PROVISIONAL ANSWER KEY
NAME OF THE POST:1) Assistant Professor, Power Electronics (AMQ-A)
(Advt. No. : 89/2015-16) Class II
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Note : Candidate must ensure the complaince to send all suggestion in the given format with reference to this paper with provisional answer key only. Any non compliance shall not be treated.

101. The value of V and I for the circuit sown in Figure-1 will be

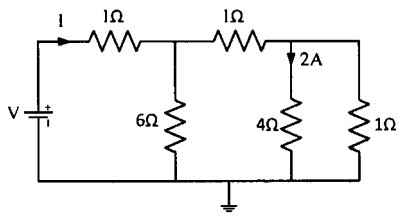

Figure-1

(A) 31 V, 13 A
(B) 28 V, 10 A
(C) 31 V, 10 A
(D) 29 V, 13 A

102. Which of these amplifiers is used in a digital to analog converter?
(A) Noninverter
(B) Voltage follower
(C) Summer
(D) Difference amplifier

103. Photoflash unit consists of which type of circuit?
(A) RLC
(B) LC
(C) RL
(D) RC

104. Figure-2 shows a general R-L circuit which is fed from a constant magnitude, variable frequency sinusoidal voltage source V_{in}. At 50 Hz, the R and L elements each have a voltage drop U_{rms}. If the frequency of the input voltage source is changed to 100 Hz, then new voltage drop across resistor 'R' will be

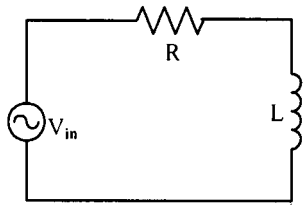

Figure-2

(A) $\sqrt{\frac{8}{5}}\ U_{rms}$
(B) $\sqrt{\frac{5}{8}}\ U_{rms}$
(C) $\sqrt{\frac{3}{2}}\ U_{rms}$
(D) $\sqrt{\frac{2}{5}}\ U_{rms}$

105. Which type of power is measured by a wattmeter?
(A) Instantaneous
(B) RMS
(C) Average
(D) Instantaneous, RMS and average

106. The network function $Z(s) = \frac{(s+2)}{(s+1)(s+3)}$ represents an
(A) RC impedance
(B) RL impedance
(C) RC impedance and RL admittance
(D) RL impedance and RC admittance

107. When a second order control system is subjected to a unit step input, the value of $\xi = 0.5$ and $\omega_n = 6$ rad/sec. The rise time and peak overshoot will be
(A) 0.202 sec; 10.2%
(B) 0.305 sec; 20.3%
(C) 0.403 sec; 16.3%
(D) 0.489 sec; 18.5%

108. A system can be completely described by a transfer function if is
(A) Non linear and continuous
(B) Linear and time-varying
(C) Non linear and time invariant
(D) Linear and time invariant

109. What will be the overall transfer function for the block diagram shown in Figure-3

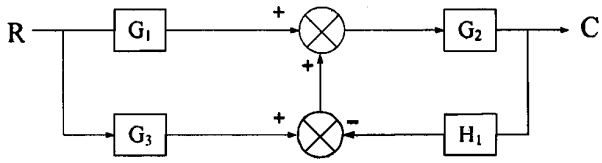

Figure-3

(A) $\frac{G_1G_3 + G_2G_3}{1 + G_1H_1}$ (B) $\frac{G_1H_1 + G_2G_3}{1 + G_2G_3}$

(C) $\frac{G_1G_2 + G_2G_3}{1 + G_2H_1}$ (D) $\frac{G_1G_2 + G_2G_3}{1 + G_1H_1}$

110. How many roots with positive real parts does the characteristics equation have? $s^5 + 1.5s^4 + 2s^3 + 4s^2 + 5s + 10 = 0$

(A) 1 (B) 2

(C) 3 (D) 4

111. The point on the Bode plot, where two asymptotic lines meet is known as

(A) Corner frequency

(B) Break frequency

(C) Either corner or break frequency

(D) Neither corner not break frequency

112. The gain margin of a unity feedback control system with the open loop transfer function $G(S) = \frac{s+1}{s^2}$ is

(A) 0 (B) $\frac{1}{\sqrt{2}}$

(C) $\sqrt{2}$ (D) infinity

113. The emitter of a transistor is generally doped the heaviest because it

(A) has to dissipate maximum power

(B) has to supply more number of charge carriers.

