

**4. Electrical Engineering 17.03.2019 FN 9.30-11.30 AM**

1. Which of the following features of solute and solvent atoms that determine the degree to which the solute dissolves in solvent?
  1. Atomic size factor
  2. Crystal structure
  3. Electronegativity
  4. Valances
  - (a) 1, 2 and 3 only
  - (b) 1, 2 and 4 only
  - (c) 3 and 4 only
  - (d) 1, 2, 3 and 4
  
2. A solenoid is  $0.25\text{ m}$  long, having  $1000\text{ turns}$  and has  $2.5\text{ A}$  current flowing through it in a vacuum chamber. When placed in pure oxygen environment, the magnetic induction exhibits an increase of  $1.04 \times 10^{-8}\text{ Wb/m}^2$ . The magnetic susceptibility of oxygen will be nearly:
  - (a)  $8.3 \times 10^{-3}$
  - (b)  $83 \times 10^{-3}$
  - (c)  $8.3 \times 10^{-7}$
  - (d)  $83 \times 10^{-7}$
  
3. Which one of the following materials is having higher dielectric strength?
  - (a) Polyethylene
  - (b) Polyvinylchloride
  - (c) Mica
  - (d) Transformer oil

4. Which one of the following breakdown occurs due to an excessive voltage applied to a dielectric material?
- (a) Thermal breakdown
  - (b) Intrinsic breakdown
  - (c) Defect breakdown
  - (d) Surface breakdown
5. Which of the following are classified as magnetic materials?
- (a) Ferro, Piezo, Pyro, Dia materials
  - (b) Smooth and Hard materials
  - (c) Crystal, Pyro and Soft materials
  - (d) Dia, Para, Ferro, Anti Ferro and Ferrimagnetic materials
6. For electrical contacts used in switches, brushes and relays, the material must possess:
- 1. High electrical conductivity
  - 2. High thermal conductivity
  - 3. High melting point
  - 4. Good oxidation resistance
- (a) 1, 2 and 3 only
  - (b) 1, 2 and 4 only
  - (c) 3 and 4 only
  - (d) 1, 2, 3 and 4

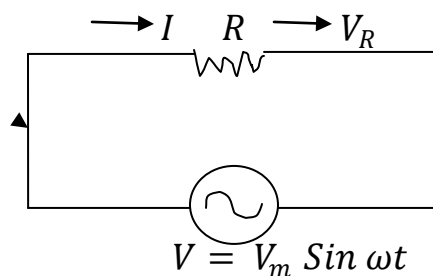
7. Consider the following properties:
1. Highly coherent (both Spatial and Temporal)
  2. Highly monochromatic
  3. Highly directional
  4. Sharply focused

The above properties are applicable to which one of the following?

- (a) Light Amplification by Stimulated Emission of Radiation
  - (b) Optical Resonator
  - (c) Semiconductor
  - (d) Optical Fibre
8. Materials for which the resistivity at a very low temperature abruptly plunges from a finite value to one that is virtually zero and remains there upon further cooling are called:
- (a) Low conductors
  - (b) Superconductors
  - (c) High conductors
  - (d) Extremely high conductors
9. Which one of the following statements is *not* correct?
- (a) Ferrites are hard and brittle materials
  - (b) Ferrites have higher thermal conductivity
  - (c) Ferrites have a high resistivity
  - (d) Ferrites cannot be shaped by ordinary machining process

10. According to Kirchhoff's Voltage Law (*KVL*), the algebraic sign of an *IR* drop is primarily dependent upon the:
- (a) Amount of current flowing through it
  - (b) Value of *R*
  - (c) Direction of current flow
  - (d) Battery connection
11. For any medium, electric flux density *D* is related to electric field intensity *E* by the equation:
- (a)  $D = \epsilon_0 E$
  - (b)  $D = \epsilon_0 \epsilon_r E$
  - (c)  $D = \frac{E}{\epsilon_0 \epsilon_r}$
  - (d)  $D = E \frac{\epsilon_0}{\epsilon_r}$
12. In any linear resistive network, the voltage across or the current through any resistor or source may be calculated by adding algebraically all the individual voltages or currents caused by the separate independent sources acting alone, with all other independent voltage sources replaced by short circuits and all other independent current sources replaced by open circuits. Which one of the following theorems states the above definition?
- (a) Maximum power transfer theorem
  - (b) Superposition theorem
  - (c) Maxwell's theorem
  - (d) Source transformation theorem

