

PROVISIONAL ANSWER KEY

NAME OF THE POST: Assistant Director of Transport, Class II,

Advt No. : 95/2016-17 (ACE-MECH)

Date of Preliminary Test : 05-03-2017

Subject : Concerned Subject ( 101 to 300 )

Date of Publication : 14-03-2017

Last Date to send suggestion(s) : 21-03-2017

Note:

- 1). All Suggestions are to be sent with reference to website published Question paper with Provisional Answer Key Only.
- 2). All Suggestions are to be sent in the given format only.
- 3). Candidate must ensure the above compliance.

**101.** Volumetric flow rate  $Q$ , acceleration due to gravity  $g$  and head  $H$  form a dimensionless group, which is given by

- (A)  $\sqrt{\frac{gH^5}{Q}}$                       (B)  $\frac{Q}{\sqrt{gH}}$   
(C)  $\frac{Q}{\sqrt{g^3H}}$                       (D)  $\frac{Q}{\sqrt{g^2H}}$

**102.** The correct sequence of the centrifugal pump components through which the fluid flows is

- (A) Impeller, Suction Pipe, Foot Valve and Strainer, Delivery Pipe.  
(B) Foot Valve and strainer, Suction Pipe, Impeller, Delivery Pipe  
(C) Impeller, Suction Pipe, Delivery Pipe, Foot Valve Strainer  
(D) Suction Pipe, Delivery Pipe, Impeller, Foot Valve and Strainer

**103.** A hydraulic press has a ram of 20 cm diameter and a plunger of 5 cm diameter. The force required at the plunger to lift a weight of  $16 \times 10^4$  N shall be:

- (A)  $256 \times 10^4$  N                      (B)  $64 \times 10^4$  N  
(C)  $4 \times 10^4$  N                      (D)  $1 \times 10^4$  N

**104.** Blowing down of boiler water is the process to

- (A) Reduce the boiler pressure  
(B) Increase the steam temperature  
(C) Control the solids concentration in the boiler water  
(D) Control the drum level

**105.** Cars arrive at a service station according to Poisson's distribution with a mean rate of 5 per hour. The service time per car is exponential with a mean of 10 minutes. At steady state, the average waiting time in the queue is

- (A) 10 minutes                      (B) 20 minutes  
(C) 25 minutes                      (D) 50 minutes

106. The values of enthalpy of steam at the inlet and outlet of a steam turbine in a Rankine cycle are 2800kJ/kg and 1800kJ/kg respectively. Neglecting pump work, the specific steam consumption in kg/kW-hour is  
(A) 3.60 (B) 0.36  
(C) 0.06 (D) 0.01
107. The shear strength of a sheet metal is 300MPa. The blanking force required to produce a blank of 100mm diameter from a 1.5 mm thick sheet is close to  
(A) 45KN (B) 70KN  
(C) 141 KN (D) 3500KN
108. A pump handling a liquid raises its pressure from 1 bar to 30 bar. Take the density of the liquid as 990 kg/m<sup>3</sup>. The isentropic specific work done by the pump in kJ/kg is  
(A) 0.10 (B) 0.30  
(C) 2.50 (D) 2.93
109. A single purchase crab has a handle 45 cm long and a drum of 25 cm diameter. The pinion has 30 teeth and spur has 150 teeth. The efficiency of the machine is 75%. If the maximum force that can be applied is 500 N, the maximum load that can be lifted, will be  
(A) 6750 N (B) 9860 N  
(C) 13500 N (D) 20250 N
110. A rope runs over a freely rotating frictionless pulley and two masses of 20 kg and 120 kg are hanging vertically from its two ends. The tension in the rope is  
(A) less than 200N and more than 30 N  
(B) More than 335 N and less than 338 N  
(C) exactly 100 kgf = 981 N  
(D) Exactly 100 kgf = 1373.4 N
111. The crystal structure of diamond is less close-packed than that of Cu, because the C-C bonds are  
(A) Shorter than the Cu-Cu bonds (B) Directional in nature  
(C) Non-directional in nature (D) Only partially covalent

112. In case of circular shaft subjected to torque the value of shear stress
- (A) Is uniform throughout
  - (B) Varies linearly from axis to surface
  - (C) Is maximum at the surface of the shaft
  - (D) Is zero at the axis and linearly increases to a maximum value at the surface of the shaft
113. The stress required to cause slip in a metal single crystal depends upon
- (A) Crystal Structure
  - (B) Temperature
  - (C) Orientation of the crystal with respect to the applied stress
  - (D) Cross-sectional area
114. A material whose molecular properties allow considerable reversible extension is referred to as
- (A) A polymer
  - (B) A Plastic
  - (C) A elastomer
  - (D) An isomer
115. For which of the following situations, Zeroth Law of Thermodynamics will not be valid?
- (A) 50 ml of water at 25° C is mixed with 150 ml of water at 25° C
  - (B) 500 ml of milk at 15° C is mixed with 100 ml of water at 15° C
  - (C) 5 kg of wet steam at 100° C is mixed with 50 kg of dry and saturated steam at 100° C
  - (D) 10 ml of water at 20°C is mixed with 10ml of sulphuric acid at 20°C
116. Joule-Thomson coefficient for an ideal gas having equation  $Pv = RT$  is
- (A) Unity
  - (B) Infinite
  - (C) 0.5
  - (D) Zero
117. A bicycle pump forces air into the tyre against a pressure of 5 bar. If the piston is pushed slowly, the process can be approximated to
- (A) Adiabatic
  - (B) Isothermal
  - (C) Throttling
  - (D) Free compression
118. What will be the volume occupied by a given mass of air at a temperature of 400° C if the same mass of air occupied 2 m<sup>3</sup> at 15° C, while the pressure remain unchanged?
- (A) 4.67 m<sup>3</sup>
  - (B) 14.78 m<sup>3</sup>
  - (C) 284.5 m<sup>3</sup>
  - (D) 0.046 m<sup>3</sup>