(C) is the first region of the transistor

(D) must possess low resistance

114. Consider the following statements:

(i) BJT is a current controlled devices with a high input impedance and high gain band width.

(ii) FET is a voltage controlled devices with high input impedance and low gain band width.

(iii) UJT is a negative resistance devices and can be used as an oscillator.

(iv) BJT, UJT and FET can all be used for amplification.

Which of the statements given above are correct?

(A) i and ii (B) ii and iii

(C) iii and iv (D) i and iv

115. What kind of filter can be used to select a signal of one particular radio station?

(A) Low pass
(B) High pass
(C) Band pass
(D) Band stop

116. The most commonly used amplifier in sample and hold circuit is

(A) a unity gain inverting amplifier
(B) a unity gain non-inverting amplifier
(C) an inverting amplifier with a gain of 10
(D) an inverting amplifier with a gain of 100

117. A full wave rectifier supplies a load of 1 kΩ. The AC voltage applied to the diodes is 200-0-200 V_{rms}. If diode resistance is neglected, then what will be average dc current in load?

(A) 200 mA
(B) 180 mA
(C) 150 mA
(D) 250 mA

118. Darlington pair arrangement provides _____

(A) very high β value
(B) very low β value
(C) same β as of one transistor
(D) sum of the two β values

119. A differentiator and an oscillator using Op-amp are examples of:

(A) zero and first order respectively
(B) first and zero order respectively
(C) zero and second order respectively
(D) first and second order respectively

120. The inductance of a 25A electrodynamic ammeter changes uniformly at the rate of 0.0035 μH/degree. The spring constant is 10^{-6} N-m/degree. What will be the angular deflection at full scale?

(A) 95°
(B) 71°
(C) 125°
(D) 140°

121. The material of the core of the current transformer (C.T.) should be of

(A) High reluctance and high core loss
(B) Low reluctance and low core loss
(C) High reluctance and low core loss
(D) Low reluctance and high core loss

122. A 3-phase 500 V motor load has a power factor of 0.4. Two wattmeters are connected to measure the input. They show the input to be 30 kW. What will be the reading of each wattmeter?

(A) 34.85 kW, -4.85 kW
(B) -34.85 kW, 4.85 kW
(C) 34.85 kW, 34.85 kW
(D) 34.85 kW, 4.85 kW

123. The energy stored in the magnetic field of a solenoid 30 cm long and 3 cm diameter wound with 1000 turns of wire carrying a current of 10A is

(A) 0.015 joule
(B) 0.15 joule
(C) 0.5 joule
(D) 1.15 joule

124. A thermistor has a resistance of 13.5 kΩ at 25°C. What will be the output thermistor voltage V_0 for a given bias resistance value 1.5 kΩ and DC potential voltage 18 V?

(A) 1 V
(B) 3.8 V
(C) 2.8 V
(D) 1.8 V

125. The short pitch winding for an alternator gives

(A) improved waveform of the generated emf per phase
(B) reduced value of self-inductance of the winding
(C) increased rating of the machine
(D) reduced tooth ripples

126. Which of the following represents the range of temperatures for thermocouples?

(A) 0°C to 750°C
(B) -200°C to 350°C
(C) -200°C to 1250°C
(D) -200°C to 2000°C

127. A converter which can operate in both 6-pulse and 3-pulsc modes is a

(A) 1-phase full-wave converter
(B) 3-phase half-wave converter
(C) 3-phase semi converter
(D) 3-phase full wave-converter

128. The binary equivalent of hexadecimal number 4FAD is

(A) 0101 1111 0010 1100
(B) 0100 1111 0010 1100
(C) 0100 1111 1010 1101
(D) 0100 1110 0010 1101

129. Which one of the following statements is NOT TRUE for a continuous time causal and stable LTI system?

(A) All the poles of the system must lie on the left side of the jω axis.
(B) Zeros of the system can lie anywhere in the s-plane.
(C) All the poles must lie within 1 sec.
(D) All the roots of the characteristic equation must be located on the left side of the jω axis.

