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

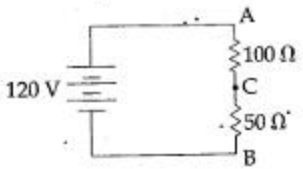
(C) B - E junction is reverse biased and B - C junction is forward biased

(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/H (B) $HJ/$ (C) BI (D) HI

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

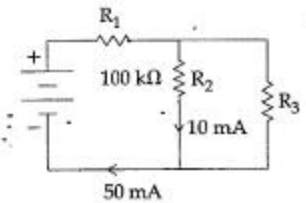
(C) Current Source (D) Short - Circuits

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 :



(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) $\pm 6\%$ (B) $\pm 10\%$

(C) $\pm 12\%$ (D) $\pm 2\%$

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

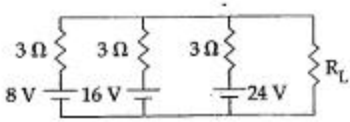
(A) Universal motor (B) Split phase motor

(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) $\frac{N}{2}$ (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 :



(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) $\frac{\phi_i}{\phi_g}$

(C) $\frac{\phi_g}{\phi_i}$ (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 %

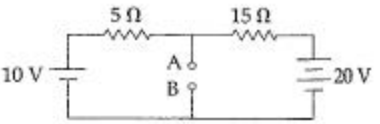
(C) 41.6 % (D) 50 %

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) $\frac{120 f}{p}$

(C) $\frac{120 p}{f}$ (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

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TEST - (iii)

Part - C : GENERAL ENGINEERING (Mechanical)

101. For laminar flow in a pipe, average velocity is equal to :

(A) $2\ U_{max}$ (B) U_{max}

(C) $0.5\ U_{max}$ (D) $0.25\ U_{max}$

102. Crude oil of kinematic viscosity 2.25 stokes flows through a 20 cm diameter pipe, the rate of flow being 1.5 litres/s. The flow will be :

(A) Uncertain (B) Laminar

(C) Turbulent (D) Transition

103. The power transmitted by a belt is maximum when the maximum tension in the belt compared to centrifugal tension is :

(A) 3-5 times (B) 2 times

(C) 3 times (D) 4 times

104. Effort lost in friction in a simple machine is :

(A) $P - 2P_0$ (B) $2P - P_0$

(C) $P_0 - P/2$ (D) $P - P_0$

105. Non uniform ramming of moulding sand may lead to the following casting defect :

(A) scabs (B) swells

(C) blow holes (D) bends

106. A Bell Coleman cycle is :

(A) reversed Stirling cycle

(B) reversed Carnot cycle

(C) reversed Joule cycle

(D) reversed Atkinson cycle

107. For a centrifugal blower, power consumption is proportional to :

(A) cubic power of r.p.m.

(B) r.p.m.

(C) square of r.p.m.

(D) square root of r.p.m.

108. A reaction turbine (hydraulic) discharge 34 m^3/s under a head of 8 m and with an overall efficiency of 91%. The power developed in MW is :

(A) 4.32 (B) 3.24

(C) 2.43 (D) 2.34

109. The equivalent evaporation (kg/hr.) of a boiler producing 2000 kg/hr. of steam with enthalpy content of 2426 kJ/kg from feed water at temp. 40°C (liquid enthalpy = 168 kJ/kg; enthalpy of vaporisation of water at 100°C = 2258 kJ/kg) is :

(A) 1649 (B) 2000

(C) 2149 (D) 1682

110. For maximum work output in a two stage expansion gas turbine with perfect, the intermediate pressure (P) has the following relationship with maximum pressure (P_1) and minimum pressure (P_2) of the cycle :

(A) $P = \sqrt{\frac{P_1 + P_2}{P_1 - P_2}}$ (B) $P = \sqrt{P_1 P_2}$

(C) $P = \left(\frac{P_1}{P_2}\right)^{\frac{1}{2}}$ (D) $P = \left(\frac{P_1 + P_2}{4}\right)^{\frac{1}{2}}$

111. Discharge (Q) of a centrifugal pump is given by :

(A) $b V_f$ (B) $\pi D V_f$

(C) $\pi b V_f$ (D) $\pi db V_f$

Where, D = Diameter of impeller at inlet.

b = Width of impeller at inlet.

V_f = Velocity of flow at inlet.

SPACE FOR ROUGH WORK

112. When steam flows over moving blades of an impulse turbine :
(A) both pressure and velocity decreases.
(B) pressure drops and velocity increases.
(C) pressure remains constant and velocity decreases.
(D) both pressure and velocity remains constant.

113. Electrode used in TIG is :
(A) Copper (B) Tungsten
(C) Aluminium (D) Cast iron

114. Maximum efficiency for a single stage pure impulse blading (symmetric) with nozzle angle 'α' is :
(A) $\cos^2\left(\frac{\alpha}{2}\right)$ (B) $\cos\alpha$
(C) $\cos^2\alpha$ (D) $\cos\left(\frac{\alpha}{2}\right)$

115. The crank pin is to be connected in the bush and the dimensions for the bush and crank are given respectively of in mm are $16^{+0.017}_{+0.000}$, $16^{-0.035}_{-0.062}$. Maximum clearance between bush and crank pin is :
(A) 0.079 mm (B) 0.0079 mm
(C) 0.035 mm (D) 0.062 mm

116. How many links does a pantograph mechanism contain ?
(A) Ten (B) Two
(C) Four (D) Nine

117. A single-stage impulse turbine with a diameter of 120 cm runs at 3000 rpm. If the blade speed ratio is 0.42, the inlet velocity of steam will be :
(A) 900 m/s (B) 80 m/s
(C) 200 m/s (D) 450 m/s

118. For hydrodynamically smooth boundaries, the friction factor for turbulent flow is :
(A) dependent on relative roughness only
(B) constant
(C) dependent only a Reynolds number
(D) function of Reynolds number and relative roughness

119. An important factor to be taken into account while designing a core print is :
(A) Pouring temperature
(B) Pattern material
(C) Type of mould
(D) Moulding sand characteristics

120. The flow of water in wash basin through a central opening is an example of :
(A) Rankine vortex
(B) Free vortex
(C) Forced vortex
(D) Rotational vortex

121. Which one of the following safety device is used to protect the boiler when the water level falls below a minimum level :
(A) Safety valve
(B) Water level indicator
(C) Finisible plug
(D) Blow off cock

122. One stoke is equal to :
(A) 1 cm^2/sec (B) 1 m^2/sec
(C) 1 mm^2/sec (D) 10 m^2/sec

123. Euler's number relates :
(A) Inertia force and elastic force.
(B) Inertia force and gravity force.
(C) Inertia force and pressure force.
(D) Pressure force and viscous force.

124. The length of a pipe is 1000 m and its diameter is 20 cm. If the diameter of an equivalent pipe is 40 cm, then its length is :
(A) 4000 m (B) 32000 m
(C) 20000 m (D) 8000 m

125. A casting defect which results in general enlargement of a casting is known as :
(A) swell (B) shift
(C) sand wash (D) blow hole

SPACE FOR ROUGH WORK

126. A jet of water issues from a nozzle with a velocity 20 m/s on a flat plate moving away from it at 10 m/s. The cross-sectional area of the jet is 0.01 m^2 and the density of water = 1000 kg/m^3. The force developed on the plate in Newtons is :

(A) 2000 (B) 9810

(C) 5000 (D) 7000

127. The total number instantaneous centres for a mechanism consisting of 'n' links are :

(A) $\frac{n(n-1)}{2}$ (B) $\frac{n}{2}$

(C) n (D) $\frac{(n-1)}{2}$

128. Poisson's ratio is defined as the ratio of :

(A) Shear stress to shear strain

(B) Longitudinal strain to lateral strain

(C) Lateral strain to longitudinal strain

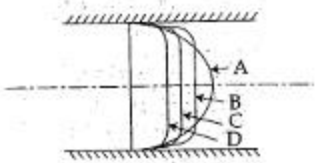
(D) Axial stress to axial strain

129. The product of circular pitch and diametral pitch is equal to :

(A) π (B) Module

(C) Unity (D) $1/\pi$

130. The figure shows four curves for velocity distribution across a section for Reynolds number equal to 1000, 3000, 4000, 5000. Curve A corresponding to Reynolds number :



(A) 5000 (B) 1000 (C) 3000 (D) 4000

131. The dimensions of the surface tension are :

(A) $[M^1 L^0 T^2]$ (B) $[M^1 L^0 T^{-2}]$

(C) $[M^1 L^1 T^{-2}]$ (D) $[M^1 L^{-1} T^{-2}]$

132. To prevent oscillation of the meniscus the length of the connecting tubes should be :

(A) unequal

(B) large

(C) small

(D) equal to 10 times diameter

133. For an ideal gas the compressibility factor is :

(A) some finite value greater than unity

(B) zero

(C) units

(D) infinity

134. A body of mass 5 kg is pushed up to 2 m on a smoth 30° incline by a force of 60 N acting parallel to the plane. The work done on the body is :

(A) Zero (B) 70.95 J

(C) 141.9 J (D) 35.47 J

135. Reheat factor for a multi-stage steam turbine is the ratio of :

(A) inlet temperature to the exit temperature.

