Part - B : GENERAL ENGINEERING (Electrical)

101. A lamp having mean spherical candle power of 800 is suspended at a height of 10 m. Calculate the illumination just below the lamp.

    (A) 8000 lux   (B) 8 lux

    (C) 80 lux   (D) 800 lux

102. Hydrogen is used in large alternators mainly to :

    (A) reduce eddy current losses

    (B) reduce distortion of wave form

    (C) cool the machine

    (D) strengthen the magnetic field

103. Two wires A and B have the same cross-section and are made of the same material. $R_A = 800\ \Omega$ and $R_B = 100\ \Omega$. The number of times A is longer than B is :

    (A) 5   (B) 6   (C) 2   (D) 4

104. In the circuit shown in figure, find the transient current i(t) when the switch is closed at t = 0. Assume zero initial condition.
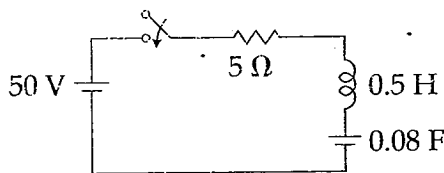
    (A) $50\ t\ e^{-0.5t}$ (B) $50\ t\ e^{-5t}$

    (C) $100\ t\ e^{-5t}$ (D) $100\ t\ e^{-0.5t}$

105. The Ebers - Moll model is applicable to :

    (A) JFET   (B) BJT

    (C) NMOS transistor   (D) UJT

106. A d.c. voltmeter has a sensitivity of 1000 Ω/watt. When it measure half full scale in 100 V range, the current through the voltmeter will be :

   (A) 50 mA   (B) 100 mA

    (C) 1 mA   (D) 0.5 mA

107. A delta - star transformer has a phase to phase voltage transformation ratio of a : 1 [delta phase : star phase]. The line to line voltage ratio of star - delta is given by :

    (A) $\dfrac{a}{1}$ (B) $\dfrac{\sqrt{3}}{\sqrt{a}}$

    (C) $a\dfrac{\sqrt{3}}{1}$ (D) $\dfrac{\sqrt{3}}{a}$

108. Which of the following motors can be run on A.C. as well as D.C. supply ?

    (A) Reluctance motor

    (B) universal motor

    (C) Repulsion motor

    (D) synchronous motor

109. The power factor of the circuit shown in figure :
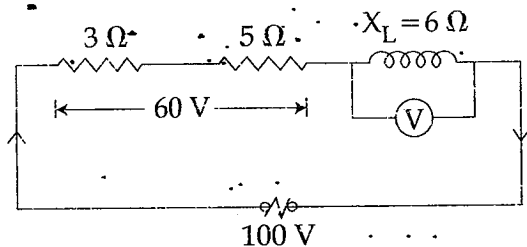
    (A) 0.75 lagging   (B) 0.6 lagging

    (C) 0.3 lagging   (D) 0.8 lagging

110. The power factor of an a.c. circuit is given by :

    (A) $\dfrac{R}{Z}$ (B) $\dfrac{X_L}{R}$ (C) $\dfrac{Z}{R}$ (D) $\dfrac{R}{X_L}$

111. A synchronous motor working at leading power factor can be used as :

    (A) mechanical synchronizer

    (B) voltage booster

    (C) phase advancer

    (D) noise generator

112. A 150 V d.c. motor of armature resistance 0.4 Ω has back emf of 142 V. The armature current is :

    (A) 100 A   (B) 10 A

    (C) 20 A   (D) 150 A

113. As compared to full-wave rectifier using two diodes, the four diode bridge rectifier has the dominant - advantage of :
(A) higher efficiency
(B) higher current carrying capacity
(C) lower peak inverse voltage requirement
(D) lower ripple factor

114. Speed of the megger is kept at :
(A) 160 rpm
(B) 100 rpm
(C) 120 rpm
(D) 140 rpm

115. Two 100 W, 200 V lamps are connected in series across a 200 V supply. The total power consumed by each lamp will be watts :
(A) 200 (B) 25 (C) 50 (D) 100