13. Consider the following circuit:



The value of current in the circuit is:

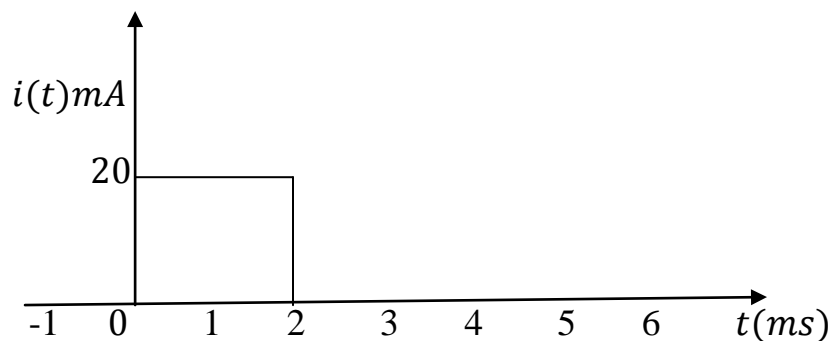
- (a)  $i = I_m \text{ Sin } \omega t$
  - (b)  $i = 2 I_m \text{ Sin } \omega t$
  - (c)  $i = I_m \text{ Sin } 2 \omega t$
  - (d)  $i = 2 I_m \text{ Sin } 2 \omega t$
14. If two sinusoidal waves whose phases are to be compared:
1. Both be written as sine waves or both cosine waves
  2. Both be written with positive amplitudes
  3. Each has the same frequency
  4. One wave should be sine and the other cosine wave

Which of the above statements are correct?

- (a) 1, 2 and 4 only
- (b) 1, 3 and 4 only
- (c) 1, 2 and 3 only
- (d) 2, 3 and 4 only

15. The drawback of  $m$ -derived filter is removed by connecting number of sections in addition to prototype and  $m$ -derived sections with terminating:
- (a) Full sections
  - (b) One-fourth sections
  - (c) Half sections
  - (d) Square of three-fourth sections
16. The hybrid parameter of the open circuit reverse voltage gain is indicated as:
- (a)  $h_{11} = \left. \frac{V_1}{I_1} \right|_{V_2 = 0}$
  - (b)  $h_{21} = \left. \frac{I_2}{I_1} \right|_{V_2 = 0}$
  - (c)  $h_{12} = \left. \frac{V_1}{V_2} \right|_{I_1 = 0}$
  - (d)  $h_{22} = \left. \frac{I_2}{V_2} \right|_{I_1 = 0}$
17. Two identical 750 *turn* coils  $A$  and  $B$  lie in parallel planes. A current changing at the rate of 1500  $A/s$  in  $A$  induces an emf of 11.25  $V$  in  $B$ . If the self-inductance of each coil is 15  $mH$ , then the percentage of the flux produced in coil  $A$  which links the turns of  $B$  will be:
- (a) 40 %
  - (b) 50 %
  - (c) 60 %
  - (d) 70 %

18. What is the capacitor voltage that is associated with the current for the wave form shown when the value of the capacitance is  $5 \mu F$ ?



- (a)  $v(t) = 1$   
(b)  $v(t) = 2$   
(c)  $v(t) = 4$   
(d)  $v(t) = 8$
19. Current measured during a test is  $30.4 A$ , flowing in a resistor of  $0.105 \Omega$ . It is noted that the ammeter reading is low by  $1.2 \%$  and the marked resistance is high by  $0.3 \%$ . The true power will be nearly:
- (a)  $79.5 W$   
(b)  $89.3 W$   
(c)  $99.1 W$   
(d)  $109.0 W$
20. Schering Bridge is used for the measurement of:
- (a) Capacitors  
(b) Inductors  
(c) Q-of inductors  
(d) Medium value resistors

21. Consider the following statements for *PMMC* Instruments:
1. The scale is non-uniformly divided
  2. The power consumption is very low as  $25 \mu W$  to  $200 \mu W$
  3. The torque-weight ratio is high which gives a high accuracy

Which of the above statements are correct?