(B) cumulative enthalpy drop to the total isentropic enthalpy.

(C) total isentropic enthalpy drop to the total entropy increase.

(D) total isentropic enthalpy drop to the exit temperature.

136. The purpose of the flywheel in an IC engine is :

(A) To regulate the fuel supply

(B) To keep the output power constant at the crank shaft

(C) To increase the power capacity of the engine

(D) To reduce the vibration in an engine

SPACE FOR ROUGH WORK

137. The ratio of equivalent length of the column to minimum radius of gyration is called as :
(A) Bulking factor
(B) Factor of safety
(C) Poisson's ratio
(D) Co-efficient restitution

138. The hot wire anemometer is used to measure :
(A) Liquid velocities
(B) Pressure in gases
(C) Discharge of gases and liquids
(D) Gas velocities

139. An engine oil of viscosity 22.5×10^{-2} (Per.s) is flowing through a pipe of radius 1 m. Average velocity of oil through the pipe is 1.2 m/sec. If the velocity profile is parabolic profile then maximum velocity of oil is :
(A) 2.4 m/sec (B) 1.8 m/sec
(C) 1.5 m/sec (D) 3.6 m/sec

140. In a 1 = 100 scale model of a harbour, time which corresponds to the prototype tidal period of 12 Hrs will be in Hr :
(A) 12 (B) 1 (C) 10 (D) 1.2

141. Two Tensile forces, each of magnitude F are acting at a point perpendicular to each other, then their resultant force will be :
(A) $\sqrt{2}$ F (B) Zero
(C) $\sqrt{F}$ (D) $\sqrt{2F}$

142. The Taylor's correlation between the cutting speed (V) and the tool life (T) is given by :
(A) $\frac{V^n}{T}$ = Constant
(B) VT^n = Constant
(C) $\frac{V}{T^n}$ = Constant
(D) V^nT = Constant

143. The co-efficient of discharge, velocity and contraction Cd, Cv, and Cc are related as :
(A) Cd = Cc − Cv (B) $Cd = \frac{Cc}{Cv}$
(C) Cd = Cc × Cv (D) Cd = Cc + Cv

144. The expression for capillary rise is given by when, σ-surface tenrion, θ-Angle of contact and ρ-density :
(A) $h = \frac{2\sigma \sin\theta}{\rho g d}$ (B) $h = \frac{4\sigma \cos\theta}{\rho g d}$
(C) $h = \frac{2\sigma \cos\theta}{\rho g d}$ (D) $h = \frac{4\sigma \sin\theta}{\rho g d}$

145. Notch is a device used for measuring :
(A) velocity through small channels
(B) rate of flow through pipes
(C) rate of flow through a small channels
(D) velocity through pipes

146. Which cross-section of a cantilever beam which is loaded with UDL can give economical design :
(A) Square (B) Circular
(C) I-Section (D) Rectangular

147. What torque is Nm is required to give 3 m^3/s of water, a moment of momentum, so that it has a tangential velocity of 3 m/s at a distance of 1.8 m from the axis ?
(A) 16200 (B) 157
(C) 2624 (D) 8138

148. The device which permits the connection and disconnection of shaft is :
(A) Bearing (B) Connector
(C) Clutch (D) Pulley

SPACE FOR ROUGH WORK

149. Heating wet steam at constant temperature is the same as heating at constant :
(A) Entropy (B) Pressure
(C) Volume (D) Enthalpy

150. The term bleeding in a steam turbine refer to :
(A) removal of wet steam in the low pressure stages of turbine.
(B) leakage of steam.
(C) steam extracted for preheating feed water.
(D) steam doing no useful work.

151. Which of the following is an extensive property ?
(A) temperature (B) pressure
(C) density (D) enthalpy

152. The latent heat of evaporation of water at 100°C is 2560 kJ/kg. What is the change of entropy associated with the evaporation ?
(A) -25.6 kJ/kg-K (B) 25.6 kJ/kg-K
(C) 256×10^3 kJ/kg-K (D) 6.86 kJ/kg-K

153. Using lubricants on engine parts is an example of reducing :
(A) Motion (B) Force
(C) Acceleration (D) Friction

154. One poise is equivalent to :
(A) 1 kg/m-hr
(B) 1 gm/cm-sec
(C) 98 dyne/sec
(D) 68 kgf-sec/m^2

155. For maximum discharge, ratio of the pressure at the exit and at inlet of the nozzle (P_2/P_1) is equal to :
(A) $[2/(n+1)]^{(n+1)/n}$
(B) $[2/(n+1)]^{n/(n-1)}$
(C) $[2/(n+1)]^{(n-1)/n}$
(D) $[2/(n+1)]^{n/(n+1)}$

156. The process of removing unwanted material from the casting is called :
(A) blowing (B) cleansing
(C) finishing (D) fettling

157. If in a diesel engine petrol is used then the engine will :
(A) run at low speed
(B) explode
(C) run at high speed
(D) run with high knocking

158. For a closed system, the difference between heat added to the system and work done by the system, is equal to change in :
(A) entropy (B) temperature
(C) internal energy (D) enthalpy

159. The indicator on an engine is used to determine :
(A) IHP and mcp (B) BHP
(C) Speed (D) Temperature

160. The circular pitch of a toothed wheel having 24 teeth and module of 4.25 mm will be :
(A) 8.50 mm (B) 1.35 mm
(C) 4.25 mm (D) 6.67 mm

161. The process in which no heat enters or leaves the system is called as :
(A) isentropic (B) isobaric
(C) isochoric (D) isothermal

162. Two gases X and Y having the same temperature T, the same pressure P and the same volume V are mixed. If the mixture has the volume V and temperature T, then the pressure of the mixture will be :
(A) 4P (B) $\frac{P}{2}$ (C) P (D) 2P

163. Which gas among the following has the highest value of adiabatic index ?
(A) Helium (B) Nitrogen
(C) Oxygen (D) Methane

SPACE FOR ROUGH WORK

164. Rotameter is a device used to measure :

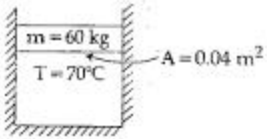
(A) Rotation

(B) Absolute pressure

(C) Velocity of fluid

(D) Flow rate

165. The piston of a vertical piston-cylinder device containing a gas has a mass of 60 kg and a cross-sectional area 0.04 m^2. The entire system is placed in a vacuum chamber. If temperature of the gas is 70°C. What is the pressure of gas inside the cylinder ? $g = 9.8\ m/s^2$



(A) 0.7 bar (B) 0 bar

(C) 0.3 bar (D) 0.147 bar

166. The only angle on which the strength of the tool depends, is;

(A) lip angle

(B) clearance angle

(C) rake angle

(D) cutting angle

167. The size of the gear is usually specified by :

(A) Pitch circle diameter

(B) Pressure angle

(C) Circular pitch

(D) Diameter pitch

168. The circumferential stress in a thin shell due to internal fluid pressure is given by :

(A) $\frac{\pi Pd^2}{4}$ (B) $\frac{Pd}{t}$

(C) $\frac{4P}{\pi d^2}$ (D) $\frac{Pd}{2t}$

169. A long circular cylinder has a diameter D and length L. The slenderness ratio of the column is :

(A) $\sqrt{\frac{L}{D}}$ (B) $\left(\frac{L}{D}\right)$

(C) $\left(\frac{2L}{D}\right)$ (D) $\left(\frac{4L}{D}\right)$

170. Rivets are generally specified by :

(A) Diameter of head

(B) Thickness of plates to be riveted

(C) Length of rivet

(D) Nominal diameter

171. A beam is fixed at one end and free at the other end. A load acts in the centre. The maximum bending moment will occur at :

(A) between centre and fixed end

(B) under the load

(C) fixed end

(D) free end

172. Which of the following material is added to base sand to impart bonding strength :

(A) sea coal (B) silica

(C) bentonite (D) wood flour

173. The commercially available petrol in India has an octane rating of :

(A) 85-90 (B) 20-30

(C) 40-50 (D) 60-75

174. Herring bone gears are :

(A) Double helical gears

(B) Spur gears with small teeth

(C) Large worm gears

(D) Spiral gears

SPACE FOR ROUGH WORK

175. Which of the following fuel having maximum resistance to detonation ?
(A) n-heptane (B) benzene
(C) toluene (D) iso-octane