130. The Boolean expression $ABCD + A\overline{B}CD + ABC\overline{D} + A\overline{B}C\overline{D}$ is equivalent to

(A) A
(B) AC
(C) ABC
(D) ABCD

131. For the circuit shown in the Figure-4 the boolean expression for the output Y in terms of the input P, Q, R and S is

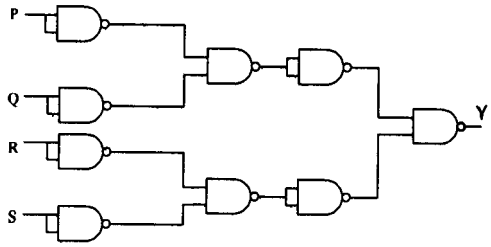

Figure-4

(A) $\overline{P} + \overline{Q} + \overline{R} + \overline{S}$
(B) $P + Q + R + S$
(C) $(\overline{P} + \overline{Q})(\overline{R} + \overline{S})$
(D) $(P + Q)(R + S)$

132. DAD H instruction can be used to shift _____ by one bit the _____ bit contents of HL register pair.

(A) Left, 16
(B) right, 8
(C) right, 16
(D) none of the above

133. Maximum power loss occurs during

(A) Delay time
(B) Rise time
(C) Spread time
(D) Turn off time

134. Resonant mode power supplies in comparison to square mode

(A) have smaller component count
(B) have negligible power loss
(C) do not cause overvoltage's
(D) slower in control action

135. Which is not a 8085 interrupts?

(A) RST7.5
(B) ADD
(C) RST 5.5
(D) TRAP

136. The interpolation formula to get the discrete time fourier transform (DTFT) from discrete fourier transform (DFT) coefficients is called

(A) Synchronizing function
(B) ratio of two sine functions
(C) Lagrange interpolation
(D) ratio of two synchronizing functions

137. DFT coefficients are Z transform evaluated at N equally spaced points in Z domain on

(A) unit circle
(B) half circle
(C) circle with radius 2
(D) circle with radius 1/2

138. The plates of VF display are coated with a _____ fluorescent material that glows when bombarded by electrons

(A) barium oxide
(B) zinc chloride
(C) zinc sulfate
(D) barium chloride

139. Which layer is present in Controller Area Network (CAN)

(A) Physical layer
(B) Transfer layer
(C) Object layer
(D) Invisible layer

140. Which is not an interfacing device used to connect processor to the peripheral device?

(A) SPI
(B) RS422
(C) Ethernet
(D) Wi Fi

141. In a transmission line, reflection will be zero if it is terminated by an impedance

(A) equal to twice the characteristic impedance
(B) equal to the characteristic impedance
(C) less than characteristic impedance
(D) equal to one fourth the characteristic impedance

142. A rotating electrical machine having its self inductance of both the stator and the rotor windings, independent of rotor position will definitely not develop

(A) starting torque
(B) synchronizing torque
(C) hysteresis torque
(D) reluctance torque

143. For a P-pole machine, the relation between electrical and mechanical degrees is given by

(A) $\theta_{elec} = (2/P) * \theta_{mech}$
(B) $\theta_{elec} = (4/P) * \theta_{mech}$
(C) $\theta_{elec} = (P) * \theta_{mech}$
(D) $\theta_{elec} = (P/2) * \theta_{mech}$

144. In a dc machine, which of the following statement is true?

(A) Compensating winding is used for neutralizing armature reaction while interpole winding is used for producing residual flux
(B) Compensating winding is used for neutralizing armature reaction while interpole winding is used for improving commutation
(C) Compensating winding is used for improving commutation while interpole winding is used for neutralizing armature reaction
(D) Compensating winding is used for improving commutation while interpole winding is used for producing residual flux

145. Corona loss is more in

(A) Unstranded conductor
(B) ACSR
(C) Stranded conductor
(D) Transposed conductor

146. A bulb in a staircase has two switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and also can be turned OFF by any one of the switches irrespective of the state of the other switch. The logic of switching of the bulb resembles

(A) an AND gate
(B) an OR gate
(C) an XOR gate
(D) a NAND gate

147. A 4-pole machine has 60 slots and 8 conductors per slot. The total flux per pole is 20mWb. The machine is a DC machine with lap connected winding and a relative speed of 1500 rpm between field flux and armature windings. What will be the generated armature voltage?