119. 10460 J of heat from a body of 3000 C is transferred to another body at 770 C. The change of entropy in this case is  
(A) 3486 J/K (B) 35 J/K  
(C) 11.6 J/K (D) 6.1 J/K
120. The molecular volume of a perfect gas at 600 kPa and 27° C will be  
(A) 4.17 m<sup>3</sup>/kg mol (B) 400 m<sup>3</sup>/kg mol  
(C) 0.15 m<sup>3</sup>/kg mol (D) 41.7 m<sup>3</sup>/kg mol
121. It is not possible to liquefy hydrogen by application of pressure, at normal room temperatures, because  
(A) It has high thermal conductivity  
(B) It is a diatomic molecule  
(C) Its critical temperature is lower than the room temperature  
(D) It forms water under pressure
122. In steam tables, the entropy is shown as zero for  
(A) Saturated vapour at atmospheric pressure  
(B) Saturated liquid at atmospheric pressure  
(C) Saturated vapour at 0°C  
(D) Saturated liquid at 0°C
123. All gases have compressibility factor of nearly unity  
(A) At very high temperatures and pressures  
(B) At very low pressures approaching zero  
(C) Near the critical point  
(D) Above the critical point
124. At Pressure P and absolute temperature T, the mass m of an ideal gas fills a closed container of volume V. An additional mass 2m of the same gas is introduced into the container and the volume is then reduced to V/3 and the temperature to T/3. The pressure of the gas will now be  
(A) 3P (B) 2P  
(C) P/3 (D) 9P
125. Rankine cycle efficiency for fixed steam temperature of any value up to critical temperature will be maximum for steam pressure of  
(A) 9.8 MPa (B) 19.61 MPa  
(C) Half the critical pressure (D) Critical pressure

126. An inventor claims that his engine will develop 9 kW receiving 17500 J/s of heat while working between temperatures of 130°C and – 40°C his claim
- (A) Is not possible
  - (B) Is possible
  - (C) Cannot be judged
  - (D) Is possible with further improvements
127. A perfect reversed heat engine is used for making ice at –5°C from water available at 20° C. The temperature of brine is –10°C. If the specific heat for ice is 2 kJ/kg and latent heat of ice is 335 kJ/kg, then the quantity of ice formed per kW hour will be (Specific heat of water = 4.2 kJ/kg)
- (A) 94 kg
  - (B) 74 kg
  - (C) 88 kg
  - (D) 86.4 kg
128. Increasing the compression ratio of and Otto engine from 5 to 6 will change the air-standard efficiency by
- (A) 20%
  - (B) 8%
  - (C) 25%
  - (D) – 20%
129. A reversible adiabatic path, on a P-V diagram, for an ideal gas passes through state A where  $P = 1 \text{ MPa}$  and  $V = 0.0025 \text{ m}^3$ . Given that the ratio of specific heats for the gas is 1.4, the slope of the path at A is
- (A)  $4 \times 10^5 \text{ kPa/m}^3$
  - (B)  $-4 \times 10^5 \text{ kPa/m}^3$
  - (C)  $-5.6 \times 10^5 \text{ kPa/m}^3$
  - (D)  $5.6 \times 10^5 \text{ kPa/m}^3$
130. An insulated rigid vessel contains some gas and an electrical resistor. In a certain interval of time the resistor connected to an external electric power source heats the gas. Considering the vessel and its contents as the system,
- (A) Heat and work transfers are zero
  - (B) Heat and work transfers are positive
  - (C) Heat transfer is zero and work transfer is negative
  - (D) Heat transfer is positive and work transfer is zero.
131. The Dew point temperature of humid air is
- (A) Always higher than the wet bulb temperature
  - (B) Same as the wet bulb temperature
  - (C) The temperature of air obtained on cooling it till saturation at constant volume
  - (D) The temperature of air obtained on cooling it till saturation at constant volume

132. An Engine operating on Otto cycle is having a thermal efficiency of 0.3 and relative efficiency of 0.5. The air-standard efficiency of the cycle is  
(A) 0.15 (B) 0.2  
(C) 0.6 (D) 0.8
133. A Push (Location) fit is used for  
(A) Gears fixed on a shaft by means of a key  
(B) Shaft rotating at a slow speed in a journal bearing  
(C) Shaft rotating at a high speed in a journal bearing  
(D) Swinging parts such as the fit between gudgeon pin and the connecting rod of an automobile engine
134. Diamond tipped tools are not used for turning ferrous materials because  
(A) Diamond has poor thermal conductivity  
(B) Carbon has good solubility in iron  
(C) Diamond has poor toughness  
(D) All of above
135. The amount of reduction in a single pass which can be achieved in wire drawing of a non-strain hardening material is limited. The limit depends on  
(A) The yield strength of the material  
(B) The die angle  
(C) The coefficient of friction between the die and the material  
(D) Ductility of the material measured by percentage reduction in area in a tension test
136. Coke to metal ratio in the charge of a cold blast cupola operating with indigenous high ash coke is of the order of  
(A) 1:5 (B) 5:1  
(C) 1 :10 (D) 10:1
137. The hardness testing method which does not involve resistance to plastic deformation is  
(A) Shore scleroscope (B) Brinell  
(C) Rockwell (D) Vickers
138. The linear shrinkage of brass is approximately  
(A) 10 mm/meter (B) 20 mm/meter  
(C) 15 mm/meter (D) 13 mm/meter