176. In arc welding temperature generated is of the order of :
(A) 8000°C (B) 1000°C
(C) 3500°C (D) 5500°C

177. A fan rotates at a constant speed of 60 rpm. The total angular displacement it makes in 10 sec is :
(A) Zero (B) 10π rad
(C) 40π rad (D) 20π rad

178. Barometer is used to measure :
(A) Rain level
(B) Pressure in pipes and channels
(C) Atmospheric pressure
(D) Very low pressure

179. Bending moment at the supports in case of simply supported beam is :
(A) > 1 (B) Zero
(C) 1 (D) < 1

180. A simply supported beam of 1 m length is subjected to a distributed load of 0.4 N/m. The maximum bending moment occurring in the beam is :
(A) 1.0 N-m (B) 0.1 N-m
(C) 0.05 N-m (D) 0.025 N-m

181. The maximum speed and minimum speed in r.p.m. at a Watt governor are 72 and 68 respectively. The range of speed of the governor is :
(A) 4 (B) 2 (C) 8 (D) 6

182. The rate of change of moment of momentum represents the :
(A) Power developed by the fluid
(B) Force exerted by fluid
(C) Torque applied by the fluid
(D) Work done by the fluid

183. Fan belt in automobiles is :
(A) E - Section V belt
(B) A three layer flat belt
(C) A five layer flat belt
(D) B - Section V belt

184. For a particular ideal gas, the value of R is 0.280 kJ/kgK and the value of γ is 1.375. The value of C_p and C_v are, respectively, in kJ/kgK :
(A) 1.25, 0.8 (B) 1.0267, 0.7467
(C) 1.111, 0.66 (D) 1.2, 0.70

185. The compression ratio for diesel engine lie in the range of :
(A) 30 to 40 (B) 5 to 8
(C) 15 to 20 (D) 3 to 6

186. The degree of reaction of a Kaplan turbine is :
(A) equal to 1
(B) equal to 380
(C) greater than zero but less than $\frac{1}{2}$
(D) greater than $\frac{1}{2}$ but less than 1

187. A fluid with kinematic viscosity 0.4×10^{-4} m^2/s flows through a 80 mm diameter pipe. The maximum velocity for laminar flow will be :
(A) ≤ 2 m/s (B) ≤ 10 mm/s
(C) ≤ 1 m/s (D) ≤ 1.5 m/s

188. Which is not a part of magneto-ignition system ?
(A) condenser (B) battery
(C) induction coil (D) circuit breaks

189. If the x-component of a force is negative and the y-component is positive, the direction of that force must lie in the :
(A) Fourth quadrant (B) First quadrant
(C) Second quadrant (D) Third quadrant

SPACE FOR ROUGH WORK

190. In a gear drive, module is equal to :

(A) $\frac{1}{\text{Diametral pitch}}$ (B) $\frac{1}{\text{Circular pitch}}$

(C) $\frac{\text{Circular pitch}}{\pi}$ (D) $\frac{\text{Diametral pitch}}{\pi}$

191. The quantity, which is equal to rate of change of momentum is known as :

(A) impulse (B) displacement

(C) acceleration (D) force

192. Multistage centrifugal pumps are used to obtain high :

(A) Pumping of viscous fluids

(B) Discharge

(C) Head

(D) Efficiency

193. The diameter of core of a circular section is given as :

(A) $d/\sqrt{2}$ (B) $d/2$

(C) $d/3$ (D) $d/4$

194. The path traced by a single particle of smoke issuing from a burning wooden stick is a :

(A) Flow line (B) Stream line

(C) Streak line (D) Path line

195. What amongst the following is **not** related to a CI engine ?

(A) Flywheel (B) Fuel pump

(C) Fuel injector (D) Carburettor

196. The relation between the number of links (L) and number of pairs (P) is :

(A) $L=2P-3$ (B) $L=2P-2$

(C) $L=2P-4$ (D) $L=3-2P$

197. A current meter is a device for measuring :

(A) Viscosity (B) Velocity

(C) Current (D) Pressure

198. Density of water is maximum at :

(A) 277° Kelvin (B) 0°C

(C) 0° Kelvin (D) 100°C

199. An isothermal process is one in which :

(A) The pressure of the gas in the system is proportional to the volume of the gas.

(B) The internal energy of the system under consideration decreases during the change.

(C) The heat transfer of the system under consideration is zero.

(D) The temperature of the system under consideration remains constant during the change.

200. In I.C. engine, removing the burnt gases from combustion chamber of engine cylinder, is known as :

(A) polymerisation (B) scavengeing

(C) supercharging (D) detonation

-oOo-

SPACE FOR ROUGH WORK

Staff Selection Commission

Junior Engineer (Civil & Electrical) Exam - 2014

Held on 25-05-2014 **Morning Session**

Test Form No.
टेस्ट फॉर्म संख्या
654 QM 4

JN – 1091908

DD-2014
PAPER - I

Time Allowed : 2 Hours
निर्धारित समय : 2 घण्टे

Maximum Marks : 200
अधिकतम अंक : 200

Read the following instructions carefully before you begin to answer the questions. This Booklet contains questions in English as well as in Hindi.
प्रश्नों के उत्तर देने से पहले नीचे लिखे अनुदेशों को ध्यान से पढ़ लें। इस पुस्तिका में प्रश्न अंग्रेज़ी तथा हिन्दी दोनों में दिये गये हैं।

INSTRUCTIONS TO CANDIDATES

1. This Booklet contains **200** questions in all comprising the following **three** tests :
   Test – (i) : General Intelligence and Reasoning (50 Questions)
   Test – (ii) : General Awareness (50 Questions)
   Test – (iii) : Part - A : General Engineering (Civil and Structural) (100 Questions)
   OR
   Part - B : General Engineering (Electrical) (100 Questions)
   OR
   Part - C : General Engineering (Mechanical) (100 Questions)
2. In questions set bilingually in English and Hindi, in case of discrepancy, the English version will prevail.
3. Test-I General Intelligence and Reasoning and Test-II General Awareness are compulsory for all the candidates. Candidates are required to attempt only one Section in Test-III General Engineering i.e. Part A Civil and Structural OR Part B Electrical OR Part C Mechanical as per option in the application form given by the candidates failing which you will be awarded '**ZERO**' mark.
4. All questions are compulsory and carry equal marks.
5. *The paper carries negative marking. 0.25 marks will be deducted for each wrong answer.*
6. **Before you start to answer the questions you must check up this Booklet and ensure that it contains all the pages (1-64) and see that no page is missing or repeated. If you find any defect in this Booklet, you must get it replaced immediately.**
7. You will be supplied the Answer-Sheet separately by the Invigilator. Before you actually start answering the questions, you must complete and code the details of ***Name, Roll Number, Ticket Number, Name of the examination as mentioned in the admission certificate, Date of birth, Test Form Number and Stream*** i.e. Civil and Structural OR Electrical OR Mechanical etc., on Side-I of the Answer-Sheet carefully. You must also put your signature and Left-Hand thumb impression on the Answer Sheet at the prescribed place before you start answering the questions. These instructions must be fully complied with, failing which, your Answer-Sheet will not be evaluated and you will be awarded '**ZERO**' mark.
8. Answers must be shown by completely blackening the corresponding ovals on Side-II of the Answer-Sheet against the relevant question number by **Black/Blue Ball-Point Pen** Only. Answers which are not shown by **Black/Blue** Ball-Point Pen will not be awarded any mark.
9. A machine will read the coded information in the OMR Answer-Sheet. In case the information is incomplete or different from the information given in the application form, such candidate will be awarded '**ZERO**' mark.
10. The Answer-Sheet must be handed over to the Invigilator before you leave the Examination Hall.
11. **Failure to comply with any of the above Instructions will render a candidate liable to such action/penalty as may be deemed fit.**
12. The manner in which the different questions are to be answered has been explained at the back of this Booklet (Page No. **64**), which you should read carefully before actually answering the questions.
13. Answer the questions as quickly and as carefully as you can. Some questions may be difficult and others easy. Do not spend too much time on any question.
14. **No rough work is to be done on the Answer-Sheet. Space for rough work has been provided below the questions.**
15. ***"Mobile phones and wireless communication devices are completely banned in the examination halls/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature."***