116. The Biot-Savart's law is a general modification of :
(A) Faraday's laws
(B) Kirchhoff's law
(C) Lenz's law
(D) Ampere's law

117. The active and reactive powers of an inductive circuit are 60 W and 80 VAR respectively. The power factor of the circuit is :
(A) 0.8 lag
(B) 0.5 lag
(C) 0.6 lag
(D) 0.75 lag

118. For which of the following the excitation control method is satisfactory ?
(A) Long lines
(B) Low voltage lines
(C) High voltage lines
(D) Short lines

119. The type of protection that does not respond to faults occurring beyond its zone even though the fault current may pass thro' the zone is :
(A) Back-up protection
(B) Busbar protection
(C) Unit protection
(D) Generator protection

120. If F is the load factor, the loss load factor is given by :
(A) $0.35\,F + 0.7\,F^2$
(B) $0.25\,F + 0.75\,F^2$
(C) $0.25\,F^2 + 0.85\,F$
(D) $0.75\,F + 0.20\,F^2$

121. In a $3\frac{1}{2}$ digit voltmeter, the largest number that can be read is :
(A) 9 9 9 9
(B) 0 9 9 9
(C) 1 9 9 9
(D) 5 9 9 9

122. In suburban services as compared with urban service :
(A) the coasting period is smaller but free running period is longer
(B) the coasting period is smaller
(C) the coasting period is longer
(D) the coasting period and free running periods are same

123. Quadrilateral speed time curve is used for :
(A) goods line service
(B) sub urban service
(C) urban service
(D) main line service

124. Which of the following motor will give relatively high starting torque ?
(A) Shaded pole motor
(B) Capacitor start motor
(C) Capacitor run motor
(D) Split phase motor

125. The current in reverse bias in P - N junction diode may be :
(A) between 2A and 5A
(B) few micro or nano amperes
(C) few milli amperes
(D) between 0.2 A and 2A

126. The repulsion-start induction-run motor is used because of :
(A) high starting torque
(B) good power factor
(C) high efficiency
(D) minimum cost

127. Which of the following is non-linear circuit parameter ?
(A) Transistor
(B) Inductance
(C) Condenser
(D) Wire wound resistor

128. The B – H curve is used to find the mmf of this section of the magnetic circuit. The section is :

(A) vacuum

(B) iron part

(C) air gap

(D) both iron part and air gap

129. A terminal where three or more branches meet is known as :

(A) mesh (B) node

(C) terminus (D) loop

130. For V-curves for a synchronous motor the graph is drawn between :

(A) armature current and power factor

(B) field current and armature current

(C) terminal voltage and load factor

(D) power factor and field current

131. Bundled conductors in EHV transmission system provide :

(A) increased corona loss

(B) increased line reactance

(C) reduced line capacitance

(D) reduced voltage gradient

132. Welding is injurious to eye because of :

(i) infrared radiation

(ii) ultraviolet radiation

Among the above two, choose the correct one from the following choices :

(A) both are wrong

(B) (i) alone is correct

(C) (ii) alone is correct

(D) both are correct

133. The rated speed of a given d.c. shunt motor is 1050 r.p.m. To run this machine at 1200 r.p.m the following speed control scheme will be used :

(A) Varying frequency

(B) Armature circuit resistance control

(C) Field resistance control

(D) Ward-Leonard control

134. After closing the switch 's' at t = 0, the current i (t) at any instant 't' in the network shown in the figure :
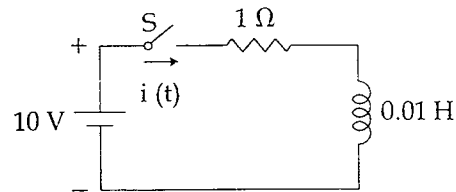
(A) $10 - 10\ e^{-100t}$ (B) $10 + 10\ e^{100t}$

(C) $10 - 10\ e^{100t}$ (D) $10 + 10\ e^{-100t}$

135. To increase the range of an a.c. ammeter you would use :

(A) A condenser across the meter

(B) Current transformer

(C) A potential transformer

(D) An inductance across the meter

136. The voltage across 5 – H inductor is

$$V(t) = \begin{cases} 30\ t^2, & t > 0 \\ 0, & t < 0 \end{cases}$$

Find the energy stored at t = 5 s. Assume zero initial current.