139. The surface at which the two halves of the sand mould meet when cope and drag are filled together is called
- (A) Middle Surface (B) Casting surface  
 (C) Parting Surface (D) None of the above
140. Which one is the strongest among the following brazing joints?
- (A) Inclined (B) Lap  
 (C) Butt (D) V-butt
141. Edge preparation for welding is not required upto a thickness of
- (A) 15 mm (B) 25 mm  
 (C) 30 mm (D) 4 mm
142. The variation of spindle speed with diameter of workpiece at constant cutting speed forms a series which is
- (A) In geometric progression (B) In arithmetic progression  
 (C) Exponential (D) None of the above
143. A workpiece 200 mm long is to have  $3^\circ$  included angle taper turned on to it by offset centre method. The offset required is
- (A)  $200 \sin 3^\circ$  (B)  $100 \sin 3^\circ$   
 (C)  $200 \sin 1 \frac{1}{2}^\circ$  (D)  $100 \sin 1 \frac{1}{2}^\circ$
144. A drilling machine has spindle speeds from 70 to 800 in eight steps. The fourth speed from the lowest will be nearly
- (A) 175 rpm (B) 236 rpm  
 (C) 320 rpm (D) 435 rpm
145. The process for producing smooth surfaces by plastically moving away the raised micro-irregularities on the surface and pressing it into the micro-cavities is known as
- (A) Buffing (B) Burnishing  
 (C) Super finishing (D) Polishing

146. Two cubical castings of the same metal and sizes of 2 cm side and 4 cm side are moulded in green sand. If the small casting solidifies in 2mins, the expected time of solidification of larger casting will be
- (A) 16 mins (B)  $2\sqrt{8}$  mins  
(C) 8 mins (D) 4 mins
147. Micrometer measurements are more accurate than those by Vernier Caliper, primarily because:
- (A) The micrometer used flat parallel anvils  
(B) Component dimension lies in the axis of measurement  
(C) Micrometer does not use a linear sliding scale  
(D) Micrometer uses a calibrated drum
148. In metal cutting Amonton's Laws of Friction are not obeyed. This could be attributed to
- (A) Higher strain rate associated with metal cutting  
(B) High sliding velocity of the chip over the tool face  
(C) Higher order normal stresses causing sticking zone on the tool face  
(D) Reduction in hardness of tool material at temperatures prevailing at the tool-chip interface
149. In air-standard Otto cycle the terminal pressure at the end of compression, heat release and expansion are respectively  $P_2$ ,  $P_3$  and  $P_4$ . If the corresponding values are  $P'_2$ ,  $P'_3$  and  $P'_4$  taking into account the effect of variable specific heat and dissociation of the working fluid, then
- (A)  $P_2 < P'_2$  and  $P_3 < P'_3$   
(B)  $P_3 < P'_3$  and  $P_4 < P'_4$   
(C)  $P_2 > P'_2$ ,  $P_3 > P'_3$  and  $P_4 < P'_4$   
(D)  $P_2 > P'_2$  and  $P_3 > P'_3$
150. A converging diverging nozzle of a supersonic solid propellant rocket is designed for an exit pressure of 35 KPa. The rocket flying at an altitude having an ambient pressure of 28 KPa would cause
- (A) A normal shock in the diverging portion of the nozzle  
(B) A normal shock at the exit of the nozzle  
(C) A normal shock at the throat of the nozzle  
(D) No Shock



151. Which sample of concrete can be expected to have the highest value of thermal conductivity?
- (A) Dry concrete  
**(B)** Dry concrete with 0.4 % reinforcement  
 (C) Concrete having 10 % moisture (by volume)  
 (D) Concrete having 10% moisture by volume and 0.6% reinforcement
152. The ratio of heat flow  $Q_a/Q_b$  from two walls of same thickness having thermal conductivity  $k_a=2k_b$  for the same temperature difference will be
- (A) 1  
**(B)** 2  
 (C) 0.5  
 (D) 4
153. A dimension heat transfer coefficient which gives a measure of the ratio of the heat transfer rate to the rate at which heat would be conducted within the fluid under temperature gradient is known as
- (A) Reynold's number  
**(C)** Nusselt number  
 (B) Grashoff's number  
 (D) Stanton number
154. In a furnace the wall thickness is 60 cm and is 100 cm wide and 150 cm high out of material with thermal conductivity of 0.4 W/m K. The temperature inside and outsides are  $1000^\circ$  and  $4^\circ$  C respectively. The thermal resistance is
- (A)** 1 K/W  
 (B) 2 K/W  
 (C) 18 K/W  
 (D) 15K/W
155. If the thermal conductivity of a material of wall varies as  $k_0(1-\alpha_0)$ , the temperature at the centre of the wall will be
- (A) Same as in case of constant thermal conductivity  
 (B) More than that in case of constant thermal conductivity  
**(C)** Less than that in case of constant thermal conductivity  
 (D) Temperature will depend on other factors
156. For the flow over a hot flat plate with Prandtl numbers greater than unity, the thermal boundary layer for laminar forced convection
- (A)** Is thinner than the hydrodynamic (velocity) boundary layer  
 (B) Has a thickness equal to zero  
 (C) Is of the same thickness as hydrodynamic (velocity) boundary layer  
 (D) Is thicker than the hydrodynamic (velocity) boundary layer