उम्मीदवारों के लिए अनुदेश

1. इस पुस्तिका में कुल 200 प्रश्न हैं, जिनमें निम्नलिखित तीन परीक्षण शामिल हैं :
   परीक्षण – (i) : सामान्य बुद्धि और तर्क (50 प्रश्न)
   परीक्षण – (ii) : सामान्य जानकारी (50 प्रश्न)
   परीक्षण – (iii) : भाग - क : सामान्य इंजीनियरी (100 प्रश्न)
   (सिविल एवं संरचनात्मक)
   अथवा
   भाग - ख : सामान्य इंजीनियरी (100 प्रश्न)
   (विद्युत)
   अथवा
   भाग - ग : सामान्य इंजीनियरी (100 प्रश्न)
   (यांत्रिक)
2. अंग्रेज़ी और हिन्दी भाषा में तैयार किए गए द्विभाषी प्रश्नों में कोई विसंगति होने की स्थिति में अंग्रेज़ी विवरण मान्य होगा।
3. परीक्षण-I सामान्य बुद्धि और तर्क एवं परीक्षण-II सामान्य जानकारी सभी उम्मीदवारों के लिए अनिवार्य है। उम्मीदवारों को आवेदन-पत्र में दिए गए विकल्प के अनुसार परीक्षण-III सामान्य इंजीनियरी का केवल एक ही भाग-क सिविल एवं संरचनात्मक अथवा भाग-ख विद्युत अथवा भाग-ग यांत्रिक को हल करना होगा अन्यथा आपको '**शून्य**' अंक दिया जाएगा।
4. सभी प्रश्न अनिवार्य हैं तथा सबके बराबर अंक हैं।
5. *प्रश्न पत्र में **वस्तुनिष्ठ अंकन होगा। हर गलत उत्तर के लिए 0.25 अंक काटा जाएगा।***
6. **प्रश्नों के उत्तर देने से पहले आप इस पुस्तिका की जाँच करके देख लें कि इसमें पूरे पृष्ठ (1-64) हैं तथा कोई पृष्ठ कम या दुबारा तो नहीं आ गया है। यदि आप इस पुस्तिका में कोई त्रुटि पाएँ, तो **तत्काल** इसके बदले दूसरी पुस्तिका ले लें।**
7. निरीक्षक द्वारा आपको उत्तर-पत्रिका अलग से दी जाएगी। प्रश्नों के उत्तर वास्तव में शुरू करने से पहले आप उत्तर-पत्रिका के Side-I में दिशानुसार के अनुसार अपने **नाम, रोल नम्बर, टिकट नम्बर, परीक्षा का नाम जैसे प्रवेश पत्र में दिखाया गया है, जन्म तिथि, टेस्ट फॉर्म संख्या तथा विषय** अर्थात् सिविल एवं संरचनात्मक या विद्युत या यांत्रिक आदि आवश्य लिखें। प्रश्नों के उत्तर देने से पहले उत्तर पत्रिका पर निर्दिष्ट स्थान में आप अपने हस्ताक्षर एवं बाएँ हाथ के अंगूठे का निशान भी अवश्य लगाएँ। उपर्युक्त अनुदेशों का पूरी तरह अनुपालन किया जाए, अन्यथा आपकी उत्तर-पत्रिका की जाँच नहीं जाएगा और '**शून्य**' अंक दिया जाएगा।
8. उत्तर-पत्रिका में सभी उत्तर Side-II में प्रश्न संख्या के सामने दिये गये सम्बन्धित **अण्डाकार खानों को केवल काला/नीला बॉल-पॉइंट पेन** से पूरी तरह काला करके दिखाएँ। जो अण्डाकार खाने काला/नीला बॉल-पॉइंट पेन से नहीं भरे जाएँगे, उनके लिए कोई अंक नहीं दिया जाएगा।
9. ओ.एम.आर. उत्तर पत्रिका में भरी गई कूट सूचना को एक मशीन पढ़ेगी। यदि सूचना अपूर्ण है अथवा आवेदन प्रपत्र में दी गई सूचना से भिन्न है, तो ऐसे अभ्यर्थी को '**शून्य**' अंक दिया जाएगा।
10. परीक्षा-भवन छोड़ने से पहले परीक्षार्थी को उत्तर-पत्रिका निरीक्षक के हवाले कर देनी चाहिए।
11. ऊपर के अनुदेशों में से किसी एक का भी पालन न करने पर उम्मीदवार पर विवेकानुसार कार्यवाही की जा सकती है या दण्ड दिया जा सकता है।
12. विभिन्न प्रश्नों के उत्तर देने की विधि इस पुस्तिका के पीछे (पृष्ठ संख्या **64**) में छपे हुए निर्देशों में दे दी गई है, इसे आप प्रश्नों के उत्तर देने से पहले ध्यानपूर्वक पढ़ लें।
13. प्रश्नों के उत्तर जितनी जल्दी हो सके तथा ध्यानपूर्वक दें। कुछ प्रश्न आसान तथा कुछ कठिन हैं। किसी एक प्रश्न पर बहुत अधिक समय न लगाएँ।
14. **कोई रफ़ कार्य उत्तर-पत्रिका पर नहीं करना है। रफ़ कार्य के लिए स्थान प्रश्नों के नीचे दिया गया है।**
15. ***"परीक्षा हॉलों/कमरों में मोबाइल फ़ोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फ़ोन/किसी अन्य बेतार संचार साधन को स्विच ऑफ़ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जाएगा और उनके विरुद्ध कार्यवाई की जाएगी, उनकी अभ्यर्थिता रद्द कर देने सहित।"***

इस पुस्तिका की सील तब तक न खोलें जब तक कहा न जाए।

TEST - (i)

GENERAL INTELLIGENCE AND REASONING

Directions : In question nos. **1** to **8**, select the related word/ letters/number from the given alternatives.

1. 5 : 26 :: 8 : ?
   (A) 67 (B) 64 (C) 65 (D) 66

2. Pyorrhea : Teeth :: Eczema : ?
   (A) Skin (B) Heart (C) Lungs (D) Eye

3. N × O : 14 × 15 :: G × S : ?
   (A) 5 × 17 (B) 15 × 16
   (C) 6 × 18 (D) 7 × 19

4. Writer : Book :: ?
   (A) Composer : Song (B) Building : Architect
   (C) Poem : Poet (D) Chair : Carpenter

5. BMCX : CNDY :: ? : EXFW
   (A) DWEV (B) DUGT
   (C) FGUT (D) DTGU

6. 24 : 288 :: 22 : ?
   (A) 248 (B) 238 (C) 240 (D) 242

7. Car : Garage :: Aircraft : ?
   (A) Airdrome (B) Shelter
   (C) Hangar (D) Jetty

8. $\frac{3}{8} : \frac{12}{32} :: \frac{4}{5} : ?$
   (A) $\frac{16}{20}$ (B) $\frac{4}{6}$ (C) $\frac{5}{6}$ (D) $\frac{10}{23}$

9. Which one of the following is always associated with JUSTICE ?
   (A) Autocracy (B) Hypocracy
   (C) Democracy (D) Legitimacy

Directions : In question nos. **10** to **18**, find the odd number/ letters/figure/number pair from the given alternatives.

10. (A) 21 - 27 (B) 9 - 27
    (C) 9 - 12 (D) 15 - 19

11. (A) 38 - 76 (B) 28 - 84
    (C) 34 - 76 (D) 23 - 64

12. (A) 5 - 7 (B) 3 - 8 (C) 6 - 8 (D) 4 - 5

13. (A) Sphere (B) Triangle
    (C) Circle (D) Oval

14. (A) Rosemary (B) Mint
    (C) Peepal (D) Coriander

15. (A) ZXUR (B) ZXWU
    (C) YWVT (D) WUTR

16. (A) Gold (B) Iron
    (C) Brass (D) Copper

17. (A) Thrive (B) Excite
    (C) Flourish (D) Prosper

18. (A) Krishna (B) Vaigai
    (C) Kaveri (D) Narmada

19. Which one of the given response would be a meaningful order of the following ?
    (1) Tissue (2) Cell (3) Organ
    (A) (2), (3), (1) (B) (1), (2), (3)
    (C) (3), (1), (2) (D) (2), (1), (3)

20. Which item will appear **third** in the dictionary ?
    (A) pair (B) pain (C) page (D) pall

SPACE FOR ROUGH WORK

Directions : In question nos. **21** to **26,** a series is given, with one term missing. Choose the correct alternative from the given ones that will complete the series.