- (a) 1 and 2 only
  - (b) 1 and 3 only
  - (c) 2 and 3 only
  - (d) 1, 2 and 3
22. The lagging loads when connected to the electro-dynamometer wattmeter cause the wattmeter reading to:
- (a) Read high
  - (b) Have no effect
  - (c) Read low
  - (d) Zero
23. The power flowing in a 3-phase, 3-wire balanced load system is measured by two wattmeter method. The reading of wattmeter *A* is  $7500 W$  and of wattmeter *B* is  $-1500 W$ . The power factor of the system will be nearly:
- (a) 0.9
  - (b) 0.7
  - (c) 0.6
  - (d) 0.4



24. The self-capacitance of a coil is measured by a  $Q$  meter. The circuit is set into resonance at  $2\text{ MHz}$  and the tuning capacitor is  $460\text{ pF}$ . The frequency is now adjusted to  $4\text{ MHz}$  and resonance conditions are obtained the tuning capacitor at  $100\text{ pF}$ . The value of self-capacitance of the coil will be:
- (a)  $20\text{ pF}$
  - (b)  $30\text{ pF}$
  - (c)  $40\text{ pF}$
  - (d)  $50\text{ pF}$
25. A coil with a resistance of  $10\ \Omega$  is connected in the direct-measurement mode. Resonance occurs when the oscillator frequency is  $1.0\text{ MHz}$  and the resonating capacitor is set at  $65\text{ pF}$ . The percentage error introduced in the calculated value of  $Q$  by  $0.02\ \Omega$  insertion resistance will be:
- (a)  $0.1\ \%$
  - (b)  $0.2\ \%$
  - (c)  $0.3\ \%$
  - (d)  $0.4\ \%$
26. If two time varying signals of equal amplitude and  $270^\circ$  phase displacement are applied to  $X$  and  $Y$  plates of  $CRO$ , the display will be:
- (a) A straight line
  - (b) An ellipse
  - (c) A circle
  - (d) A rectangle

27. If the bandwidth of an oscilloscope is given as direct current to 10 *MHz*. The fastest rise time a sine wave can have to be accurately reproduced by an instrument will be:
- (a) 20 *ns*
  - (b) 25 *ns*
  - (c) 30 *ns*
  - (d) 35 *ns*
28. In a transducer, the observed output deviates from the correct value by a constant value the resulting error is called:
- (a) Zero error
  - (b) Sensitivity error
  - (c) Non-conformity error
  - (d) Hysteresis error
29. The output of transducer depending not only on present input quantity but also depends on input quantities previously applied to it. This property of transducer is called:
- (a) Causality
  - (b) Hysteresis
  - (c) Stress
  - (d) Non-elasticity

30. How many bits are in an *ASCII* code?
- (a) 4
  - (b) 7
  - (c) 9
  - (d) 11
31. The *BCD* of 123 is:
- (a) 000100110010
  - (b) 001010011
  - (c) 000100100011
  - (d) 011011
32. A system which contains basic Boolean operations (AND, OR, NOT), some inputs and a set of output are called:
- (a) Sequential circuits
  - (b) Combinatorial circuits
  - (c) Internal circuits
  - (d) Switching circuits
33. Computers with large numbers of instructions, complex addressing modes and variable length instructions are called:
- (a) Complex Instruction Set Computers
  - (b) Complex addressing mode computers
  - (c) Reduce Instruction set computers
  - (d) Load-store architecture computers

34. Which of the following I/O techniques need processor involvement during I/O operations?

1. Programmed I/O
2. Interrupt-driven I/O
3. Direct memory access

- (a) 1, 2 and 3  
(b) 1 and 2 only  
(c) 1 and 3 only  
(d) 2 and 3 only

35. If,

$T_n$  = Average time to read or write  $n$  bits

$T_A$  = Average access time

$n$  = Number of bits

$R$  = Transfer rate, in bits per second

Which one of the following relationships for non-random-access memory is correct?