157. Formation of frost on evaporator in refrigerator  
(A) Results in loss of heat due to poor heat transfer  
(B) Increases heat transfer rate  
(C) Is immaterial  
(D) Can be avoided by proper design
158. Presence of moisture in Feron refrigeration system causes  
(A) Ineffective refrigeration  
(B) Damage to compressor  
(C) Freezing at automatic regulating valve  
(D) None of the above
159. The phenomenon of emf developed between two dissimilar metals in contact is known as  
(A) Seeback effect  
(B) Thomson effect  
(C) Peltier effect  
(D) Thermocouple effect
160. In a lathe gear box if the first four consecutive speeds are 19,30,47 and 74 rpm. The next speed would be  
(A) 93 rpm  
(B) 104 rpm  
(C) 111 rpm  
(D) 116 rpm
161. In a rack and pinion arrangement, the pinion has 30 teeth of 10mm pitch and rotates at 45 rpm. The rack is fixed to the table of a planning machine. The speed of the table will be  
(A) 54 m/min  
(B) 27 m/min  
(C) 13.5 m/min  
(D) 6.5 m/min
162. If the speed of a mechanism is to be reduced in the ratio of 1000: 1, which of the following systems would you choose?  
(A) Bevel gear system  
(B) Spur gear system  
(C) Differential gear system  
(D) Worm and worm wheel system
163. In order to test the efficiency of a reducer gear train 1 KW input was given at the input end at a speed of 1440 rpm and at a output end the measured torque was 56.36 N.m. If the ratio of speed reduction in this unit is 10: 1, the efficiency is about  
(A) 78%  
(B) 85%  
(C) 63%  
(D) 96%

- 164.** A streamline and an equipotential line in a flow field  
 (A) Are parallel to each other      **(B)** Are perpendicular to each other  
 (C) Intersect at an acute angle      (D) Are identical
- 165.** In a condenser of a power plant, the steam condenses at a temperature of  $60^{\circ}\text{C}$ . The cooling water enters at  $30^{\circ}\text{C}$  and leaves at  $45^{\circ}\text{C}$ . The logarithmic mean temperature difference (LMTD) of the condenser is  
 (A)  $16.2^{\circ}\text{C}$       **(B)**  $21.6^{\circ}\text{C}$   
 (C)  $30^{\circ}\text{C}$       (D)  $37.5^{\circ}\text{C}$
- 166.** A column has a rectangular cross-section of  $10\text{mm} \times 20\text{mm}$  and a length of 1 m. The slenderness ratio of the column is close to  
 (A) 200      **(B)** 346  
 (C) 477      (D) 1000
- 167.** A pipe of 25mm outer diameter carries steam. The heat transfer coefficient between the cylinder and surroundings is  $5\text{W/m}^2\text{K}$ . It is proposed to reduce the heat loss from the pipe by adding insulation having a thermal conductivity of  $0.05\text{W/mK}$ . Which one of the following statements is TRUE?  
 (A) The outer radius of the pipe is equal to the critical radius  
 (B) The outer radius of the pipe is less than the critical radius  
**(C)** Adding the insulation will reduce the heat loss  
 (D) Adding the insulation will increase the heat loss
- 168.** The contents of a well-insulated tank are heated by a resistor of  $23\Omega$  in which 10A current is flowing. Consider the tank along with its contents as a thermodynamic system. The work done by the system and the heat transfer to the system are positive. The rates of heat (Q), work (W) and change in internal energy ( $\Delta U$ ) during the process in kW are  
**(A)**  $Q = 0, W = -2.3, \Delta U = +2.3$       (B)  $Q = +2.3, W = 0, \Delta U = +2.3$   
 (C)  $Q = -2.3, W = 0, \Delta U = -2.3$       (D)  $Q = 0, W = +2.3, \Delta U = -2.3$
- 169.** Cars arrive at a service station according to Poisson's distribution with a mean rate of 5 per hour. The service time per car is exponential with a mean of 10minutes. At steady state, the average waiting time in the queue is  
 (A) 10 minutes      (B) 20 minutes  
 (C) 25 minutes      **(D)** 50 minutes

170. The coefficient of restitution of a perfectly plastic impact is  
(A) 0 (B) 1  
(C) 2 (D)  $\infty$
171. The values of enthalpy of steam at the inlet and outlet of a steam turbine in a Rankine cycle are 2800kJ/kg and 1800kJ/kg respectively. Neglecting pump work, the specific steam consumption in kg/kW-hour is  
(A) 3.60 (B) 0.36  
(C) 0.06 (D) 0.01
172. Two identical ball bearings P and Q are operating at loads 30kN and 45kN respectively. The ratio of the life of bearing P to the life of bearing Q is  
(A) 81/16 (B) 27/8  
(C) 9/4 (D) 3/2
173. An unbiased coin is tossed five times. The outcome of each toss is either a head or a tail. The probability of getting at least one head is  
(A) 1/32 (B) 13/32  
(C) 16/32 (D) 31/32
174. The shear strength of a sheet metal is 300MPa. The blanking force required to produce a blank of 100mm diameter from a 1.5 mm thick sheet is close to  
(A) 45kN (B) 70kN  
(C) 141kN (D) 3500kN
175. The ratios of the laminar hydrodynamic boundary layer thickness to thermal boundary layer thickness of flows of two fluids P and Q on a flat plate are 1/ 2 and 2 respectively. The Reynolds number based on the plate length for both the flows is  $10^4$ . The Prandtl and Nusselt numbers for P are 11/8 and 35 respectively. The Prandtl and Nusselt numbers for Q are respectively  
(A) 8 and 140 (B) 8 and 70  
(C) 4 and 70 (D) 4 and 35
176. The crank radius of a single-cylinder I. C. engine is 60mm and the diameter of the cylinder is 80mm. The swept volume of the cylinder in  $\text{cm}^3$  is  
(A) 48 (B) 96  
(C) 302 (D) 603