(A) 312.5 kJ (B) 0.625 kJ

(C) 3.125 kJ (D) 156.25 kJ

137. The energy stored in the magnetic field of a solenoid 30 cm long and 3 cm diameter with 1,000 turns of wire carrying current of 10 A is :

(A) 1.15 J (B) 0.015 J

(C) 0.15 J (D) 0.5 J

138. In a power plant if the maximum demand on the plant is equal to the plant capacity, then :

(A) load factor will be nearly 60%

(B) plant reserve capacity will be zero

(C) diversity factor will be unity

(D) load factor will be unity

139. The least expensive fractional horse power motor is _____ motor :

(A) A.C. series (B) shaded pole

(C) capacitor start (D) split phase

140. Which of the following condition is **NOT** mandatory for alternators working in parallel ?

(A) The alternators must have the same phase sequence.

(B) The terminal voltage of each machine must be the same.

(C) The machines must have equal kVA ratings.

(D) The alternators must operate at the same frequency.

141. Find the current through 5 Ω resistor :
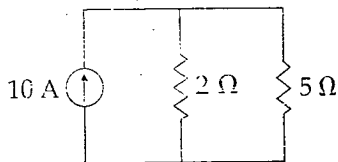
(A) 3.5 A   (B) 7.15 A

(C) 5 A   (D) 2.85 A

142. An isolator is used in series with Air blast Circuit Breaker employed at UHV lines because :

(A) CB life is enhanced with the use of isolator

(B) current to be interrupted will be large

(C) gap between CB contacts is small so an isolator is used to switch off voltage

(D) gap between CB poles is small

143. Diversity factor has direct effect on the :

(A) Operating cost of unit

(B) Fixed cost of the unit generated

(C) Variable cost of the unit generated

(D) Both variable and fixed cost of unit generated

144. Regulation of an alternator supplying resistive or inductive load is :

(A) infinity   (B) always negative

(C) always positive   (D) zero

145. The highest transmission a.c. voltage in India is :

(A) 1750 kV   (B) 132 kV

(C) 220 kV   (D) 400 kV

146. Point out the **WRONG** statement.

The magnetising force at the centre of a circular coil varies :

(A) inversely as its radius

(B) directly as the number of its turns

(C) directly as the current

(D) directly as its radius

147. The rotor slots, in an induction motor are usually not quite parallel to the shaft because it :

(A) improves the power factor

(B) improves the efficiency

(C) helps the rotor teeth to remain under the stator teeth

(D) helps in reducing the tendency of the rotor teeth to remain under the stator teeth

148. If a 10 - μF capacitor is connected to a voltage source with $v(t) = 50 \sin 2000 t$ V, then the current through the capacitor is _____ A.

(A) $10^6 \cos 2000 t$ (B) $5 \times 10^{-4} \cos 2000 t$

(C) $\cos 2000 t$ (D) $500 \cos 2000 t$

149. In a series resonance circuit, the impedance at half power frequencies is :

(A) $2R$ (B) $\dfrac{R}{\sqrt{2}}$ (C) $\sqrt{2}\,R$ (D) $\dfrac{R}{2}$

150. A 10 Ω resistive load is to be impedance matched by a transformer to a source with 6250 Ω of internal resistance. The ratio of primary to secondary turns of transformer should be :

(A) 25   (B) 10   (C) 15   (D) 20

151. The synchronous speed of a three phase induction motor having 20 polar and connected to a 50 Hz source is :

(A) 1200 rpm   (B) 300 rpm

(C) 600 rpm   (D) 1000 rpm

654 QM 4

152. A circuit with a resistor, inductor and capacitor in series is resonant of f_0 Hz. If all the component values are now doubled the new resonant frequency is :