(A) 200 V
(B) 180 V
(C) 280 V
(D) 240 V

148. On the Bode phase plot the slope of $[1 + j10\omega - \omega^2/25]^2$ is

(A) 45°/decade
(B) 90°/decade
(C) 135°/decade
(D) 180°/decade

149. If the frequency of input voltage of a transformer is increased keeping the magnitude of voltage unchanged, then

(A) both hysteresis loss and eddy current loss in the core will increase
(B) hysteresis loss will increase but eddy current loss will decrease
(C) hysteresis loss will decrease but eddy current loss will increase
(D) hysteresis loss will decrease but eddy current loss will remain unchanged

150. The fulfload copper loss and iron loss of a transformer are 6400 W and 5000 W respectively. The copper loss and iron loss at half load will be, respectively

(A) 3200 W and 2500 W
(B) 3200 W and 5200 W
(C) 1600 W and 1250 W
(D) 1600 W and 5000 W

151. Regarding Ward-Leonard system of speed control, which statement is false?

(A) it is usually used where wide and very sensitive speed control is required
(B) it is used for motors having ratings from 750 kw to 4000 kw
(C) capital outlay involved in the system is right since it uses two extra machines
(D) it gives a speed range of 10:1 but in one direction only

152. Three single-phase transformers are connected to form 3-phase transformer bank as shown in Figure-5. The transformer connection will be represented by

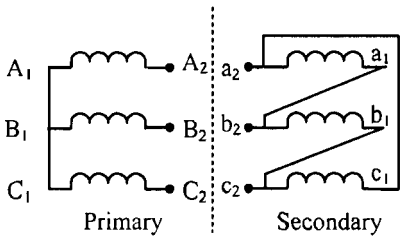

Figure-5

(A) Yd0
(B) Yd1
(C) Yd6
(D) Yd11

153. A 3-phase, 4-pole, 1440 rpm, 50 Hz induction motor has star connected rotor winding having a resistance of 0.2 Ω/phase and standstill leakage reactance of 1 Ω/phase. The stator is energized at rated voltage and frequency. The rotor power factor at starting will be

(A) 0.293 (B) 0.25
(C) 0.532 (D) 0.196

154. Two identical synchronous machines A and B, running at the same speed, are linked through an inductor, as shown in Figure-6

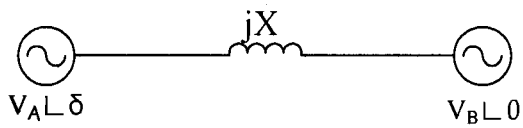

Figure-6

Machine A will supply active and reactive power to machine B when δ is

(A) positive and $V_A < V_B$ (B) negative and $V_A > V_B$
(C) negative and $V_A < V_B$ (D) positive and $V_A > V_B$

155. The direction of rotation of 3-phase induction motor is clockwise when it is supplied with 3-phase sinusoidal voltage having phase sequence A-B-C. For counter clockwise rotation of the motor, the phase sequence of the power supply should be

(A) B-C-A (B) C-A-B
(C) A-C-B (D) B-C-A and C-A-B.

156. Determine the output voltage of the following regulator in Figure-7 (assuming that the input voltage is sufficiently high to allow normal operation).

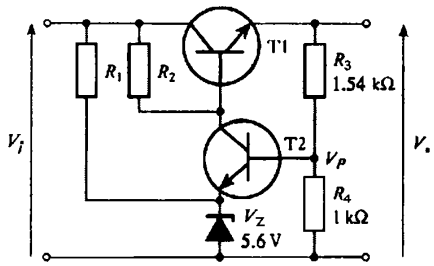

Figure-7

(A) 11 V (B) 12 V
(C) 15 V (D) 16 V

157. A 220V, 200A, 800 rpm dc separately excited motor has an armature resistance of 0.06 Ω. The motor armature is fed from a variable voltage source with an internal resistance of 0.04 Ω. Calculate internal voltage of the variable voltage source when the motor is operating in regenerative braking at 80% of the rated motor torque and 600 rpm.