177. A pump handling a liquid raises its pressure from 1 bar to 30 bar. Take the density of the liquid as  $990 \text{ kg/m}^3$ . The isentropic specific work done by the pump in kJ/kg is
- (A) 0.10 (B) 0.30  
(C) 2.50 (D) 2.93
178. A spherical steel ball of 12mm diameter is initially at 1000K. It is slowly cooled in a surrounding of 300K. The heat transfer coefficient between the steel ball and the surrounding is  $5 \text{ W/m}^2 \text{ K}$ . The thermal conductivity of steel is  $20 \text{ W/mK}$ . The temperature difference between the centre and the surface of the steel ball is
- (A) Large because conduction resistance is far higher than the convective resistance  
(B) Large because conduction resistance is far less than the convective resistance  
(C) Small because conduction resistance is far higher than the convective resistance  
(D) Small because conduction resistance is far less than the convective resistance
179. A single-point cutting tool with  $12^\circ$  rake angle is used to machine a steel work-piece. The depth of cut, i.e. uncut thickness is 0.81 mm. The chip thickness under orthogonal machining condition is 1.8mm. The shear angle is approximately
- (A)  $22^\circ$  (B)  $26^\circ$   
(C)  $56^\circ$  (D)  $76^\circ$
180. A cubic casting of 50mm side undergoes volumetric solidification shrinkage and volumetric solid contraction of 4% and 6% respectively. No. riser is used. Assume uniform cooling in all directions. The side of the cube after solidification and contraction is
- (A) 48.32mm (B) 49.90mm  
(C) 49.94mm (D) 49.96mm
181. If the air has to flow from station P to station Q, the maximum possible value of pressure in kPa at station Q is close to
- (A) 50 (B) 87  
(C) 128 (D) 150

182. If the pressure at station Q is 50kPa, the change in entropy ( $S_Q - S_P$ ) in kJ/kgK is  
(A) -0.155 (B) 0  
(C) 0.160 (D) 0.355
183. The threaded bolts A and B of same material and length are subjected to identical tensile load. If the elastic strain energy stored in bolt A is 4 times that of the bolt B and the mean diameter of bolt A is 12mm, the mean diameter of bolt B in mm is  
(A) 16 (B) 24  
(C) 36 (D) 48
184. The pressure, dry bulb temperature, and relative humidity of air in a room are 1 bar, 30°C and 70% respectively. If the saturated steam pressure at 30°C is 4.25kPa, the specific humidity of the room air in kg water vapour / kg dry air is  
(A) 0.0083 (B) 0.0101  
(C) 0.0191 (D) 0.0232
185. In a rolling process, the state of stress of the material undergoing deforming is  
(A) Pure compression (B) Pure shear  
(C) Compression and shear (D) Tension and shear
186. A cantilever beam having square cross-section of side a is subjected to an end load. If a is increased by 19%, the tip deflection decreases approximately by  
(A) 19% (B) 29%  
(C) 41% (D) 50%
187. A metric thread of pitch 2mm and thread angle 60° is inspected for its pitch diameter using 3-wire method. The diameter of the best size wire in mm is  
(A) 0.866 (B) 1.000  
(C) 1.154 (D) 2.000
188. A steel bar 200 mm in diameter is turned at a feed of 0.25 mm/rev with a depth of cut of 4 mm. The rotational speed of the workpiece is 160 rpm. The material removal rate in mm<sup>3</sup> / s is  
(A) 160 (B) 167.6  
(C) 1600 (D) 1675.5

189. A cube shaped casting solidifies in 5 minutes. The solidification time in minutes for a cube of the same material, which is 8 times heavier than the original casting will be  
(A) 10 (B) 20  
(C) 24 (D) 40
190. For a ductile material, toughness is a measure of  
(A) Resistance to scratching  
(B) Ability to absorb energy up to fracture  
(C) Ability to absorb energy till elastic limit  
(D) Resistance to indentation
191. In order to have maximum power from a Pelton turbine, the bucket speed must be  
(A) Equal to the jet speed (B) Equal to half the jet speed  
(C) Equal to twice the jet speed (D) Independent of the jet speed
192. Consider one-dimensional steady state heat conduction along x-axis ( $0 \leq x \leq L$ ), through a plane wall with the boundary surfaces ( $x = 0$  and  $x = L$ ) maintained at temperatures  $0^\circ\text{C}$  and  $100^\circ\text{C}$ . Heat is generated uniformly throughout the wall. Choose the CORRECT statement.  
(A) The direction of heat transfer will be from the surface at  $100^\circ\text{C}$  to surface at  $0^\circ\text{C}$ .  
(B) The maximum temperature inside the wall must be greater than  $100^\circ\text{C}$   
(C) The temperature distribution is linear within the wall  
(D) The temperature distribution is symmetric about the mid-plane of the wall
193. A cylinder contains  $5\text{m}^3$  of ideal gas at a pressure of 1 bar. This gas is compressed in a reversible isothermal process till its pressure increases to 5 bar. The work in kJ required for this process is  
(A) 804.7 (B) 953.2  
(C) 981.7 (D) 1012.2
194. A long thin walled cylindrical shell, closed at both ends, is subjected to an internal pressure. The ratio of the hoop stress (circumferential stress) to longitudinal stress developed in the shell is  
(A) 0.5 (B) 1.0  
(C) 2.0 (D) 4.0
195. If two nodes are observed at a frequency of 1800 rpm during whirling of a simply supported long slender rotating shaft, the first critical speed of the shaft in rpm is  
(A) 200 (B) 450  
(C) 600 (D) 900