- (a)  $T_A = T_n + \frac{n}{R}$   
(b)  $T_n = T_A + \frac{n}{R}$   
(c)  $T_n = T_A - n \cdot R$   
(d)  $T_A = T_n - n \cdot R$

36. Which one of the following will cause external interrupt to *CPU*?

- (a) Register over flow
- (b) Attempt to divide by zero
- (c) Power failure
- (d) Invalid operation code

37. Consider the following specification for a *VDU* terminal:

Number of characters/line = 80

Number of bits/character = 7

Horizontal sweep time = 63.5  $\mu$ sec

Retrace time = 20% of horizontal sweep time

The bit rate will be:

- (a) 13.32 *Mbit/sec*
  - (b) 12.33 *Mbit/sec*
  - (c) 11.23 *Mbit/sec*
  - (d) 10.22 *Mbit/sec*
38. A process is thrashing if:
- (a) It is spending more time in paging than executing
  - (b) It is spending less time in paging than executing
  - (c) Page fault occurs
  - (d) Swapping cannot take place

39. The number of processes that are completed per unit time is called:
- (a) Output
  - (b) Throughput
  - (c) Efficiency
  - (d) Capacity
40. The root partition, which contains the operating-system kernel and sometime other system files, is mounted at:
- (a) Access time
  - (b) Compile time
  - (c) Boot time
  - (d) Execution time
41. Which of the following functions of Assembler are correct?
- 1. It translates the function code into its machine code equivalent
  - 2. It assigns absolute addresses to any symbolic address
  - 3. It checks the syntax of each instruction and generates error messages
- (a) 1 and 2 only
  - (b) 1 and 3 only
  - (c) 2 and 3 only
  - (d) 1, 2 and 3

42. The output voltage of an Instrumentation amplifier is given by:

(a)  $V_o = \left(1 + \frac{2R}{R_p}\right)(V_1 - V_2)$

(b)  $V_o = \left(1 + \frac{2R^2}{R_p}\right)(V_1 - V_2)$

(c)  $V_o = \left(1 + \frac{2R}{R_p^2}\right)(V_1 - V_2)$

(d)  $V_o = \left(1 + \frac{R}{2R_p}\right)(V_1 - V_2)$

43. In the saturation region of transistor the base-emitter and collector-base junctions are:

(a) Forward-biased and reverse biased respectively

(b) Both reverse-biased

(c) Both forward-biased

(d) Reverse- biased and Forward-biased respectively

44. The output equation of a differentiator circuit using an Op-amp is given by:

(a)  $V_o(t) = +RC \frac{dV_1^2(t)}{dt}$

(b)  $V_o(t) = -RC \frac{dV_1^2(t)}{dt}$

(c)  $V_o(t) = +RC \frac{dV_1(t)}{dt}$

(d)  $V_o(t) = -RC \frac{dV_1(t)}{dt}$

45. Input impedance of an operational amplifier is always:
- (a) Low
  - (b) High
  - (c) Remains same
  - (d) Increase
46. At lower or upper cutoff frequency, the voltage gain is:
- (a)  $0.303 A_{v(mid)}$
  - (b)  $0.525 A_{v(mid)}$
  - (c)  $0.707 A_{v(mid)}$
  - (d)  $0.997 A_{v(mid)}$
47. In a  $Q$  meter, distributed capacitance of coil is measured by changing the capacitance of the tuning capacitor. The values of tuning capacitors are  $C_1$  and  $C_2$  for resonant frequencies  $f_1$  and  $2f_1$  respectively. The value of the distributed capacitance  $C_d$  will be:
- (a)  $\frac{C_1 - C_2}{2}$
  - (b)  $\frac{C_1 - 2C_2}{3}$
  - (c)  $\frac{C_1 - 4C_2}{3}$
  - (d)  $\frac{C_1 - 3C_2}{2}$



48. At low frequencies, the coupling capacitors produce a decrease in:

- (a) Input resistance
- (b) Voltage gain
- (c) Generator resistance
- (d) Generator voltage