(A) 140 V (B) 125 V
(C) 165V (D) 135.2 V

158. What logic function corresponds to the following arrangement of Figure-8 ?

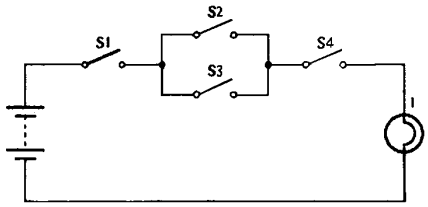

Figure-8

(A) L = S1 OR (S2 AND S3) OR S4
(B) L = (S1 OR S2) AND (S3 OR S4)
(C) L = (S1 AND S2) OR (S3 AND S4)
(D) L = S1 AND (S2 OR S3) AND S4

159. Figure-9 shows plots of speed v/s motor and load torques. Comment on the stability of the operating points A and B.

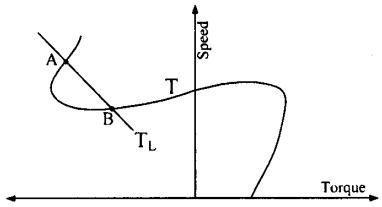

Figure-9

(A) Unstable, Stable
(B) Stable, Stable
(C) Stable, Unstable
(D) cannot say about stability

160. When induction motor drive from a source of fixed frequency then regenerative braking is possible only for
(A) speed less than synchronous speed,
(B) speed greater than synchronous speed,
(C) speed may be greater or less than synchronous speed,
(D) None of the above.

161. Which of the following is the preferred triggering pattern of thyristor?
(A) Thermal triggering
(B) High forward voltage triggering
(C) Gate triggering
(D) dv/dt triggering

162. What is the resolution of a 12-bit data converter?
(A) 0.00024%
(B) 0.0041%
(C) 0.024%
(D) 0.41%

163. Oscillation frequency of UJT oscillator for charging circuit $R_E C$ is given by:

(A) $f = \dfrac{1}{R_E C \ln\left(\dfrac{1}{1+n}\right)}$
(B) $f = \dfrac{1}{R_E C \ln\left(\dfrac{1}{1-n}\right)}$
(C) $f = \dfrac{1}{R_E \ln\left(\dfrac{1}{1+n}\right)}$
(D) $f = \dfrac{1}{R_E \ln\left(\dfrac{1}{1-n}\right)}$

164. Figure-10 shows two similar thyristors, each rated 500 A (continuous) sharing a load current. Current through thyristor Y is 120 A. the current through thyristor X will be nearly _____ A.

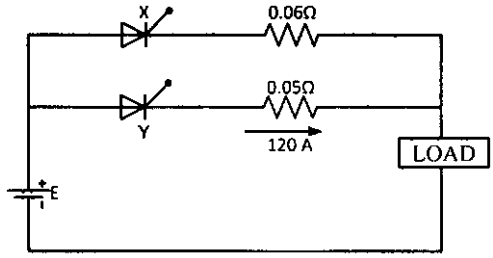

Figure-10

(A) 150 A
(B) 50 A
(C) 200 A
(D) 100 A

165. For a fully transposed transmission line
(A) positive, negative and zero sequence impedances are equal
(B) positive and negative sequence impedances are equal
(C) zero and positive sequence impedances are equal
(D) negative and zero sequence impedances are equal

166. The conduction loss versus device current characteristic of a power MOSFET is best approximated by
(A) a straight line
(B) a rectangular hyperbole
(C) a parabola
(D) an exponentially decaying function

167. The cut-off frequency of the following circuit shown in Figure-11 is

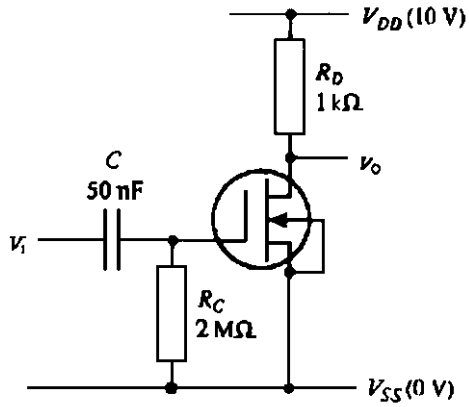

Figure-11

(A) 0.63 Hz
(B) 1.6 Hz
(C) 3.6 Hz
(D) 10 Hz

168. What will the peak value of currents through capacitor and main thyristor, respectively in Class-D commutation for the following circuit parameter: V_S =230 V. L=20 μH and C=40 μF and a constant load current of 120 A.