(A) $f_0/4$ (B) $2f_0$ (C) f_0 (D) $f_0/2$

153. A 2 cm long coil has 10 turns and carries a current of 750 mA. The magnetising force of the coil is :

(A) 375 AT/m   (B)   225 AT/m

(C) 675 AT/m   (D)   450 AT/m

154. A consumer has annual consumption of 7,00,800 units. If his maximum demand is 200 kW. The load factor will be :

(A) 70%   (B)   20%   (C)   40%   (D)   50%

155. The rated voltage of a 3-phase power system is given as :

(A) peak line to line voltage

(B) rms phase voltage

(C) peak phase voltage

(D) rms line to line voltage

156. For a half wave rectified sine wave the ripple factor is :

(A) 1.00   (B)   1.65   (C)   1.45   (D)   1.21

157. Which one of the following bridges is generally used for measurement of frequency and also capacitance ?

(A) Wien bridge   (B)   Hay's bridge

(C) Owen's bridge   (D)   Schering bridge

158. Two voltmeters of (0 – 300 V) range are connected in parallel to a a.c. circuit. One voltmeter is moving iron type reads 200 V. If the other is PMMC instrument, its reading will be :

(A) 127.4 V   (B)   slightly less 200 V

(C) zero   (D)   222 V

159. The least number of 1-φ wattmeters required to measure total power consumed by an unbalanced load fed from a 3φ, 4 wire system is :

(A) 4   (B)   1   (C)   2   (D)   3

160. Total capacitance between the points L and M in figure is :

(A) 4.05 μF   (B)   1.45 μF
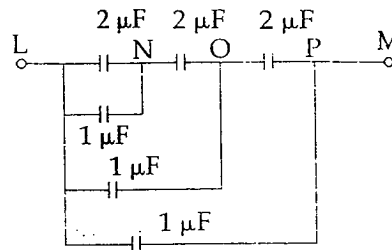
(C) 1.85 μF   (D)   2.05 μF

161. EMF induced in a coil rotating in a uniform magnetic field will be maximum when the :

(A) Rate of cutting flux by the coil sides is minimum.

(B) Flux linking with the coil is maximum.

(C) Rate of change of flux linkage is minimum.

(D) Rate of change of flux linkage is maximum.

162. If resistance is 20 Ω and inductance is 2 H in a RL series circuit, then time constant of this circuit will be :

(A) 100s   (B)   0.001s

(C) 0.1s   (D)   10s

163. When the rotor of a three phase induction motor is blocked, the slip is :

(A) 1   (B)   0   (C)   0.1   (D)   0.5

164. The positive, negative and zero sequence impedances of 3-phase synchronous generator are j 0.5 pu, j 0.3 pu and j 0.2 pu respectively. When symmetrical fault occurs on the machine terminals. Find the fault current. The generator neutral is grounded through reactance of j 0.1 pu.

(A) –j 3.33 pu   (B)   –j 1.67 pu

(C) –j 2.0 pu   (D)   –j 2.5 pu

165. Transient current in RLC circuit is oscillatory when the value of R is :

(A) more than $2\sqrt{\dfrac{C}{L}}$ (B)   less than $2\sqrt{\dfrac{L}{C}}$

(C) less than $2\sqrt{\dfrac{C}{L}}$ (D)   more than $2\sqrt{\dfrac{L}{C}}$

166. For average values of load current, current chopping occurs more frequently in :

(A) VCB's (B) OCB's

(C) ACB's (D) SF_6 CB's

167. A BJT is said to be operating in the saturation region, if :

(A) Both the junctions are forward biased

(B) both the junctions are reverse biased

(C) B - E junction is reverse biased and B - C junction is forward biased

(D) B-E junction is forward biased and B-C junction is reverse biased

168. The mutual inductance between two unity coupled coils of 9 H and 4 H will be :

(A) 36 H (B) 2.2 H (C) 6 H (D) 13 H

169. Determine the voltage at point C shown below with respect to ground :
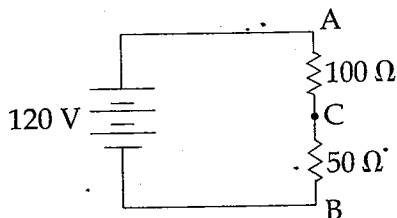
(A) 80 V (B) 120 V (C) 40 V (D) 70 V