196. A manufacturer can produce 12000 bearings per day. The manufacturer received an order of 8000 bearings per day from a customer. The cost of holding a bearing in stock is Rs.0.20 per month. Setup cost per production run is Rs.500. Assuming 300 working days in a year, the frequency of production run should be
- (A) 4.5 days (B) 4.5 months  
 (C) 6.8 days (D) 6.8 months
197. A certain amount of an ideal gas is initially at a pressure  $P_1$  and temperature  $T_1$ . First, it undergoes a constant pressure process 1-2 such that  $T_2 = 3T_1/4$ . Then, it undergoes a constant volume process 2-3 such that  $T_3 = T_1/2$ . The ratio of the final volume to the initial volume of the ideal gas is
- (A) 0.25 (B) 0.75  
 (C) 1.0 (D) 1.5
198. An annular disc has a mass  $m$ , inner radius  $R$  and outer radius  $2R$ . The disc rolls on a flat surface without slipping. If the velocity of the centre of mass is  $v$ , the kinetic energy of the disc is
- (A)  $\frac{9}{6} mv^2$  (B)  $\frac{11}{16} mv^2$   
 (C)  $\frac{13}{16} mv^2$  (D)  $\frac{15}{16} mv^2$
199. Consider a simply supported beam of length,  $50h$ , with a rectangular cross-section of depth,  $h$ , and width,  $2h$ . The beam carries a vertical point load,  $P$ , at its midpoint. The ratio of the maximum shear stress to the maximum bending stress in the beam is
- (A) 0.02 (B) 0.10  
 (C) 0.05 (D) 0.01
200. A machine produces 0, 1 or 2 defective pieces in a day with associated probability of  $1/6$ ,  $2/3$  and  $1/6$ , respectively. The mean value and the variance of the number of defective pieces produced by the machine in a day, respectively, are
- (A) 1 and  $1/3$  (B)  $1/3$  and 1  
 (C) 1 and  $4/3$  (D)  $1/3$  and  $4/3$
201. The hot tearing in a metal casting is due to
- (A) High fluidity  
 (B) High melt temperature  
 (C) Wide range of solidification temperature  
 (D) Low coefficient of thermal expansion



202. Cutting tool is much harder than the workpiece. Yet the tool wears out during the tool-work interaction, because
- (A) Extra hardness is imparted to the workpiece due to coolant used
  - (B) Oxide layers on the workpiece surface impart extra hardness to it
  - (C)** Extra hardness is imparted to the workpiece due to severe rate of strain
  - (D) Vibration is induced in the machine tool.
203. A minimal spanning tree in network flow models involves
- (A) All the nodes with cycle/loop allowed
  - (B)** All the nodes with cycle/loop not allowed
  - (C) Shortest path between start and end nodes
  - (D) All the nodes with directed arcs
204. The process utilizing mainly thermal energy for removing material is
- (A) Ultrasonic Machining
  - (B) Electrochemical Machining
  - (C) Abrasive Jet Machining
  - (D)** Laser Beam Machining
205. A mass  $m_1$  of 100 kg travelling with a uniform velocity of 5 m/s along a line collides with a stationary mass  $m_2$  of 1000 kg. After the collision, both the masses travel together with the same velocity. The coefficient of restitution is
- (A) 0.6
  - (B) 0.1
  - (C) 0.01
  - (D)** 0
206. Consider a single degree-of-freedom system with viscous damping excited by a harmonic force. At resonance, the phase angle (in degree) of the displacement with respect to the exciting force is
- (A) 0
  - (B) 45
  - (C)** 90
  - (D) 135
207. The current erection cost of a structure is Rs. 13,200. If the labour wages per day increase by  $\frac{1}{5}$  of the current wages and the working hours decrease by  $\frac{1}{24}$  of the current period, then the new cost of erection in Rs. is
- (A) 16,500
  - (B)** 15,180
  - (C) 11,000
  - (D) 10,120
208. A tourist covers half of his journey by train at 60 km/h, half of the remainder by bus at 30 km/h and the rest by cycle at 10 km/h. The average of the tourist in km/h during his entire journey is
- (A) 36
  - (B) 30
  - (C)** 24
  - (D) 18

209. Water (specific heat,  $c_p = 4.18 \text{ kJ / kgK}$ ) enters a pipe at a rate of  $0.01 \text{ kg/s}$  and a temperature of  $20^\circ\text{C}$ . The pipe, of diameter  $50 \text{ mm}$  and length  $3\text{m}$ , is subjected to a wall heat flux  $q_w$  in  $\text{W/m}^2$ . If  $q_w = 5000$ , and the convection heat transfer coefficient at the pipe outlet is  $1000 \text{ W/m}^2 \text{ K}$ , the temperature in  $^\circ\text{C}$  at the inner surface of the pipe at the outlet is
- (A) 71 (B) 76  
(C) 79 (D) 81
210. The pressure, temperature and velocity of air flowing in a pipe are  $5 \text{ bar}$ ,  $500 \text{ K}$  and  $50 \text{ m/s}$ , respectively. The specific heats of air at constant pressure and at constant volume are  $1.005 \text{ kJ/kgK}$  and  $0.718 \text{ kJ/kgK}$ , respectively. Neglect potential energy. If the pressure and temperature of the surroundings are  $1 \text{ bar}$  and  $300 \text{ K}$ , respectively, the available energy in  $\text{kJ/kg}$  of the air stream is
- (A) 170 (B) 187  
(C) 191 (D) 213
211. Two large diffuse gray parallel plates, separated by a small distance, have surface temperatures of  $400 \text{ K}$  and  $300 \text{ K}$ . If the emissivities of the surfaces are  $0.8$  and the Stefan-Boltzmann constant is  $5.67 \times 10^{-8} \text{ W/m}^2\text{K}^4$ , the net radiation heat exchange rate in  $\text{kW/m}^2$  between the two plates is
- (A) 0.66 (B) 0.79  
(C) 0.99 (D) 3.96
212. A bar is subjected to fluctuating tensile load from  $20 \text{ kN}$  to  $100 \text{ kN}$ . The material has yield strength of  $240 \text{ MPa}$  and endurance limit in reversed bending is  $160 \text{ MPa}$ . According to the Soderberg principle, the area of cross-section in  $\text{mm}^2$  of the bar for a factor of safety of  $2$  is
- (A) 400 (B) 600  
(C) 750 (D) 1000
213. A single degree of freedom system having mass  $1 \text{ kg}$  and stiffness  $10\text{kN/m}$  initially at rest is subjected to an impulse force of magnitude  $5 \text{ kN}$  for  $10^{-4}$  seconds. The amplitude in  $\text{mm}$  of the resulting free vibration is
- (A) 0.5 (B) 1.0  
(C) 5.0 (D) 10.0
214. During the electrochemical machining (ECM) of iron (atomic weight =  $56$ , valency =  $2$ ) at current of  $1000 \text{ A}$  with  $90\%$  current efficiency, the material removal rate was observed to be  $0.26 \text{ gm/s}$ . If Titanium (atomic weight =  $48$ , valency =  $3$ ) is machined by the ECM process at the current of  $2000 \text{ A}$  with  $90\%$  current efficiency, the expected material removal rate in  $\text{gm/s}$  will be
- (A) 0.11 (B) 0.23  
(C) 0.30 (D) 0.52

