(Answer ALL questions)

56. In an open loop control system
   1. Output is independent of control input
   2. Output is dependent on control input
   3. Only system parameters have effect on the control output
   4. None of the above

57. The open loop transfer function $G(s)$ of a unity feedback control system is given as, $G(s) = [k(s+2/3)/s2(s+2)]$ From the root locus, it can be inferred that when k tends to positive infinity
   1. Three roots with nearly equal real parts exist on the left half of the s-plane
   2. One real root is found on the right half of the s-plane
   3. The root loci cross the jω axis for a finite value of $k; k \neq 0$
   4. Three real roots are found on the right half of the s-plane

58. A transfer function of a system is a Laplace transform of its :
   1. Square wave response
   2. Step response
   3. Ramp response
   4. Impulse response

59. The number of root loci branches which do not terminate at zero is given by
   1. The number of zeros
   2. The number of poles
   3. The number of zeros + The number of poles
   4. The number of zeros – The number of poles

60. _____ is a part of the human temperature control system
   1. Digestive system
   2. Perspiration system
   3. Ear
   4. Leg movement

61. The transient response, with feedback system,
   1. rises slowly
   2. rises quickly
   3. decays slowly
   4. decays quickly

62. Which of the following statements is correct for a system with gain margin close to unity or a phase margin close to zero?
   1. The system is relatively stable
   2. The system is highly stable
   3. The system is highly oscillatory
   4. None of the above

63. The frequency and time domain are related through which of the following?
   1. Laplace Transform and Fourier Integral
   2. Laplace Transform
   3. Fourier Integral
   4. Either (2) or (3)

64. A transformer under no-load operates with poor power factor because
   1. its leakage flux is very high
   2. it needs high reactive current to magnetise the iron core
   3. its real power demand for iron loss is much less than reactive power
   4. both (2) and (3)

65. If a single-phase, 100 kVA, 2000/200 V two-winding transformer is connected as an auto-transformer of rating 2000/2200 V, then it can deliver a power of
   1. 100 kVA
   2. 1000kVA
   3. 10 kVA
   4. 1100 kVA

NG 16 (GROUP A)

66. In a singly excited electro-mechanical system the excitation current is $i = l_{max} \sin \omega t$ and inductance of the stator winding is $L_{ss} = L_0 + L_2 \cos 2\theta$, where θ is the angle between the stator mmf axis and rotor position, then the developed torque is a function of
   1. $\sin \theta$
   2. $\sin 2\theta$
   3. $\cos \theta$
   4. $\cos 2\theta$

67. The DC generator that is capable of delivering rated terminal voltage equal to no-load induced emf i.e., $V_T = E_g$, at rated load condition is called
   1. shunt generator
   2. series generator
   3. cumulatively compounded generator
   4. differentially compounded generator

68. When the speed of a three-phase induction motor is controlled above base speed
   1. both developed torque and power doesn't remain constant
   2. developed torque remains constant but not power
   3. both developed torque and power remains constant
   4. developed power remains constant but not torque

69. Which of the following single-phase motors has a better speed-torque characteristic under both starting and running conditions
   1. split-phase motor
   2. split-phase motor with external resistance
   3. capacitor start motor
   4. capacitor start and capacitor run motor

70. Which of the following motors doesn't require a starter
   1. DC shunt motor
   2. Fractional Horse-power motors
   3. Three-phase induction motors of power rating above 5 kW
   4. Three-phase synchronous motor of 50 Hz power supply

71. A synchronous condenser under over-excited condition
   1. induces an emf lesser than supply voltage and draws leading current
   2. induces an emf higher than supply voltage and draws lagging current
   3. induces an emf lesser than supply voltage and draws lagging current
   4. induces an emf higher than supply voltage and draws leading current

72. If a capacitor is energised by a symmetrical square wave current source, then the steady state voltage across the capacitor will be a
   1. Square wave
   2. Triangular wave
   3. Step function
   4. Impulse function

73. If a pulse voltage of $V(t)$ of 4V magnitude and 2 seconds duration is applied to a pure inductor of 1.0H with zero initial current, the current (in amps) drawn at $t = 3$ seconds will be
   1. Zero
   2. 2
   3. 4
   4. 8

74. A 3-phase 3 wire supply feeds a load of three equal resistor connected in star. If one of the resistor is open circuited, then the percentage reduction in load will be
   1. 75
   2. 66.66
   3. 50
   4. 3.33