21. 1, 2, 8, __?__, 148, 765
(A) 74 (B) 32 (C) 40 (D) 33

22. BC, FGH, KLMN, __?__, XYZABC
(A) QRSTU (B) RSTUV
(C) PQRST (D) QRST

23. DF, __?__, JL, MO
(A) LN (B) CE (C) GI (D) AC

24. 7, 12, 19, 28, 39, __?__
(A) 51 (B) 49 (C) 57 (D) 52

25. DMP, FLN, HKL, JJJ, __?__
(A) MIH (B) MII (C) LIH (D) MIF

26. Z3A, W9D, __?__, Q81J, N243M
(A) R31E (B) V21H
(C) T27G (D) S29F

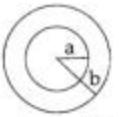
27. If 'EVENT' is coded as 54552 then 'REVENGE' is coded as :
(A) 9545575 (B) 8455753
(C) 9845575 (D) 8755475

28.
$$\begin{array}{r} 2.04 \\ \times\ .75 \\ \hline ? \end{array}$$
(A) 15.300 (B) 1.5300
(C) 153.00 (D) 1530.00

29. If BACTERIA can be written as ABIARCET then how PROTOZOA can be written :
(A) AROZOTOPO (B) ORPTOZOA
(C) APORZOOT (D) TOZOAPRO

30. Unscramble these letters to make a _____.
EYDSNY
(A) mountain (B) city
(C) animal (D) river

31.



If radius b is double that of radius a, the area of the smaller circle to that of the larger circle is in proportion :
(A) 1 : 16 (B) 1 : 2 (C) 1 : 4 (D) 1 : 8

32. Insert the arithmetic signs in the following numerical figure :
7, 3, 6 = 24
(A) + × (B) − + (C) − × (D) − ÷

33. Insert the arithmetical signs in the following numerical figure :
9, 3, 4, 6 = 29
(A) × + − (B) + − ×
(C) × − + (D) + × −

34. If $7x - 5y = 20$ and $12x + 5y = 75$, what is the value of xy ?
(A) 30 (B) 15 (C) 18 (D) 20

Directions : In question nos. **35** to **37,** select the missing number from the given responses.

35.

(A) 100 (B) 36 (C) 121 (D) 42

36.

(A) 82 (B) 81 (C) 83 (D) 84

37.

(A) 24 (B) 45 (C) 63 (D) 36

SPACE FOR ROUGH WORK

38. Ram started from his house and travelled 3 km towards South. Then turned left and travelled 4 km. Then again he turned right and travelled 3 km. From there, he turned left and travelled 4 km. At what distance is he now from his house ?

(A) 15 km (B) 5 km

(C) 10 km (D) 14 km

39. From point A, Ravi walks 5 km North - West to point B, from point B he walks 10 km South to point C. From point C he moves 5 km North - East to point D. From point D he was back to point A. If Ravi always walked in a straight line what figure has he traced ?

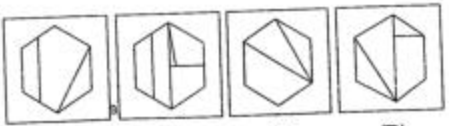
(A) Trapezium. (B) Rhombus

(C) Kite (D) Parallelogram

40. Identify the answer figure from which the given pieces in question figure are found.

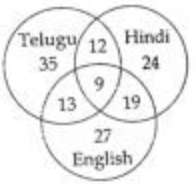
Question figure :

Answer figures :



(A) (B) (C) (D)

41. This Venn diagram shows the no. of people who can speak Telugu, Hindi and English. Find out the total no. of people who can speak all the three languages ?



(A) 19 (B) 13 (C) 12 (D) 9

42. How many triangles are there in the figure ?

(A) 7 (B) 13 (C) 11 (D) 9

43. Indicate the best relation among blackboard, classroom and school.

(A) (B) (C) (D)

Directions : In question nos. **44** and **45**, one or two statements is given followed by two Conclusions **I, II** and **III**. You have to consider the statement to be true, even if it seems to be at variance from commonly known facts. You are to decide which of the given conclusions can definitely be drawn from the given statement. Indicate your answer.

44. **Statement :** Some fishes are crocodiles. Some Crocodiles are snakes. No snake is snail. All snails are tortoises.

Conclusion : I Some snakes are fish

II Some fishes are tortoise

(A) None of these Conclusions **I** and **II** follow

(B) Conclusion **I** follow

(C) Conclusion **II** follow

(D) Both the Conclusions **I** and **II** follow

SPACE FOR ROUGH WORK

45. **Statement :** Jessica has 4 children. Two of them have blue eyes and two have brown eyes. Half of the children are girls.

Conclusions : I At least one girl has blue eyes

II Two of the children are boys.

III The boys have brown eyes.

(A) Conclusion **I** only

(B) Conclusion **II** only

(C) Conclusion **I** and **III** only

(D) Conclusion **II** and **III** only

Directions : In question nos. **46** and **47**, which answer figure will complete the pattern in the question figure.

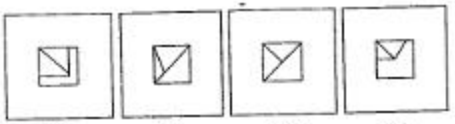
46. **Question figure :**

Answer figures :

(A) (B) (C) (D)

47. **Question figure :**

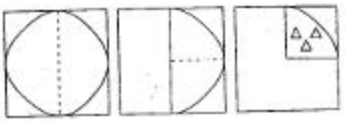
Answer figures :



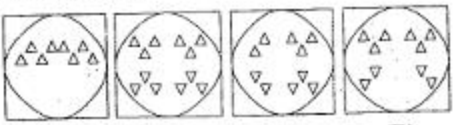
(A) (B) (C) (D)

48. A piece of paper is folded and cut as shown below in the question figures. From the given answer figures, indicate how it will appear when opened.

Question figure :



Answer figures :

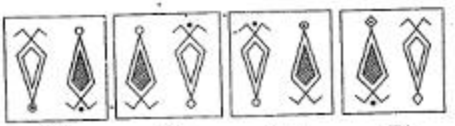


(A) (B) (C) (D)

49. If a mirror is placed on the line AB, then which of the answer figures is the right image of the given figure.

Question figure :

Answer figures :



(A) (B) (C) (D)

50. In the following question, a matrix of certain characters is given. These characters follow a certain trend, row - wise or column - wise. Find out this trend and choose the missing character accordingly.

Z	?	S
J	G	?
?	T	P

(A) WCV (B) RHS

(C) WCW (D) RQM

SPACE FOR ROUGH WORK

TEST - (ii)

GENERAL AWARENESS

51. During National emergency, the following article cannot be suspended :
(A) Article 20 (B) Article 17
(C) Article 21 (D) Article 19

52. Which one of the following states has a separate Constitution ?
(A) Sikkim
(B) Assam
(C) Jammu and Kashmir
(D) Arunachal Pradesh

53. "Origin of Species by Natural Selection" was written by :
(A) William Harvey (B) Lamark
(C) Charles Darwin (D) Wallace

54. How many islands are there in Lakshadweep ?
(A) 47 (B) 17 (C) 27 (D) 36

55. Cockroach is :
(A) Sanguivorous (B) Carnivorous
(C) Herbivorous (D) Omnivorous

56. Which of the following plant is grown for the reclamation of ravines ?
(A) *Eucalyptus globulus*
(B) *Prosopis juliflora*
(C) *Dalbergia sissoo*
(D) All of the above

57. The Brahmo Samaj was founded by :
(A) Keshab Chandra Sen
(B) Raja Rammohan Roy
(C) Devendranath Tagore
(D) Dayananda Saraswathi

58. The banks are required to maintain a certain ratio between their cash in hand and total assets. This is called :
(A) CLR (Central Liquid Reserve)
(B) SBR (Statutory Bank Ratio)
(C) SLR (Statutory Liquid Ratio)
(D) CBR (Central Bank Reserve)

59. The chemical substance present in bones and teeth is :
(A) $Ca_3(BO_3)_2$ (B) $Ca(NO_3)_2$
(C) $Ca_3(PO_4)_2$ (D) CaF_2

60. What is the primary effect of excess phosphorous in the aquatic environment called ?
(A) Radiation (B) Fixation
(C) Nitrification (D) Eutrophication

61. MS Office, Photoshop and Animagic are examples of :

(A) Device driver
(B) Application software
(C) System software
(D) Operating system

62. Indian Income Tax is :
(A) Indirect and Progressive
(B) Direct and Proportional
(C) Indirect and Proportional
(D) Direct and Progressive

63. NABARD is a :
(A) Department (B) Bank
(C) Bureau (D) Board

64. The onset of reproductive life is called :
(A) Maturation (B) Menarche
(C) Menopause (D) Puberty

65. Which among the following instruments produces electricity ?
(A) Transmitter (B) Electrografers
(C) Dynamo (D) Voltametre

66. Unit of electric current is :
(A) Velocity (B) Volts
(C) Ampere (D) Calorie

67. Reservation for the Scheduled Castes and Scheduled Tribes in the services has been provided in the Indian Constitution under :