215. In a CAD package, mirror image of a 2D point P(5, 10) is to be obtained about a line which passes through the origin and makes an angle of  $45^\circ$  counter clockwise with the X-axis. The coordinates of the transformed point will be  
 (A) (7.5, 5) (B) (10, 5)  
 (C) (7.5, -5) (D) (10, -5)
216. A flywheel connected to a punching machine has to supply energy of 400 Nm while running at a mean angular speed of 20 radians/s. If the total fluctuation of speed is not to exceed  $\pm 2\%$ , the mass moment of inertia of the flywheel in  $\text{kg} - \text{m}^2$  is  
 (A) 25 (B) 50  
 (C) 100 (D) 125
217. Water is coming out from a tap and falls vertically downwards. At the tap opening, the stream diameter is 20mm with uniform velocity of 2 m/s. Acceleration due to gravity is  $9.81 \text{ m/s}^2$ . Assuming steady, in viscous flow, constant atmospheric pressure everywhere and neglecting curvature and surface tension effects, the diameter in mm of the stream 0.5m below the tap is approximately  
 (A) 10 (B) 15  
 (C) 20 (D) 25
218. In highly rarefied gases, the concept of this loses validity  
 (A) Thermodynamic equilibrium (B) Continuum  
 (C) Stability (D) Macroscopic view point
219. The constant volume gas thermometer works on the principle that  
 (A) At low pressure, the temperature of the gas is independent of its pressure at constant volume  
 (B) At high pressure, the temperature of the gas is independent of its pressure at constant volume  
 (C) At low pressure, the temperature of the gas is proportional to its pressure at constant volume  
 (D) At high pressure, the temperature of the gas is proportional to its pressure at constant volume
220. There is no work transfer involved in this process  
 (A) Adiabatic expansion (B) Isothermal expansion  
 (C) Polytropic expansion (D) Free expansion

221. This process is one in which there is only work interaction between the system and the surroundings
- (A) Diabetic process                      (B) Adiabatic process  
(C) Isothermal process                    (D) Quasi-static process
222. In which of the following processes, the heat is fully converted into work?
- (A) Reversible adiabatic process      (B) Reversible isobaric process  
(C) Reversible isometric process      (D) Reversible isothermal process
223. An inventor states that his new conceptual engine, while operating between temperature limits of 377°C and 27°C, will reject 50% of heat absorbed from the source. What type of cycle will this engine have?
- (A) Carnot cycle                          (B) Stirling cycle  
(C) Impossible cycle                      (D) Possible cycle
224. For a given temperature  $T_1$ , as the difference between  $T_1$  and  $T_2$  increase, the COP of a carnot heat pump
- (A) Increases                              (B) Decreases  
(C) Does not change                      (D) First decrease, then increases
225. A heat engine is supplied with 2512kJ/min of heat at 650°C. Heat rejection with 900kJ/min takes place at 100°C. This type of heat engine is
- (A) Ideal                                    (B) Irreversible  
(C) Impossible                              (D) Practical
226. Consider the following statements for a throttling process.
1. It is an adiabatic process
  2. There is no work transfer in the process
  3. Entropy increases in throttling process
- Which of these statements are correct?
- (A) 1,2 and 3                              (B) 1 and 2 only  
(C) 2 and 3 only                          (D) 1 and 3 only
227. The driving and driven shafts connected by a Hooke's joint are inclined by an angle  $\alpha$  to each other. The angle through which the driving shaft turns is given by  $\theta$ . The condition for the two shafts to have equal speeds is
- (A)  $\cos \theta = \sin \alpha$                       (B)  $\sin \theta = \sqrt{\tan \alpha}$   
(C)  $\tan \theta = \pm \sqrt{\cos \alpha}$                     (D)  $\cot \theta = \cos \alpha$