170. The efficiency normally obtained in a circuit under the conditions of maximum power transfer is :

(A) 100% (B) 25%

(C) 50% (D) 75%

171. A magnet is kept in the medium of air surrounded by an iron ring. The magnetic lines of force from the magnet will be :

(A) Very small in the ring

(B) Crowded in the ring

(C) Passing out of the ring

(D) Evenly distributed within the ring

172. Which semiconductor device behaves like two SCR's ?

(A) Triac (B) MOSFET

(C) JFET (D) UJT

173. Three resistors, each of 'R' Ω are connected in star. What is the value of equivalent delta connected resistors ?

(A) 3 R Ω (B) $\frac{R}{2}$ Ω

(C) 2 R Ω (D) $\frac{R}{3}$ Ω

174. Super position theorem can be applied only to :

(A) bilateral networks

(B) linear networks

(C) non-linear networks

(D) linear bilateral networks

175. Moving coil (PMMC) and moving iron instruments can be distinguished by observing its :

(A) size of terminals (B) pointer

(C) range (D) scale

176. In a fluorescent tube circuit, the function of choke is primarily to :

(A) improve the brightness of the tube

(B) initiate the discharge

(C) reduce the flicker

(D) reduce the starting current

177. The magnetic field energy in an inductor changes from maximum value to minimum value in 5 m sec when connected to an a.c. source. The frequency of the source is :

(A) 500 Hz (B) 20 Hz

(C) 50 Hz (D) 200 Hz

178. The distribution losses that the utility suffers while transferring power from generating station to the consumer is accounted under :

(A) Maintenance cost

(B) Fixed charges

(C) Running charges

(D) Cost of fuel

179. The magnetic potential difference in a magnetic circuit is given by :

(A) $B\,l\,H$ (B) $H\,J\,l$ (C) $B\,l$ (D) $H\,l$

180. Two electric bulbs have tungsten filament of same thickness. If one of them gives 60 W and the other gives 100 W, then :

(A) 60 W and 100 W lamp filaments have equal length

(B) 60 W lamp filament has shorter length

(C) 100 W lamp filament has longer length

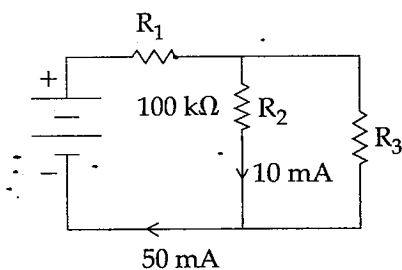(D) 60 W lamp filament has longer length

181. A capacitor with no initial charge at $t = \infty$ acts :

(A) Open - Circuit   (B)   Voltage Source

(C) Current Source   (D)   Short - Circuits

182. "Danger 440 V" plates are :

(A) informal notices   (B) danger notices

(C) caution notices   (D) advisory notices

183. Find R_3 for the circuit shown in figure :

R_1

100 kΩ R_2

R_3

10 mA

50 mA

(A) 25 mega ohm   (B) 25 milli ohm

(C) 25 ohm   (D) 25 kilo ohm

184. The purpose of choke in a fluorescent tube is to :

(A) increase voltage momentarily

(B) decrease current

(C) increase current

(D) decrease voltage momentarily

185. A 3-phase 4 pole induction motor works on 3-phase 50 c/s supply. If the slip of the motor is 4%. The actual speed will be :

(A) 720 rpm   (B) 1550 rpm

(C) 1460 rpm   (D) 1440 rpm

186. As per IE rules the permissible variation of voltage at the consumer end is :

(A) ±6%   (B) ±10%

(C) ±12%   (D) ±2%

187. In which single - phase motor, the rotor has no teeth or winding ?

(A) Universal motor   (B) Split phase motor

(C) Reluctance motor   (D) Hysteresis motor

188. Two d.c. series motors connected in series draw current I from supply and run at speed N. When the same two motors are connected in parallel taking current I from the supply, the speed of each motor will be :