(A) 120 A, 120 A
(B) 225.22 A, 445.22 A
(C) 325.22 A, 445.22 A
(D) 435.33A, 224.44A

169. The current in a 25 mH inductor changes at a constant rate of 7 A/s. What voltage is induced across this coil?

(A) 3.57 mV
(B) 175 mV
(C) 350 mV
(D) 1.75 V

170. Which is not a gate driver IC?

(A) MCT2E
(B) TLP250
(C) LM741
(D) TLP300

171. In the simple lamp dimmer shown in Figure-12 here, what method of power control is being used?

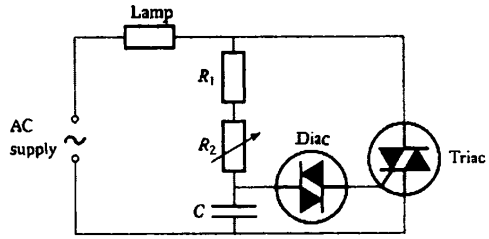

Figure-12

(A) proportional control
(B) phase control
(C) burst firing
(D) feedback control

172. A three-phase fully controlled thyristor bridge converter is used as line commutated inverter to feed 50 kW power 420 V dc to a three phase, 415 V (line), 50 Hz ac mains. Consider dc link current to be constant. The rms current of the thyristor is

(A) 119.05 A
(B) 79.37 A
(C) 68.73 A
(D) 39.68 A

173. A step down chopper is operated in the continuous conduction mode in steady state with a constant duty ratio D. If V_0 is the magnitude of the DC output voltage and if Vs is the magnitude of the input voltage, the ratio V_0/Vs is given by

(A) D
(B) l-D
(C) l/(l-D)
(D) D/(l-D)

174. A 20-pole alternator is having 180 identical stator slots with 6 conductors in each slot. All the coils of a phase are in series. If the coils are connected to realize single-phase winding, the generated voltage is VI .If the coils are reconnected to realize three-phase star-connected winding, the generated phase voltage is V2 . Assuming full pitch, single-layer winding, the ratio V1 / V2 is

(A) $1/\sqrt{3}$ (B) 2

(C) $\sqrt{3}$ (D) $\frac{1}{2}$

175. The given Figure-13 shows a step-down chopper switched at 1 kHz with a duty ratio D = 0.5. The maximum value of ripple current is:

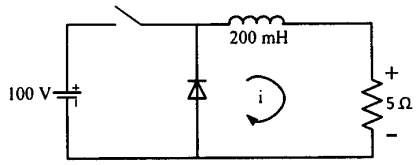

Figure-13

(A) 10 A (B) 0.5 A

(C) 0.125 A (D) 0.25 A

176. In the circuit shown in Figure-14 , the switch is operated at duty cycle of 0.5. A large capacitor is connected across the load. The inductor current is assumed to be continuous. The average voltage across the load and the average current through the diode will respectively be

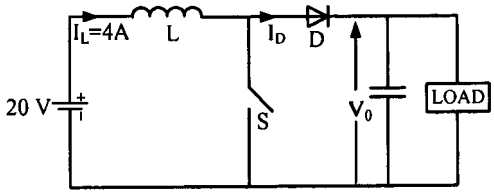

Figure-14

(A) 10 V. 2 A (B) 10V, 8 A

(C) 40 V, 2 A (D) 40 V, 8 A

177. For enhancing the power transmission in along EHV transmission line, the most preferred method is to connect a

(A) Series inductive compensator in the line

(B) Shunt inductive compensator at the receiving end

(C) Series capacitive compensator in the line

(D) Shunt capacitive compensator at the sending end

178. A negative sequence relay is commonly used to protect

(A) an alternator (B) an transformer

(C) a transmission line (D) a bus bar

179. In a PWM inverter, f_0 and f are the frequencies in Hz for the carrier signal and reference signal respectively. Then the number of pulses per half cycle is