49. The resonant frequency of '*Clapp Oscillator*' is given by:

- (a)  $f_r = \frac{C_3}{2\pi\sqrt{L}}$
- (b)  $f_r = \frac{1}{2\pi\sqrt{LC_3}}$
- (c)  $f_r = \frac{1}{2\pi\sqrt{L^2C_3}}$
- (d)  $f_r = \frac{L}{\sqrt{2\pi C_3}}$

50. A Wien-bridge oscillator uses:

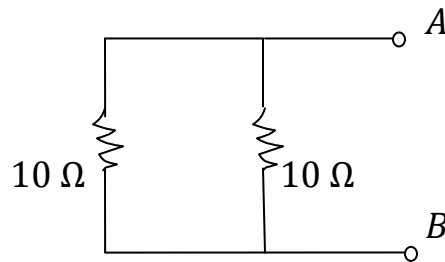
- (a) Positive feedback
- (b) Negative feedback
- (c) Both positive feedback and negative feedback
- (d) An LC tank circuit

51. A Wien-bridge is sometimes called:

- (a) Wheatstone bridge
- (b) Phase shifter
- (c) Twin-T oscillator
- (d) Notch filter

52. For an operational amplifier when used as an analog comparator the output voltage will be:
- (a)  $\pm V_{sat}$
  - (b)  $(V_1 - V_2) A_V$
  - (c)  $-\left(\frac{R_F}{R_1}\right) A_V$
  - (d)  $(V_1 - V_2) R_F$
53. A basic microprocessor operation such as reading a byte from memory or writing a byte to a port is called:
- (a) Instruction cycle
  - (b) Clock cycle
  - (c) Boot cycle
  - (d) Machine cycle
54. How many clock cycles are required for the loop in 8086 with a 5-MHz Clock when it exits the loop?
- (a) 2 Clock cycles
  - (b) 3 Clock cycles
  - (c) 4 Clock cycles
  - (d) 5 Clock cycles

55. The thermal noise voltage measured at  $27^\circ C$  by a measuring equipment of bandwidth  $10\text{ MHz}$  in the following circuit will be nearly:



- (a)  $1.1\ \mu V$   
 (b)  $0.9\ \mu V$   
 (c)  $0.7\ \mu V$   
 (d)  $0.5\ \mu V$
56. Which one of the following offers higher bandwidths and noise immunity and used in long distance telephone lines and cables for *TV*?
- (a) *STP*  
 (b) Coaxial cable  
 (c) Optical fibre  
 (d) *UTP*
57. If a channel has  $\frac{S}{N} = 7$  and  $B = 4\text{ kHz}$  and another channel has  $\frac{S}{N} = 15$  and  $B = 3\text{ kHz}$ . The channel capacities will be respectively:
- (a)  $9 \times 10^3\text{ bits/sec}$  and  $9 \times 10^3\text{ bits/sec}$   
 (b)  $9 \times 10^3\text{ bits/sec}$  and  $12 \times 10^3\text{ bits/sec}$   
 (c)  $12 \times 10^3\text{ bits/sec}$  and  $12 \times 10^3\text{ bits/sec}$   
 (d)  $12 \times 10^3\text{ bits/sec}$  and  $9 \times 10^3\text{ bits/sec}$

58. If a system is described by the differential equation:

$$5 \frac{d}{dt} y(t) + 10 y(t) = 2 x(t).$$

An impulse response of the system will be:

- (a)  $\frac{1}{5} e^{-2t} u(t)$
- (b)  $\frac{2}{5} e^{-2t} u(t)$
- (c)  $\frac{3}{5} e^{-2t} u(t)$
- (d)  $\frac{4}{5} e^{-2t} u(t)$

59. The output of a system is given by:

$$y(t) = x(t) \cos(t + 1)$$

then the system will be:

- (a) Stable
  - (b) Unstable
  - (c) Causal
  - (d) Non-causal
60. The system defined by  $y(n) = x^2(n)$  is:
- (a) Shift variant
  - (b) Scale variant
  - (c) Shift invariant
  - (d) Scale invariant