(A) $\dfrac{N}{2}$ (B) N   (C) 2 N   (D) 4 N

189. Using Millman's theorem, find the current through the load resistance R_L of 3 Ω resistance shown below :

3 Ω   3 Ω   3 Ω R_L

8 V   16 V   24 V
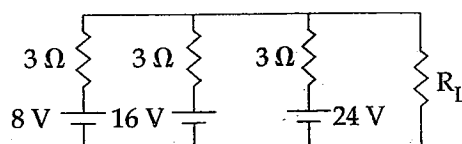
(A) 12 A   (B) 4 A   (C) 6 A   (D) 8 A

190. An ideal voltage source should have :

(A) infinite source resistance

(B) large value of emf

(C) small value of emf

(D) zero source resistance

191. Consider a constant uniform magnetic field. A conductor moves across this field at a constant velocity. The emf induced in the conductor is termed as :

    (A) Self - Induced emf

    (B) Induced emf

    (C) Statically Induced emf

    (D) Dynamically Induced emf

192. A generating station supplies the following loads 15000 kW, 12000 kW, 8500 kW, 6000 kW and 450 kW. The station has maximum demand of 22000 kW. Calculate the diversity factor.

    (A) 1.91   (B)   0.52   (C)   0.68   (D)   1.34

193. A magnetic circuit carries a flux ϕ_i in the iron part and a flux ϕ_g in the air gap. Then leakage co-efficient is :

    (A) $\phi_i - \phi_g$

    (B) $\dfrac{\phi_i}{\phi_g}$

    (C) $\dfrac{\phi_g}{\phi_i}$

    (D) $\phi_g \times \phi_i$

194. The maximum demand of a consumer is 2 kW and his daily energy consumption is 20 units. His load factor is :

    (A) 21 %

    (B)   10.15 %

    (C) 41.6 %

    (D)   50 %

195. A wheat stone bridge has ratio arm of 1000 Ω and 100 Ω resistances, the standard resistance arm consist of 4 decade resistance boxes of 1000, 100, 10, 1 Ω steps. The maximum and minimum value of unknown resistance that can be determined with this setup are :

    (A) 111100 Ω, 10 Ω

    (B)   111100 Ω, 1 Ω

    (C) 11110 Ω, 10 Ω

    (D)   10000 Ω, 10 Ω

196. Thevenin's equivalent voltage and resistance between the terminal A and B for network of given figure is :
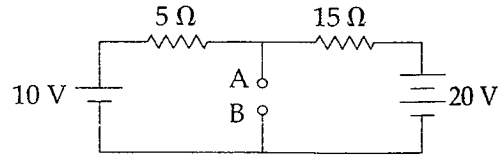
    (A) 2.5 V, 12.5 Ω (B)   2.5 V, 3.75 Ω
    (C) 12.5 V, 3.75 Ω (D)   12.5 V, 2.5 Ω

197. Low frequency operation of a.c. series motor in traction application :

    (A) Improves its commutation but starting current increases.

    (B) Improves its commutation property but pf and n reduces.

    (C) Improves its commutation, pf and efficiency.

    (D) Adversely affects commutation but pf and n improves.

198. The speed of a p-pole synchronous machine in r.p.m. is given by :

    (A) $120\,f\,p$

    (B) $\dfrac{120\,f}{p}$

    (C) $\dfrac{120\,p}{f}$

    (D) $\sqrt{120\,f\,p}$

199. Which of the following motor has high starting torque ?

    (A) synchronous motor

    (B) a.c. series motor

    (C) d.c. series motor

    (D) induction motor

200. What is the order of minimum displacement that can be measured with capacitive transducers ?

    (A) 1×10^{-12}m   (B)   1 cm
    (C) 1 mm   (D)   1 μm

-o0o-