75. An RLC resonant circuit has a resonance frequency of 1.5MHz and a bandwidth of 10kHz. If $C = 150\,pF$, then the effective resistance of the circuit will be
   1. 29.5 Ω
   2. 14.75 Ω
   3. 9.4 Ω
   4. 4.7 Ω

76. Convolution of $x(t+5)$ with impulse function $(t-7)$ is equal to
    1. $x(t-12)$
    2. $x(t+12)$
    3. $x(t-2)$
    4. $x(t+2)$

77. Copper behaves as a
    1. conductor always
    2. conductor or dielectric depending on the applied electrical field strength
    3. conductor or dielectric depending on the frequency
    4. conductor or dielectric depending on the applied electric current density

78. A metal sphere with 1.0 m radius and a surface charge density of 10 Coulomb/m² is enclosed in a cube of 10 m side. The total outward electric flux normal to the surface of the cube is
    1. $40\,\pi$ Coulomb
    2. 10 Coulomb
    3. 5 Coulomb
    4. 0 Coulomb

79. Two infinite parallel metal plates are charged with equal surface charge densities of same polarity. The electric field in the gap between the plates is
    1. Same as that produced by one plate
    2. Double the field produced by one plate
    3. Dependent on the distance between the plates
    4. Zero

80. Two conducting loops, one large and another small face each other and a distance 'd' apart. A clockwise current 'I' is suddenly established in the larger loop. The direction of the induced current in the small loop will be
    1. clockwise
    2. anticlockwise
    3. depend on the magnitude of 'I'
    4. clockwise in one half and anticlockwise in another half

81. The type of magnetic force between two bipolar DC lines
    1. attractive
    2. repulsive
    3. zero
    4. vibrative

82. The following 8085 instructions clear the accumulator except :
    1. MVI A, 00
    2. SUB A
    3. XRA A
    4. XRI 00

83. All of the following 8085 instructions effectively perform a left shift except :
    1. CMA
    2. DAD H
    3. ADD A
    4. RLC

84. When just powered 'ON' the default value of the stack pointer (SP) register of
    1. 00 H
    2. 07 H
    3. 1F H
    4. 7F H

85. The instruction queue of 8086 is
    1. 2 byte long
    2. 4 byte long
    3. 6 byte long
    4. 32 byte long

86. The B register of 8051 is useful for
    1. addition only
    2. both addition and subtraction
    3. Multiplication only
    4. both multiplication and division

87. Three equal resistances are connected in the delta form. The change in their resistance values when equated to star form is
    1. one half
    2. twice
    3. three times
    4. one third

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88. If U is the set of semiconductor devices $U = \{DIODE, BJT, SCR, MOSFET, IGBT\}$, A is the set of voltage triggered device and B is the set of current triggered devices, then

1. $A \cap B = \{DIODE, BJT, SCR\}$ and $B \cap U = \{MOSFET, IGBT\}$

2. $A \cap B = \{BJT, SCR\}$ and $B \cap U = \{MOSFET, IGBT\}$

3. $A \cap U = \{MOSFET, IGBT\}$ and $B \cap U = \{BJT, SCR\}$

4. $A \cap B = \{DIODE, MOSFET, SCR\}$ and $B \cap U = \{BJT, IGBT\}$

89. Name the dc drive which is used in battery operated vehicles

1. Cyclo converter fed ac drive
2. Dual Converter fed dc drive
3. Chopper drive
4. Induction motor drive

90. The current waveform on the AC side of a single phase bridge converter supplying a load with infinite inductance, and operating with a firing angle of 45° has a distortion factor of

1. 1.27
2. 0.90
3. 0.64
4. 0.707

91. Two identical midpoint converter are built, A and B. They are connected to identical loads. While A and B are supplied from the same line, A operates close to the substation but B is located very far from it. In order to get similar load performance with triggering angles αA and αB,

1. $\alpha A = \alpha B$
2. $\alpha A < \alpha B$
3. $\alpha A > \alpha B$
4. $\alpha A + \alpha B = 90°$

92. A separately-excited dc motor, when fed from 1-phase full converter with firing angle, runs at a speed of N rpm. When this motor is fed from 1-phase semi converter but with the same firing angle as for full-converter, the motor speed is found to be 2N rpm. The value of firing angle is

1. 70.528
2. 75.572
3. 70
4. 69.88

93. Consider the following statements made with respect to use of a freewheeling diode in bridge converter
(1) It prevents regeneration
(2) It reduces displacement factor
(3) It prevents discontinuous conduction
Of these,

1. (1) and (3) are true but (2) is false
2. (1) and (2) are true but (3) is false
3. (2) and (3) are true but (1) is false
4. All are true

94. If the space phasor in space vector modulation traces a locus of a hexagon formed by joining the tips of the six possible phasors generated by an inverter. Which of the following statement is true?