61. If Fourier transform of  $x(t) \leftrightarrow X(\omega)$ , then Fourier transform of  $\frac{d x(t)}{dt}$  is:

(a)  $-j\omega \cdot X(\omega)$

(b)  $\frac{X(\omega)}{j}$

(c)  $j\omega \cdot X(\omega)$

(d)  $\frac{j}{\omega} \cdot X(\omega)$

62. The Laplace transforms of  $tu(t)$  and  $u(t - 5)$  is respectively:

(a)  $\frac{1}{s^2}$  and  $\frac{e^{-5s}}{s}$

(b)  $\frac{1}{s}$  and  $\frac{e^{-4s}}{s}$

(c)  $\frac{1}{s^2}$  and  $\frac{e^{-4s}}{s}$

(d)  $\frac{1}{s}$  and  $\frac{e^{-5s}}{s}$

63. A causal discrete-time *LTI* system with transfer function is given by:

$$H(z) = \frac{1}{1-Az^{-1}}$$

The given system will be:

(a) Observable

(b) Non causal

(c) Stable

(d) Unstable

64. If a signal is not bandlimited strictly or the sampling frequency is less than  $2 f_m$ , error occurred is called:
- (a) Cross talk
  - (b) Jitter
  - (c) Eye opening
  - (d) Aliasing
65. An ideal reconstruction filter cannot be used for real-time applications since it is:
- (a) Non-linear
  - (b) Non-causal
  - (c) Unstable
  - (d) Stable
66. Which of the following are the popular structures in practice for FIR system?
- 1. Direct form
  - 2. Transformed form
  - 3. Cascade form
  - 4. Frequency sampling realization
  - 5. Lattice structure realization
- (a) 1, 2, 3 and 4 only
  - (b) 2, 3, 4 and 5 only
  - (c) 3, 4 and 5 only
  - (d) 1, 2, 3, 4 and 5

67. Which of the following are the advantages of using a feedback in control system?

1. Reduces sensitivity
2. Improves the transient response
3. Minimize the effects of disturbance signals

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

68. Consider the following statements in a signal flow graph:

1. Source: It is a node with only outgoing branches
2. Sink: It is a node with only incoming branches
3. Path: It is the traversal of connected branches in the direction of branch arrows such that one node is traversed more than once

Which of the above defined signal flow terms are correct?

- (a) 1, 2 and 3
- (b) 1 and 3 only
- (c) 1 and 2 only
- (d) 2 and 3 only

69. Consider the following characteristic equation:

$$s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$$

The number of roots in the right half of  $s$ -plane will be:

- (a) 4
- (b) 3
- (c) 2
- (d) 1

70. A decade is defined for range of frequencies:

- (a)  $\omega_2 = 10 \omega_1$
- (b)  $\omega_2 = 6 \omega_1$
- (c)  $\omega_2 = 4 \omega_1$
- (d)  $\omega_2 = 2 \omega_1$

71. A second order system has a transfer function given by:

$$G(s) = \frac{25}{s^2 + 8s + 25}$$

If the system initially at rest is subjected to a unit step input at  $t = 0$ , the second peak in the response will occur at:

- (a)  $\pi \text{ sec}$
- (b)  $\frac{\pi}{3} \text{ sec}$
- (c)  $\frac{2\pi}{3} \text{ sec}$
- (d)  $\frac{\pi}{2} \text{ sec}$



72. A lag compensator:

1. Improves the steady state behaviour of the system
2. Speeds up the transient response
3. Nearly preserves its transient response

Which of the above statements are correct?

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 1 and 3 only

73. For a state model:

$$\dot{X} = AX, \quad \text{where } A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$$

State transition matrix is:

- (a)  $\begin{bmatrix} e^t & 0 \\ te^t & e^t \end{bmatrix}$
- (b)  $\begin{bmatrix} e^{-t} & 0 \\ te^{-t} & e^{-t} \end{bmatrix}$
- (c)  $\begin{bmatrix} e^{2t} & 0 \\ te^{2t} & e^{2t} \end{bmatrix}$
- (d)  $\begin{bmatrix} e^{-2t} & 0 \\ te^{-2t} & e^{-2t} \end{bmatrix}$

74. If the transfer function does not have pole-zero cancellation, the system can always be represented by:
- (a) Unity feedback
  - (b) Characteristic equation
  - (c) Completely controllable and observable state model
  - (d) Neither completely controllable nor observable