(A) Article 375 (B) Article 315

(C) Article 335 (D) Article 365

68. Nucleolus is present within the :

(A) Lysosome (B) Cytoplasm

(C) Mitochondria (D) Nucleus

69. The subject on which both the Centre and State Governments can legislate are contained in :

(A) Residuary List

(B) The Union List

(C) The State List

(D) The Concurrent List

70. Plants are green because of the presence of a pigment called :

(A) Oxygen (B) Glucose

(C) Nitrogen (D) Chlorophyll

71. One billion bytes is approximately equal to :

(A) Gigabyte (B) Megabyte

(C) Terabyte (D) Petabyte

72. The term 'NIFE' refers to :

(A) Ocean floor (B) Earthquakes

(C) Core of the earth (D) Crust of the earth

73. The river cauvery originates from which of the following states ?

(A) Madhya Pradesh (B) Andhra Pradesh

(C) Tamil Nadu (D) Karnataka

74. The Jawaharlal Nehru Port is located at :

(A) Kolkata (B) Paradip

(C) Cochin (D) Mumbai

75. Which type of energy is converted into electrical energy by a battery ?

(A) Thermal (B) Mechanical

(C) Chemical (D) Biological

76. Birthday of which Indian personality is celebrated on 2nd October along with M.K. Gandhi ?

(A) V.P. Singh

(B) Rabindranath Tagore

(C) Bal Gangadhar Tilak

(D) Lal Bahadur Shashtri

77. The 24th Thirthankara of Jainism :

(A) Mahaveera (B) Vrushabha

(C) Parshwanatha (D) Ashwagosha

78. Mohamud Ghazni's last famous expedition to Hindustan was against :

(A) Somanath (B) Kalinjar

(C) Kannauj (D) Mathura

79. Savanna grasslands in Brazil are called :

(A) Campos (B) Downs

(C) Prairies (D) Pampas

80. Which of the following is a triploid plant ?

(A) Orange (B) Wheat

(C) Banana (D) Mango

81. The fundamental duties are incorporated in Article 51A of the constitution of India by the :

(A) 44th Amendment Act

(B) 41st Amendment Act

(C) 42nd Amendment Act

(D) 43rd Amendment Act

82. A consumer is said to be in equilibrium, if :

(A) He is able to locate new sources of income.

(B) He is able to fulfill his needs with a given level of income.

(C) His income and expenditure are equal.

(D) He can fulfill his needs without consumption of certain items.

83. Which metal gives H_2 with steam in Red heat condition ?
(A) Pb (B) Cu (C) Fe (D) Ag

84. The source of River Vaigai is in the hills of :
(A) Cardamom (B) Agasthiar
(C) Amarkantak (D) Jawadi

85. The universal energy currency of plants and animals is :
(A) ATP (B) Chlorophyll
(C) Calorie (D) NADP

86. Air pollution is caused by :
(A) Loud speakers (B) Insecticides
(C) Sewage (D) Smoke

87. Who among the following can be removed from the office without impeachment ?
(A) Chief Election Commissioner
(B) President of India
(C) Chief Justice of India
(D) Governor of a State

88. The fundamental Rights of Indian citizen are contained in :
(A) Part VIII of constitution
(B) Part III of constitution
(C) Part IV of constitution
(D) The seventh schedule of the constitution

89. 'School Capital' of India is :
(A) Lucknow (B) Dehradun
(C) Bangalore (D) Delhi

90. Where in India can you find the highest cricket ground above sea level ?
(A) Guwahati (B) Dehradun
(C) Chail (D) Gwalior

91. The fertilizer Nitrolym is :
(A) $CaCN_2 + C$ (B) $CaCN_2$
(C) $CaCN + C$ (D) $Ca(CN)_2 + CO_2$

92. 'Sambalpur' is situated on the bank of which of the following rivers ?
(A) Mahanadi (B) Yamuna
(C) Saraswati (D) Saryu

93. The Per Capita Income is obtained by :
(A) Dividing the total national capital with the profit earned.
(B) Summing up the income of the citizens of the country.www.previouspapers.in
(C) Dividing the national income by the population.
(D) Estimating the minimum income of individual citizens.

94. Mistral is a cold wind which blows down the valley of :
(A) Volga (B) Rhine
(C) Rhone (D) Seine

95. The largest nationalized bank of India is the :
(A) Central Bank of India
(B) State Bank of India
(C) Reserve Bank of India
(D) Bank of India

96. With increasing quantum number, the energy difference between adjacent energy levels in atoms :
(A) Decreases first and then ihcreases
(B) Decreases
(C) Increases
(D) Remains constant

97. Megasthanees was a Greek Ambassador sent by :
(A) Seleukos (B) Alexander
(C) Philippos (D) Justin

98. In the etching of glass, we use the acid :
(A) HBr (B) HCl (C) HF (D) HI

99. Steppe grassland is found in :
(A) Russia (B) Africa
(C) South America (D) Australia

100. The Sikh religion originated with the teaching of :
(A) Rangit Singh (B) Ramdas
(C) Guru Nanak (D) Govind Singh

TEST - (iii)

Part - A : GENERAL ENGINEERING (Civil and Structural)

101. The minimum percentage of steel in R.C.C. slab using mild steel reinforcement in given by :

(A) 0.35% (B) 0.12%

(C) 0.15% (D) 0.30%

102. To obtain very high strength concrete, it is necessary to use very fine grained :

(A) Volcanic scoria (B) Granite

(C) Magnetite (D) Barite

103. Which of the following type of lime is used for underwater constructions ?

(A) Fat lime (B) Quick lime

(C) Slaked lime (D) Hydraulic lime

104. Which one of the following has least bearing Capacity ?

(A) Loose gravel (B) Hard rocks

(C) Soft rocks (D) Compact gravel

105. Factor of safety is the ratio of :

(A) bearing stress and working stress

(B) yield stress and working stress

(C) tensile stress and working stress

(D) compressive stress and working stress

106. For lined canals, the freeboard is measured from the :

(A) full supply level to the top of the lining

(B) full supply level to the top of the bank

(C) top of the bank to the top of the lining

(D) full supply level to the top of the dowel

107. The property of a material by which it gets permanent deformation under a load which is not recovered after removal of load is called :

(A) elasticity (B) brittleness

(C) ductility (D) plasticity

108. The concrete having a slump of 6.5 cm, is said to be :

(A) plastic (B) dry

(C) earth moist (D) semi-plastic

109. Capillary rise is a phenomenon that is attributed to the following property of fluid :

(A) vapour pressure

(B) viscosity

(C) density

(D) surface tension

110. The value of C_V for sharp edged orifice is generally :

(A) 0.98 (B) 0.95 (C) 0.96 (D) 0.97

111. As a cheap alternative, the fineness of cement is tested by using :

(A) IS 100 μ sieve where at least 90% (by weight) should be retained

(B) IS 90 μ sieve where at least 90% (by weight) should pass

(C) IS 90 μ sieve where at least 95% (by weight) should pass

(D) IS 100 μ sieve where at least 90% (by weight) should pass

112. Strain energy due to sudden axial load is given by :

σ : resultant stress

P : axial load

Δ : detornator

ϵ : strain

E : modulous of elasticity

(A) $\frac{1}{2}P\Delta$ (B) $\sigma.\epsilon$

(C) $P\Delta$ (D) $\frac{\sigma^2}{2E}$

113. The maximum permissible stress for hand driven rivet in axial tension is :

(A) 250 N/mm^2 (B) 80 N/mm^2

(C) 90 N/mm^2 (D) 100 N/mm^2

114. Measurement of pressure difference between two points is, generally done by using :

(A) Venturimeter

(B) Pitot tube

(C) Differential manometer

(D) None of the above

115. Calcium chloride added in concrete acts as :

(A) retarder

(B) accelerator

(C) air entraining agent

(D) plasticizer

116. The following document contains detailed description of all items of work excluding their quantities, along with the current rates :

(A) Analysis of rates

(B) Tender document

(C) Abstract estimate

(D) Schedule of rates

117. Specific gravity has a unit :

(A) g/cc

(B) kg/m^3

(C) N/m^3

(D) No unit - dimensionless

118. To construct a massive dam the type of cement used is :

(A) blast furnace slag cement

(B) low heat cement

(C) rapid hardening cement

(D) ordinary Portland cement

119. The size of a fillet weld is indicated by :

(A) Size of the plate

(B) Side of the triangle of fillet

(C) Throat of the fillet

(D) Length of fillet weld

120. In limit state method of design, for bars in compression the values of bond stress shall be :

(A) Decreased by 25%

(B) Increased by 20%

(C) Decreased by 20%

(D) Increased by 25%

121. The main gas liberated from an anaerobic sludge digestor is :

(A) NH_3 (B) CO

(C) CO_2 (D) CH_4

122. Spacing of stirrups in a rectangular beam is :

(A) increased at the ends

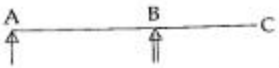
(B) kept constant throughout the length

(C) decreased towards the centre of the beam

(D) increased at the centre of the beam

123. The minimum percentage of longitudinal reinforcement in RCC column is :

(A) 1.2 (B) 0.6 (C) 0.8 (D) 1.0

124. 