(A) $N=f/f_0$, (B) $N=f/2f_0$,
(C) $N=f_0/2f$, (D) $N=f_0/f$

180. The separately excited dc motor in the Figure-15 below has a rated armature current of 20A and a rated armature voltage of 150V. An ideal chopper switching at 5 kHz is used to control the armature voltage. If a L_a = 0 lmH, $R_a = 1\Omega$, neglecting armature reaction, the duty ratio of the chopper to obtain 50% of the rated torque at the rated speed and the rated field current is

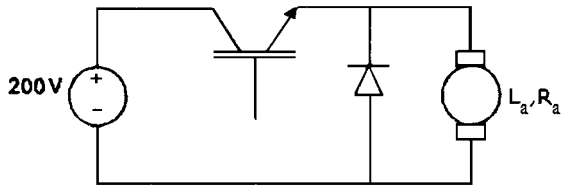

Figure-15

(A) 0.4 (B) 0.5
(C) 0.6 (D) 0.7

181. A single phase full wave AC voltage controller has a resistive load of 20 Ω while the input voltage is 220V at 50 Hz. What will be the rms value of load voltage if the firing angles of each of the antiparallel thyristors be 90°?

(A) 155.59 V (B) 165.04 V
(C) 178.32 V (D) 11 V

182. An 8-pole, 3-phase, 50 Hz induction motor is operating at a speed of 700 rpm. The frequency of the rotor current of the motor in Hz is

(A) 1.5 Hz (B) 3.56 Hz
(C) 48.5 Hz (D) 51.5 Hz

183. A three-phase, 4-pole, self excited induction generator is feeding power to a load at a frequency f_1. If the load is partially removed, the frequency becomes f_2. If the speed of the generator is maintained at 1500 rpm in both the cases, then

(A) $f_1\ f_2 > 50$ Hz and $f_1 > f_2$ (B) $f_1 < 50$ Hz and $f_2 > 50$ Hz
(C) $f_1\ f_2 < 50$ Hz and $f_2 > f_1$ (D) $f_1 > 50$ Hz and $f_2 < 50$ Hz

184. In a single phase to single phase cycloconverter, if α_1 and α_2 are the trigger angles of positive converter and negative converter, then

(A) $\alpha_1 + \alpha_2 = \frac{\pi}{2}$ (B) $\alpha_1 + \alpha_2 = \pi$

(C) $\alpha_1 + \alpha_2 = \frac{3\pi}{2}$ (D) $\alpha_1 + \alpha_2 = 2\pi$

185. A 10 kHz even-symmetric square wave is passed through a bandpass filter with centre frequency at 30 kHz and 3 dB passband of 6 kHz. The filter output is
(A) a highly attenuated square wave at 10 kHz.
(B) nearly zero.
(C) a nearly perfect cosine wave at 30 kHz.
(D) a nearly perfect sine wave at 30 kHz

186. Which is not a part of transformer design steps?
(A) Load power estimation
(B) Area product calculation
(C) Window area check
(D) None of the above

187. For a specified input voltage and frequency, if the equivalent radius of the core of a transformer is reduced by half, the factor by which the number of turns in the primary should change to maintain the same no load current is
(A) 1/4
(B) 1/2
(C) 2
(D) 4

188. The A & B constants of a π-circuit having a 500 Ω resistance for the shunt branch at the sending end, 1000 Ω resistance for the shunt branch at the receiving end and 100 Ω resistance for the series branch are
(A) $A = 1.1 \angle 0° \Omega$ and $B = 100 \angle 0° \Omega$
(B) $A = 1.2 \angle 0° \Omega$ and $B = 50 \angle 0° \Omega$
(C) $A = 1.3 \angle 0° \Omega$ and $B = 50 \angle 0° \Omega$
(D) $A = 1.4 \angle 0° \Omega$ and $B = 100 \angle 0° \Omega$

189. If the receiving end voltage is 220 kV then the no load sending end voltage and the voltage rise from sending end to receiving end for a 50 Hz, 300 km long line will be
(A) 209.14 kV, 6268 volts/phase
(B) 418.28 kV, 8152 volts/phase
(C) 418.28 kV, 6268 volts/phase
(D) 209.14 kV, 8152 volts/phase

190. Corona loss is _____
(A) inversely proportional to system frequency
(B) directly proportional to system frequency
(C) independent to system frequency
(D) directly proportional to square root of system frequency