75. For the given transfer function:

$$G(s) = \frac{50}{s(1+0.25s)(1+0.1s)}$$

The corner frequencies will be respectively:

- (a)  $2 \text{ rad/sec}$  and  $10 \text{ rad/sec}$
  - (b)  $4 \text{ rad/sec}$  and  $10 \text{ rad/sec}$
  - (c)  $2 \text{ rad/sec}$  and  $5 \text{ rad/sec}$
  - (d)  $4 \text{ rad/sec}$  and  $5 \text{ rad/sec}$
76. A single phase transformer has total core loss of  $1000 \text{ W}$  at  $420 \text{ V}$ ,  $60 \text{ Hz}$  and total core loss of  $400 \text{ W}$  at  $210 \text{ V}$ ,  $30 \text{ Hz}$ . The total core loss at  $350 \text{ V}$ ,  $50 \text{ Hz}$  will be nearly:
- (a)  $593.4 \text{ W}$
  - (b)  $685.4 \text{ W}$
  - (c)  $777.8 \text{ W}$
  - (d)  $869.8 \text{ W}$

77. In a transformer, the core loss is  $120\text{ W}$  at  $40\text{ Hz}$  and  $82.5\text{ W}$  at  $30\text{ Hz}$ . Both losses are measured at the same flux density. The hysteresis and eddy current losses at  $50\text{ Hz}$  will be:
- (a)  $100\text{ W}$  and  $62.5\text{ W}$
  - (b)  $95\text{ W}$  and  $62.5\text{ W}$
  - (c)  $100\text{ W}$  and  $52.5\text{ W}$
  - (d)  $95\text{ W}$  and  $52.5\text{ W}$
78. What is the condition for progressive winding in dc machine?
- (a)  $Y_b > Y_f$
  - (b)  $Y_b < Y_f$
  - (c)  $Y_b = Y_f$
  - (d)  $Y_b = 0.5 Y_f$
79. A dc shunt generator has an induced voltage on open circuit of  $127\text{ V}$ . When the machine is on load, the terminal voltage is  $120\text{ V}$ . For the field resistance of  $15\ \Omega$ , armature resistance of  $0.02\ \Omega$  and by ignoring armature reaction, the load current will be:
- (a)  $360\text{ A}$
  - (b)  $354\text{ A}$
  - (c)  $348\text{ A}$
  - (d)  $342\text{ A}$

80. A 100 kVA, 6600/330 V, 50 Hz, single-phase transformer took 10 A and 436 W at 100 V in a short-circuit test, referring to the high voltage side. The voltage to be applied to the high voltage side on full-load at 0.8 p. f. lagging when the secondary load voltage is 330 V will be:
- (a) 6914 V
  - (b) 6734 V
  - (c) 6452 V
  - (d) 6172 V
81. A 440 V dc series motor of negligible resistance and with unsaturated magnetic circuit takes 50 A when running at a certain speed on a given load. If the load torque varies as the cube of the speed, the resistance necessary to reduce the speed by 50 % will be:
- (a) 20.5  $\Omega$
  - (b) 24.0  $\Omega$
  - (c) 28.5  $\Omega$
  - (d) 32.0  $\Omega$
82. A 220 V shunt motor has an armature resistance of 0.5  $\Omega$  and takes armature current of 40 A at full load. To raise the speed by 50 % if developed torque is constant, the main flux to be reduced will be:
- (a) 49.0 %
  - (b) 45.0 %
  - (c) 41.5 %
  - (d) 37.5 %

83. A 3-phase, 6-pole induction motor is connected to a 60 Hz supply. The voltage induced in the rotor bars is 4 V when the rotor is at standstill. The voltage and frequency induced in the rotor bars at 300 rpm will be:
- (a) 3 V and 45 Hz
  - (b) 3 V and 55 Hz
  - (c) 4 V and 45 Hz
  - (d) 4 V and 55 Hz
84. During short circuit test the loss can be obtained by measuring mechanical power required to drive the synchronous machine. The loss  $P_{sc}$  comprises of:
- 1.  $I^2R$  loss in armature winding due to the flow of short circuit current (ac)
  - 2. Local core loss caused by armature leakage flux
  - 3. Hysteresis loss
- Which of the above statements are correct?
- (a) 1, 2 and 3
  - (b) 1 and 2 only
  - (c) 1 and 3 only
  - (d) 2 and 3 only
85. A 3300 V, delta-connected motor has a synchronous reactance per phase (delta) of 18  $\Omega$ . It operates at a leading power factor of 0.707 when drawing 800 kW from the mains. The excitation emf will be:
- (a) 2871 V
  - (b) 2653 V
  - (c) 2435 V
  - (d) 2217 V