The beam shown in Fig. is :

(A) Free cantilever beam

(B) Single overhanging beam

(C) Double overhanging beam

(D) Proper cantilever beam

125. The slendemess ratio of a column is zero when its length :

(A) Effective length is equal to Actual length

(B) is very large

(C) is equal to its radius of gyration

(D) is supported on all sides throughout its length

126. Most important constituents of cement are :
(A) C_3A and C_2S (B) C_3S and C_3A
(C) C_3S and C_2S (D) C_3A and C_4AF

127. Which of the following has least carbon content ?
(A) Wrought Iron (B) Cast Iron
(C) Mild Steel (D) Pig Steel

128. When R is the radius of the curve (in metres), D is the degree of curve (in degrees) and length of the chord is 30 m, then the relation between R and D is :
(A) $R = 5400/D$ (B) $R = 1520/D$
(C) $R = 1720/D$ (D) $R = 4500/D$

129. The floor area includes the area of the balcony upto :
(A) 25% (B) 85% (C) 75% (D) 50%

130. The increase in the strength of concrete with time is :
(A) Linear (B) Non-Linear
(C) Asymptotic (D) All of the above

131. Generally concrete cubes are tested measure concrete's :
(A) Compressive strength
(B) Tensile strength
(C) Twisting strength
(D) None of the above

132. In a singly reinforced beam, if the stress in concrete reaches its allowable limit earlier than the steel reaches its permissible limit, the beam section is called :
(A) critical section
(B) under reinforced section
(C) over reinforced section
(D) economic section

133. Which of the following is a dimensionless quantity ?
(A) Shear force
(B) Stress
(C) Strain
(D) Modulus of elasticity

134. Weight of one bag of cement is :
(A) 70 kg (B) 50 kg
(C) 60 kg (D) 65 kg

135. The flow constant 'f' in Darcy Weisbach equation for head loss in piped flows has a unit of :
(A) No unit - diversion less (B) m
(C) m/sec (D) kg - m/sec

136. Steel corrodes in exposure of air and moisture and rust has :
(A) 2.5 times the volume of steel
(B) 0.5 times the volume of steel
(C) equal volume compared to amount of steel rusted
(D) twice the volume of steel

137. In the quadrantal bearing system, a whole circle bearing of 293°30' can be expressed as :
(A) N 23° 30'W (B) W 23° 30'N
(C) N 66° 30'W (D) S 113° 30'N

138. Workability of concrete is directly proportional to :
(i) time of transit
(ii) water cement ratio
(iii) grading of aggregate
(iv) strength of concrete
(v) aggregate cement ratio
(A) (iii), (iv), (v) (B) (i), (ii), (iv)
(C) (ii), (iii), (v) (D) (ii), (iii)

139. A 40 cm diameter circular timber column is 4 m long. The slenderness ratio of the column is :
(A) $20\sqrt{2}$ (B) 10
(C) 20 (D) 40

140. The percentage of the fine aggregate of fineness modulus 2.6 to be combined with coarse aggregate of fineness modulus 6.8 for obtaining the aggregates of fineness modulus 5.4, is :

(A) 60% (B) 30% (C) 40% (D) 50%

141. Administrative head of public works department who is directly responsible to Government is :

(A) Assistant Engineer

(B) Executive Engineer

(C) Superintending Engineer

(D) Chief Engineer

142. The load factor applied to wind and seismic loads in design of steel structures is :

(A) 2.2 (B) 1.3 (C) 1.5 (D) 1.8

143. The minimum diameter of longitudinal reinforcement in RCC column should not be less than :

(A) 16 mm (B) 6 mm

(C) 8 mm (D) 12 mm

144. Generally the ratio of different ingredients (Cement Sand and aggregate) in concrete mix of grade M20 is :

(A) 1:2:4 (B) 1:1.5:3

(C) 1:3:6 (D) 1:1:2

145. Fineness test of cement gives us an estimate of :

(A) workability of concrete

(B) heat of hydration

(C) rate of hydration

(D) durability of concrete

146. The type of surveying which requires least office work is (least calculation) :

(A) Theodolite surveying

(B) Tacheometry

(C) Trignometrical levelling

(D) Plane table surveying

147. Admixtures which cause early setting and hardening of concrete are called :

(A) Air entraining agents

(B) Workability admixture

(C) Accelerators

(D) Retarders

148. Basalt stone is by nature :

(A) meta morphic (B) volcanic

(C) plutonic (D) sedimentary

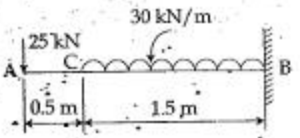
149. In open channels, maximum velocity occurs :

(A) just below the free surface

(B) at the surface

(C) near the channel bottom

(D) in the mid-depth of flow

150. 

For the cantilever beam shown in Fig, the value of shear Force at Fixed end is :

(A) 100 kN (B) 70 kN

(C) 80 kN (D) 90 kN

151. In a simply supported beam of span, L subjected to Uniformly Distributed Load (UDL) of intensity W kN/m over it's entire length the maximum bending is given by the expression :

(A) $\frac{WL^2}{8}$ (B) $\frac{WL}{2}$

(C) $\frac{WL^2}{2}$ (D) WL

152. The relationship between void ratio 'e' and porosity 'n' is :

(A) $n = \frac{1+e}{1-e}$ (B) $e = n(1+e)$

(C) $n = \frac{e}{1-e}$ (D) $e = \frac{1+n}{1-e}$

153. When 1 cm on a map represents 10 m on the ground, the representative fraction of the scale is :

(A) $\frac{1}{10000}$ (B) $\frac{1}{10}$

(C) $\frac{1}{100}$ (D) $\frac{1}{1000}$

154. A simply supported beam of span 'L' is loaded with downward uniformly distributed load of intensity W/mp over it's entire length. Which of the following orientation of T-beams is preferred to resist bending ?

(A)  (B) 

(C)  (D) 

155. The total energy line lies over the hydraulic gradient line by an amount equal to :

(A) sum of pressure, velocity and datum heads

(B) pressure head, $\frac{p}{\gamma}$

(C) velocity head, $\frac{v^2}{2g}$

(D) datum head, z

156. Diameter of a rivet hole is made larger than the diameter of the river by :

(A) 0.5 mm (B) 1.0 mm

(C) 3 mm (D) 2.0 mm

157. A flyover seggregates traffic with respect to :

(A) direction (B) grade

(C) speed (D) class of vehicle

158. For producing electricity, following combination of machines will be required :

(A) Electric Motor + Pump

(B) Hydraulic Turbine + Generator

(C) Hydraulic Turbine + Electric Motor

(D) Generator + Pump

159. Irrigation efficiency of an irrigation system is the ratio of :

(A) Water reaching the farm to water delivered from the source

(B) Crop yield to total amount of water used in a field

(C) Water actually stored in root zone to water delivered to the farm

(D) Water actually utilised by growing crops to water delivered from the source

160. The specific gravity of bitumen is :

(A) 2.09 (B) 0.8 (C) 0.9 (D) 1.09

161. The ratio of normal stress to normal strain within elastic limits is called :

(A) Young's Modulus (B) Shear Modulus

(C) Poisson's Ratio (D) Bulk Modulus

162. Gravel and sand belongs to the following category of soils :

(A) alluvial (B) cohesive

(C) expansive (D) marine

163. The shape of Bending Moment Diagram in a beam subjected to only Uniformly Distributed Load (UDL) is :

(A) Constant (B) Cubic parabola

(C) Parabola (D) Triangular

164. To prevent sulphate attack in concrete, for preparing concrete mix, water pH must be within :

(A) 7 - 10 (B) 4 - 6 (C) 5 - 7 (D) 6 - 9

165. For subcritical flow, the froude number is :

(A) Not equal to one (B) Less than one

(C) Greater than one (D) Equal to one

166. The permissible bending stress in working stress method of design of column base is considered equal to :

(A) 0.87 fy (B) 0.6 fy

(C) 0.67 fy (D) 0.75 fy

167. In single laced column construction, the thickness of the flat lacing bars shall not be less than :

(A) $\frac{1}{15}$ th of the width of the lacing bar

(B) $\frac{1}{30}$ th of the effective length of single lacing

(C) $\frac{1}{40}$ th of the effective length of single lacing

(D) $\frac{1}{10}$ th of the width of the lacing bar

168. The most accurate instrument for measuring horizontal and vertical angles is :

(A) Theodolite (B) Dumpy level

(C) Compass (D) Tape and chain

169. The quantity of wood for the shutters of doors and windows is calculated in :

(A) m^3 (B) lump-sum

(C) m (D) m^2

170. The plan of a building is in the form of square with centreline dimensions of outer walls as 14.7 m × 14.7m. If the thickness of the wall in superstructure is 0.30 m, then its plinth area is :