191. A network with different branches admittances is shown in Figure-16. What will be Y_{bus} matrix for this network?

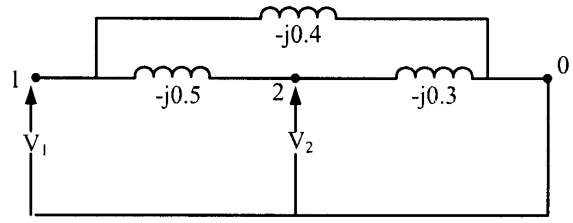

Figure-16

(A) $\begin{bmatrix} -j0.9 & +j0.5 \\ +j0.5 & -j0.8 \end{bmatrix}$ (B) $\begin{bmatrix} -j0.1 & +j0.5 \\ +j0.7 & -j0.8 \end{bmatrix}$

(C) $\begin{bmatrix} -j0.5 & +j0.5 \\ +j0.5 & -j0.5 \end{bmatrix}$ (D) $\begin{bmatrix} -j0.0 & +j0.2 \\ +j0.3 & -j0.4 \end{bmatrix}$

192. A set of simultaneous non-linear algebraic equation can be solved by
(A) Fourier series method (B) Gauss-seidel method
(C) Iterative techniques (D) (B) & (C) both

193. The line currents in a three-phase system are $I_a=5\angle 60°$ A, $I_b=5\angle -60°$ A and $I_c=0$. What will be the symmetrical component matrix of current?

(A) $\begin{bmatrix} I_{a0} \\ I_{a1} \\ I_{a2} \end{bmatrix} = \begin{bmatrix} 1.667\angle 0° \\ 3.33\angle 60° \\ 1.667\angle 120° \end{bmatrix}$ (B) $\begin{bmatrix} I_{a0} \\ I_{a1} \\ I_{a2} \end{bmatrix} = \begin{bmatrix} 4.657\angle 0° \\ 3.33\angle 60° \\ 3.667\angle 120° \end{bmatrix}$

(C) $\begin{bmatrix} I_{a0} \\ I_{a1} \\ I_{a2} \end{bmatrix} = \begin{bmatrix} 5.257\angle 0° \\ 8.33\angle 60° \\ 1.667\angle 120° \end{bmatrix}$ (D) $\begin{bmatrix} I_{a0} \\ I_{a1} \\ I_{a2} \end{bmatrix} = \begin{bmatrix} 11.257\angle 0° \\ 8.33\angle 60° \\ 1.467\angle 120° \end{bmatrix}$

194. A 50 Hz generator of reactance 1 *pu* is connected to an infinite bus through a line of reactance 0.5 *pu*. The generator e.m.f (E) is 1.1 *pu* and voltage of infinite bus is V=l *pu*. The inertia constant is 5 MW-sec/MVA. The generator is loaded to 50% of the maximum power limit. What will be the frequency of natural oscillations?
(A) 0.49 Hz (B) 0.71 Hz
(C) 0.89 Hz (D) 0.57 Hz

195. The converter used in static synchronous compensator (STATCOM) can be_____
(A) voltage- sourced
(B) current-sourced
(C) voltage-sourced or current-sourced
(D) Independent-sourced

196. The undesirable property of an electrical insulating material is
(A) high dielectric strength
(B) high relative permittivity
(C) high thermal conductivity
(D) high insulation resistivity

197. The heating element to be used in a furnace employed for heating around 1,600° C should be of material
(A) nichrome
(B) eureka
(C) molybdenum
(D) silicon-carbide

198. The basic elements of an electric drive are:
(A) electric motor and the transmission system
(B) electric motor, the transmission and control system
(C) the transmission and control system
(D) electric motor and conversion equipment

199. Which of the following statement is correct?
(A) Ladder logic is a PLC graphical programming technique introduced in the last 10 years.
(B) A ladder logic program is hard to analyze because it is totally different when compared with the equivalent relay logic solution.
(C) The number of ladder logic virtual relays and input and output instructions is limited only by memory size.
(D) The number of contacts for a mechanical relay is limited to number of coils on the relay.

200. Which one of the following statements is true for all real symmetric matrices?
(A) All the eigenvalues are real.
(B) All the eigenvalues are positive,
(C) All the eigenvalues are distinct.
(D) Sum of all the eigenvalues is zero.