Above the breakdown region

114) Address bus length of 8086 microprocessor is
(1) 8 (2) 16 (3) 20 (4) 40

115) A 4-bit R/2R ladder digital-to-analog converter uses
(1) Two resistor values (2) Three resistor values
(3) Five resistor values (4) Four resistor values

116) Binary subtraction of a decimal 15 from 43 will utilize which two's complement?
(1) 101011 (2) 110000 (3) 110001 (4) 011100

117) The main advantage of the successive - approximation A/D converter over the counter - ramp A/D converter is its
(1) More complex circuitry (2) Less complex circuitry
(3) Longer conversion time (4) Shorter conversion time

118) The practical use of binary-weighted digital-to-analog converters is limited to
(1) R/2R ladder D/A converters (2) 4-bit D/A converters
(3) 8-bit D/A converters (4) Op-amp comparators

119) A single - phase full converter with R-L load is triggered at 30°. Then each device conducts for
(1) 180° (2) 150° (3) 30° (4) 120°

120) In which of the following both frequency and voltage can be controlled?
(1) Inverter and a.c. voltage controller
(2) Cyclo-converter and a.c. voltage controller
(3) Inverter and cycloconverter
(4) Inverter, cyclo converter and a.c. voltage controller

121) A circulating current mode dual converter has the following properties.
(1) size is more and efficiency is high
(2) size is more and efficiency is low
(3) size is less and efficiency is high
(4) size is less and efficiency is low

122) The firing angle of a 1-phase a.c. voltage controller is zero. Assuming resistive load, the input current wave shape is
(1) a.c. square wave
(2) constant d.c. wave
(3) d.c. sine wave
(4) a.c. sine wave

123) The output frequency of a 1-phase cycloconverter is found to be 12 Hz then the input frequency is
(1) 50 Hz (2) 60 Hz (3) 40 Hz (4) 30 Hz

124) An IGBT gas
(1) high input impedance and low conduction losses
(2) low input impedance and low conduction losses
(3) high input impedance and high conduction losses
(4) low input impedance and high conduction losses

125) Choose a correct statement from the following :
(1) If THD increases, input p.f. increases
(2) If THD increases, input p.f. decreases
(3) If displacement factor increases, input p.f. decreases
(4) If displacement factor increases or decreases, input p.f. remain constant.

126) If the duty cycle of a d.c. chopper is 'α', then ripple factor is given by

(1) $\sqrt{(1-\alpha)/\alpha}$ (2) $\sqrt{\alpha/(1-\alpha)}$ (3) α (4) $1/\alpha$

127) Which of the following devices has the lowest 'Maximum switching frequency'?

(1) MOSFET (2) IGBT (3) SCR (4) GTO

128) The converters which operate only in two quadrants are

(1) half-wave and full-wave converters
(2) half-wave and semi converters
(3) full wave and semi converters
(4) dual converter and semi-converters

129) Forced communication is necessary in _____ circuits.

(1) GTO Based (2) MOSFET Based
(3) Converter grade SCR (4) Inverter grade SCR

130) In a BJT, when both junctions are forward biased then the operating mode is called

(1) cut-off mode (2) forward active mode
(3) saturation mode (4) reverse active mode

131) A 3-phase, 50 Hz induction motor is controlled by a voltage source inverter. The frequency of rotor current at fifth harmonic is

(1) equal to 50 Hz (2) less than250 Hz
(3) more than 250 Hz (4) exactly equal to 250 Hz

132) At no-load, the ratio of energy loss due to dynamic braking and counter current braking of a separately excited dc motor is

(1) 1:3 (2) 3:1 (3) 1:2 (4) 2:1

133) The value of slip of a 3-phase induction motor at n^{th} harmonic is approximately

(1) slip/n (2) zero (3) n × slip (4) 1

134) In v/f control of 3-phase induction motor, when it is operated at above rated speed, then

(A) voltage decreases (B) torque decreases
(C) power increases (D) slip speed increases

(1) (B) and (C) are true (2) (A) and (C) are true
(3) (C) and (D) are true (4) (B) and (D) are true

135) Speed of 3-phase induction motor is controlled by 3-phase a.c. voltage controller. If firing angle is decreased, then
(1) speed increases & peak torque decreases
(2) speed decreases & peak torque increases
(3) speed increases & peak torque increases
(4) speed decreases & peak torque decreases

136) A chopper fed dc motor runs with discontinuous armature current at particular duty ratio. The current can be made continuous by
(1) increasing duty ratio (2) increasing frequency
(3) decreasing duty ratio (4) decreasing frequency

137) In constant power operation of an a.c. drive
(1) voltage is constant and frequency is variable
(2) voltage is variable and frequency is constant
(3) both voltage & frequency are constant
(4) both voltage and frequency are variable

138) In 4 quadrant of a drive operation, quadrants II and III are
(1) forward monitoring & reverse monitoring
(2) forward braking and reverse generating
(3) forward braking and reverse monitoring
(4) forward monitoring and reverse generating

139) The slip of a 3-phase induction motor is 0.05. At the instant of dynamic braking, the slip is
(1) 0.95 (2) –0.05 (3) 1.95 (4) 0.05

140) Speed of a 3-phase a.c. motor is controlled by maintaining constant v/f ratio. At a very low speeds, the voltage is
(1) proportional to frequency
(2) less than the value of voltage in (1)
(3) more than the value of voltage in (1)
(4) equal to the rated voltage

141) The unit of luminous flux is
(1) Radians (2) Lumens (3) Lux (4) Candela

142) The heating element must possess
(1) low melting point
(2) high temperature co-efficient
(3) withstand the required temperature with getting oxidised
(4) high resistivity

143) The softening temperature of hand drawn copper electrode is
(1) 500°C (2) 300°C (3) 1000°C (4) 150°C

144) In an electric traction system coasting means
(1) power supply is on to accelerate train
(2) power supply is cut off and train is allowed to run on its own momentum
(3) power supply on & train is running at constant speed
(4) power supply on and brakes are applied to stop train

145) The unit of specific energy consumption for an electric traction system
(1) Watt hours/tonne-kilometer
(2) Watt hours/kilometer
(3) Watt hours/kilometer per hour per second
(4) Watt hours/tonne

146) Which of the motor is best suited for traction
(1) DC shunt motor (2) DC series motor
(3) Stepper motor (4) Shaded pole motor

147) Reflection factor =
(1) Reflected light/incident light (2) Incident light/Reflected light
(3) MSCP/MHSCP (4) MHSCP/MSCP

148) The heat produced in the resistance welding at the joints is proportional to
(1) I^2R (2) Eddy currents (3) VI (4) Hysterisis loss

149) The total lumens reaching the working plane is 60 and total lumens given out by lamp is 100. The utilization factor is
(1) 1.66667 (2) 160 (3) 40 (4) 0.6

150) A 220 V filament lamp takes a current of 1A and produces total flux of 4400 lumens. The lumens per watt is
(1) 40 (2) 0.05 (3) 4620 (4) 20