(A) 234 m^2 (B) 150 m^2

(C) 216 m^2 (D) 225 m^2

171. The counter lines can cross one another on map only in the case of :

(A) an overhanging cliff

(B) a vertical cliff

(C) a valley

(D) a ridge

172. The purpose of stiffeners in a plate girder is to :

(A) prevent buckling of web plate

(B) reduce the shear stress

(C) take care of bearing stress

(D) increase the moment carrying capacity of the girder

173. A fluid, which is incompressible and is having no viscosity is :

(A) Ideal fluid

(B) Real fluid

(C) Newtonian fluid

(D) Non Newtonian fluid

174. The value of property during its useful life based on purchase value and depreciations etc. is known as :

(A) Junk value (B) Salvage value

(C) Scrap value (D) Book value

175. The relationship between atmosphere pressure (p_{atm}), gage pressure (p_{gage}) and absolute pressure (p_{abs}) is given by :

(A) $p_{atm} = p_{abs} - p_{gage}$

(B) $p_{abs} = p_{atm} + p_{gage}$

(C) $p_{abs} = p_{atm} - p_{gage}$

(D) $p_{atm} = p_{abs} + p_{gage}$

176. In a structure, cables and wires are used generally as :

(A) to resist shear stress

(B) tension member

(C) compression member

(D) flexural member

177. When the magnetic bearing of the sun at noon is 185°20', the magnetic declination will be :

(A) 5°20' south (B) 5°20' east

(C) 5°20' west (D) 5°20' north

178. A RCC column is regarded as long column if the ratio of its unsupported length between end restraints to least lateral dimension is more than :

(A) 25 (B) 150 (C) 125 (D) 60

179. The height of instrument is equal to :

(A) Reduced level of bench mark − back sight

(B) Reduced level of bench mark + back sight

(C) Reduced level of bench mark + fore sight

(D) Reduced level of bench mark + Intermediate sight

180. Thickness of Plastering is usually :

(A) 40 mm (B) 6 mm

(C) 12 mm (D) 25 mm

181. Water absorption of Class I brick after 24 hours of immersion in water should not exceed _____ of self weight.

(A) 25% (B) 18% (C) 20% (D) 22%

182. For a given aggregate ratio increasing the water cement ratio :

(A) increases the strength

(B) decreases shrinkage

(C) increases shrinkage

(D) does not cause any change in shrinkage

183. Granite is a rock that is by nature :

(A) metamorphic (B) volcanic

(C) plutonic (D) sedimentary

184. When the plastic limit of a soil is greater than the liquid limit, then the plasticity index is reported as :

(A) 1

(B) Negative

(C) Zero

(D) Non-Plastic (NP)

185. Compression members always tend to buckle in the direction of the :

(A) Least radius of gyration

(B) Axis of load

(C) Perpendicular to the axis of load

(D) Minimum cross-section

186. As per IS 456-2000. In the absence of test data, the approximate value of the total strain for design may be taken as :

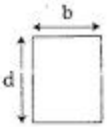
(A) 0.004 (B) 0.001

(C) 0.002 (D) 0.003

187. Separation of water or water sand cement from a freshly mixed concrete is known as :

(A) Segregation (B) Flooding

(C) Bleeding (D) Creeping

188. 

Moment of Inertia of rectangular section shown in Fig. about its base is :

(A) $\frac{bd^2}{3}$ (B) $\frac{bd^3}{12}$

(C) $\frac{bd^3}{3}$ (D) $\frac{bd^2}{12}$

189. The correct prismoidal formula for valume calculation is :

(A) $\frac{D}{6}$ [first section area + last section area + 2Σ even numbered section area + 4Σ odd numbered section areas]

(B) D [first section area + last section area + Σ even numbered section area + 2Σ odd numbered section areas]

(C) $\frac{D}{3}$ [first section area + last section area + 4Σ even numbered section area + 2Σ odd numbered section areas]

(D) $\frac{D}{3}$ [first section area + last section area + 2Σ even numbered section area + 4Σ odd numbered section areas]

190. Zinc Oxide is a pigment having colour _____.

(A) blue (B) white

(C) yellow (D) red

191. The correction for sag is :

(A) Some times additive and sometimes subtractive

(B) Always additive

(C) Always subtractive

(D) Always zero

192. The permanent deformation of concrete with time under steady load is called :

(A) visco-elasticity (B) vicidity

(C) creep (D) relaxation

193. Intersection method in plane table surveying is most suitable for :

(A) Plains (B) Forests

(C) Urban areas (D) Hilly areas

194. An aggregate is known as cyclopean aggregate if its size is more than :

(A) 75 mm (B) 4.75 mm

(C) 30 mm (D) 60 mm

195. The centrifugal force on a car moving on a horizontal circular curve is proportional to :

(A) $\frac{Wv^2}{(gR)}$ (B) $\frac{Wv}{(gR)}$

(C) $\frac{Wv^2}{(gR^2)}$ (D) $\frac{Wv}{(gR^2)}$

196. Using straight line method annual depreciation D is equal to :

(A) $\frac{\text{Life in year} - \text{scrap value}}{\text{Original cost}}$

(B) $\frac{\text{Scrap value} - \text{life in year}}{\text{Original cost}}$

(C) $\frac{\text{Original cost} - \text{life in year}}{\text{scrap value}}$

(D) $\frac{\text{Original cost} - \text{scrap value}}{\text{life in year}}$

197. If R and T are rise and tread of a stair spanning horizontally and steps are supported by wall on one side and by stringer beam on the other side, the steps are designed as beam of width :

(A) $\frac{(R+T)}{2}$ (B) $R+T$

(C) $T-R$ (D) $\sqrt{R^2+T^2}$.

198. Segregation in the concrete occurs when :

(A) Cement gets separated from mixture due to excess water

(B) Cement fails to give adequate binding quality

(C) Water is driven out of concrete at a faster rate

(D) Coarse aggregate tries to separate out from the finer material

199. Unit of second moment of area is :

(A) mm (B) mm^4 (C) mm^3 (D) mm^2

200. BOD test is conducted at a temperature of :

(A) Ambient temperature (B) 15° C

(C) 20° C (D) 27° C

-oOo-

TEST - (iii)

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

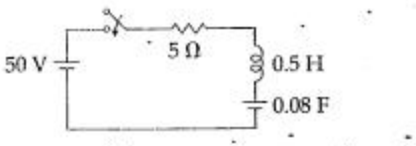
(C) cool the machine

(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) $\frac{a}{1}$ (B) $\frac{\sqrt{3}}{\sqrt{a}}$

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

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

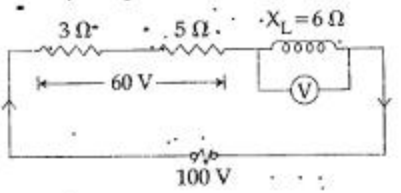
(A) Reluctance motor

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

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) 9999 (B) 0999
(C) 1999 (D) 5999

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 :

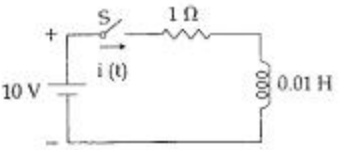
(A) Varying frequency

(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 ?

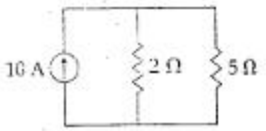
(A) The alternators must have the same phase sequence.

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

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

$\frac{1}{2} + \frac{1}{5} = \frac{1}{0.5+0.2}$

0.7 Ω

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

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

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

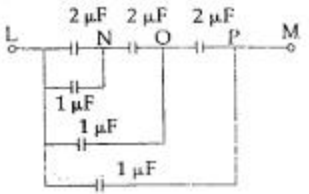
158. Two voltmeters of (0 – 300 V) range are connected in parallel to a a.c. circuit. One voltmeter is moving iron type reads 200 V. If the other is PMMC instrument, its reading will be :

(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) $-j3.33$ pu (B) $-j1.67$ pu
(C) $-j2.0$ pu (D) $-j2.5$ pu

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

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

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