1. The inverter switches at the frequency of the fundamental
2. The inverter generate the (000) space phasor
3. The fundamental is the highest possible for a given DC bus
4. The inverter generates the (111) space phasor

95. Mho relay is usually employed for the protection of

1. Short lines
2. Medium lines
3. Long lines
4. Any lines

96. In the case of transmission line protection, over current relay is used only upto

1. 110 KV
2. 220 KV
3. 50 KV
4. 1100 KV

97. The reverse power protection is applied for

1. over speed
2. excitation failure
3. turbine failure
4. stator earth fault

98. The need for maintaining adequate current margin in HVDC transmission control is

1. To avoid core saturation of Transformer
2. To provide power reversal
3. To avoid mode ambiguity
4. To reduce the harmonics

99. In monopolar HVDC link, negative polarity is preferred for the line due to

1. less skin effect
2. less corona loss
3. less radio interference.
4. Less real power loss

100. In a bipolar HVDC system 1000 MW power is transmitted into rectifier end to inverter end. If the operating voltage at the rectifier end is $\pm 500kV$, the current through the link is

1. 2000A
2. 500A
3. 750 A
4. 1000 A

101. The power reversal in HVDC link is achieved by

1. Current reversal
2. Voltage reversal
3. VDCOL operation
4. Opening and closing DC breakers

102. The worst effect of non-characteristic harmonics in HVDC transmission is

1. Core saturation of converter transformer
2. Insulation flashover
3. Power reversal
4. Communication channel failure

103. The relation between breakdown strength and gap distance in liquid dielectrics is V_b

1. K/d
2. Kd^n
3. Kd^{-n}
4. $(K_1 d + K_2)$

104. The BIL of a power system is usually chosen as

1. 25% to 30% more than the protective level offered by the protective devices (surge arresters etc.)
2. 50% more than the protective level offered by the protective devices (surge arresters etc.)
3. The minimum power frequency to withstand voltage of any apparatus or power equipment
4. The peak value of highest system voltages

105. Speed control in a DC machine by field control is employed normally for

1. achieving speeds greater rated speed
2. maintaining constant power output
3. machines which do not require frequent reversal
4. all of the above

106. For an optimally damped R-C divider, the damping resistance R_1 connected in hv arm is equal to (L = high voltage lead inductance, and C_g = equivalent ground capacitance)

1. $4\sqrt{\dfrac{L}{C_g}}$

2. $2\sqrt{\dfrac{L}{C_g}}$

3. $\sqrt{\dfrac{L}{C_g}}$

4. $1/2\sqrt{\dfrac{L}{C_g}}$

107. A Van de Graaff generator has a belt speed of 2.5 m/s, charge density of $10\,\mu c/m^2$ and a belt width of 2 m. The maximum charging current is

1. $50\,\mu A$
2. $5\,\mu A$
3. $2\,\mu A$
4. $12.5\,\mu A$

108. The candle power of a lamp is 130. A plane surface is placed at a distance of 3 meters from this lamp. Calculate the illumination on the surface when it is inclined to 45°.

1. 10.2 lux
2. 11.5 lux
3. 9.2 lux
4. 12.9 lux

109. Range of frequency used in dielectric heating is

1. 5 to 20 MHz
2. 20 to 40 MHz
3. 1 to 50 MHz
4. 40 to 100 MHz

110. In which of the following application D.C motors are still preferred?

1. High frequency operation
2. Reversibility
3. Variable speed drive
4. High starting torque

111. Two lamps 100 W and 60 W are connected in series across 230 V AC. Which statement is true?

1. 100 W lamp glow brighter
2. 60 W lamp glow brighter
3. Both lamps glow equally bright
4. None of the above

112. What is the voltage range used in single phase Electric traction system?

1. 2500V
2. 230kV
3. 1000V
4. 25kV

113. The system $y(n)+x(n)+y(n-1)$ is

1. Causal
2. Non causal
3. A continuous time system
4. A non linear system

114. The forced response of the system $y(n)-y(n-1)=u(n)$ is

1. $nu(n)$
2. $(n+1)u(n)$
3. $u(n)$
4. $u(n)-u(n-1)$

115. Which of the following filters has a monotonically decreasing frequency response?

1. Butterworth filter
2. Chebyshev filter – Type 1
3. Chebyshev filter – Type 2
4. FIR filter