86. Which of the following are the essential elements of an automatic control system?
1. Controller which normally incorporates power amplification
  2. A comparison device or error detector
  3. A measuring device
- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3
87. In transmission lines, non uniformity of current distribution is caused by:
- (a) Hall effect
- (b) Proximity effect
- (c) Faraday effect
- (d) Inductive effect
88. The ratio error regarding accuracy of a current transformer depends on:
1. Nominal ratio
  2. Secondary current
  3. Primary current
- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 1 and 3 only
- (d) 2 and 3 only

89. In power system relays the load shed depends on:
1. Self regulating factor  $d$
  2. Power deficit in percent  $D$
  3. System normal frequency  $f_s$
  4. Frequency at any time  $f$
- (a) 1, 2 and 3 only
- (b) 1, 2 and 4 only
- (c) 3 and 4 only
- (d) 1, 2, 3 and 4
90. Which one of the following is **not** a main block of solid-state relays?
- (a) Circuit breakers
- (b) Comparators
- (c) Time delay units
- (d) Level detectors
91. The full-load armature current of a 440 V shunt motor is 120 A . The armature resistance is 0.2  $\Omega$  and the speed is 800 rpm. If torque on the motor is reduced to 60 % of its full-load value and a resistor of 1.5  $\Omega$  is included in the armature circuit with field strength remaining same, the speed will be:
- (a) 700 rpm
- (b) 610 rpm
- (c) 520 rpm
- (d) 430 rpm

92. Corona loss is less when the shape of the conductor is:
- (a) Circular
  - (b) Flat
  - (c) Oval
  - (d) Square
93. A generating station has a connected load of  $450\text{ MW}$  and a maximum demand of  $250\text{ MW}$ ; the units generated being  $615 \times 10^6$  per annum. The demand factor will be nearly:
- (a) 0.48
  - (b) 0.56
  - (c) 0.64
  - (d) 0.72
94. Which power semiconductor switching device is having the property of uncontrolled turn on and off?
- (a) SCR
  - (b) BJT
  - (c) MOSFET
  - (d) Diode
95. In a *GTO* the n layer forms the:
- (a) Anode and Gate
  - (b) Cathode and Gate
  - (c) Cathode
  - (d) Gate



96. The *GTO* can be turned off by:
- (a) Positive gate signal
  - (b) Negative gate signal
  - (c) Negative anode and cathode voltage
  - (d) Removing gate signal
97. The *TRIAC* can be represented by two:
- (a) *SCRs* in anti parallel
  - (b) *SCRs* in parallel
  - (c) Diodes in anti parallel
  - (d) Diodes in parallel
98. Which terminal does *not* belong to thyristors?
- (a) Anode
  - (b) Cathode
  - (c) Gate
  - (d) Base

99. A closed-loop control is normally required to satisfy the steady-state and transient performance specifications of ac drives. The control strategy can be implemented by:
1. Scalar control: where the control variables are dc quantities and only their magnitudes are controlled
  2. Vector control: where both the magnitude and phase of the control variables are controlled

Which of the above statements is/ are correct?

- (a) 1 only
  - (b) 2 only
  - (c) Both 1 and 2
  - (d) Neither 1 nor 2
100. Consider the following statements regarding advantages of power electronics converters:
1. Increase efficiency of power converter due to less loss in power semiconductor devices
  2. Low reliability of power converter based system
  3. Life period of power converter circuit is long
  4. The size and weight of power electronics is less. Hence the installation cost is low

Which of the above statements are correct?

- (a) 1, 2 and 3 only
- (b) 1, 3 and 4 only
- (c) 1, 2 and 4 only
- (d) 2, 3 and 4 only