228. In a crank and slotted lever quick return motion mechanism, the distance between the fixed centers is 160 mm and the driving crank is 80mm long. The ratio of time taken by cutting and return strokes is  
(A) 0.5 (B) 1  
(C) 1.5 (D) 2
229. In an elliptic trammel, the length of the link connecting the two sliders is 100mm. The tracing pen is placed on 150mm extension of this link. The major and minor axes of the ellipse traced by the mechanism would be  
(A) 250 mm and 150 mm (B) 250 mm and 100 mm  
(C) 500mm and 300 mm (D) 500 mm and 200 mm
230. The differential gear is fitted on rear axle of automobiles; its function is  
(A) To rotate the front wheels at different speeds  
(B) To rotate the back wheels at the same speed during turning  
(C) To rotate the back wheel at different speeds during turning  
(D) To permit the two back wheels to rotate at the different speeds when driving in the straight path.
231. Consider the following profiles of mating gear teeth:  
1. Involute profiles  
2. Cycloidal profiles  
3. Conjugate profiles  
Which of these satisfy the law of gearing?  
(A) 1 and 2 only (B) 1 and 3 only  
(C) 2 and 3 only (D) 1, 2 and 3
232. In the case of involute system of gears, if the centre distance is changed  
(A) The velocity ratio changes  
(B) The pressure angle changes  
(C) The pitch circle remain unaffected  
(D) The law of gearing fails to get satisfied
233. The primary function of the flywheel is  
(A) To limit the fluctuations of speed during each cycle  
(B) To absorb energy during those periods of crank rotation when turning moment is less than the resisting moment  
(C) To maintain constant speed of rotation of the crank shaft when the load on the engine increases.  
(D) To maintain constant speed of rotation of the crank shaft when the load on the engine decreases

234. In order to have complete balance of several revolving masses mounted in different planes and different angular positions over a shaft
- (A) The resultant force must be zero
  - (B) The resultant couple must be zero
  - (C) The resultant force as well as couple must be zero
  - (D) Either the resultant force or the resultant couple must be zero
235. A three cylinder radial engine driven by a common crank of radius  $r$  has the cylinders spaced at  $120^\circ$  among each other. The mass of the reciprocating parts per cylinder is  $m$  kg. The primary unbalance force at a crank shaft speed of  $\omega$  rad/s
- (A)  $\frac{2}{3} m \omega^2 r$
  - (B)  $3m \omega^2 r$
  - (C)  $\frac{1}{3} m \omega^2 r$
  - (D)  $m \omega^2 r$
236. A free damped vibration system with viscous damping consists of a mass  $m$ , spring stiffness  $k$  and a damper with a damping coefficient which can be varied. The natural frequency of the system is  $\omega_n$ . For the system to be critically damped, the damping coefficient  $C_c$  is
- (A)  $2m \omega_n$
  - (B)  $m \omega_n$
  - (C)  $\sqrt{2} m \omega_n$
  - (D)  $1/2 m \omega_n$
237. In case of free vibrations with viscous damping, the damping force is proportional to
- (A) The displacement
  - (B) The velocity
  - (C) The acceleration
  - (D) The natural frequency
238. The critical speed of shaft depends on
- (A) Mass only
  - (B) Stiffness only
  - (C) Mass and Stiffness
  - (D) Mass, Stiffness and Eccentricity
239. A cotter joint is capable of transmitting
- (A) The twisting moment
  - (B) An axial tensile as well as compressive load
  - (C) The bending moment
  - (D) Only axial compressive
240. A fit on a hole- shaft system is specified as H7-s6. The type of fit is
- (A) Clearance fit
  - (B) Running (Sliding) fit
  - (C) Transition fit
  - (D) Interference fit

241. A flat end foot step bearing supports a vertical shaft of 150 mm diameter rotating at 10rad/s. The shaft carries a vertical load of 20 kN. Assuming uniform pressure distribution and coefficient of friction equal to 0.05, the power lost in friction is
- (A) 500W (B) 750W  
(C) 1000W (D) 1125W
242. The effect of increasing the stiffness springs of centrifugal clutch is
- (A) The decrease of engagement speed  
(B) The increase of engagement speed  
(C) The increase of frictional force at maximum speed  
(D) None of the above
243. What is the purpose of the flush ( ) function?
- (A) Flushes all streams and specified streams  
(B) Flushes only specified stream  
(C) Flushes input/output buffer  
(D) Flushes file buffer
244. During orthogonal cutting, an increase in cutting speed causes
- (A) An increase in longitudinal cutting force  
(B) An increase in radial cutting force  
(C) An increase in tangential cutting force  
(D) Cutting forces to remain unaffected
245. Which of the following processes has very high material removal rate efficiency?
- (A) Electron beam machining (B) Electrochemical machining  
(C) Electro discharge machining (D) Plasma arc machining
246. Clearance in a fit is the difference between
- (A) Maximum hole size and minimum shaft size  
(B) Minimum hole size and maximum shaft size  
(C) Maximum hole size and maximum shaft size  
(D) Minimum hole size and minimum shaft size
247. Rolling horizon in forecast is used for
- (A) Allowing same length of forecast horizon by easily adding a new period when one period is over  
(B) Easy updating of changes and maintaining same length of forecast horizon by adding a new period when one period is over  
(C) Easy updating of changes and there is no addition of a new period  
(D) Different reasons other than the above

248. In an exponentially weighted moving average, the weight of the demand of past periods
- (A) Increases as age of the data increases
  - (B) Increases as age of the data decreases
  - (C) Decreases as age of the data increases
  - (D) Has no relationship with age of the data.
249. The shortest processing time prioritization rule is used for
- (A) Reducing a queue size in front of a single server
  - (B) Reducing work-in-process in a single server system
  - (C) Reducing average flow time of jobs waiting in front of a server
  - (D) All of the above
250. In a quantity discount model O inventory control, the relevant costs are
- (A) Annual purchase cost
  - (B) Annual order cost and annual carrying cost
  - (C) Annual purchase cost, annual order cost and annual carrying cost
  - (D) Annual order cost
251. A cantilever beam having square cross-section of side  $a$  is subjected to an end load. If  $a$  is increased by 19%, the tip deflection decreases approximately by
- (A) 19%
  - (B) 29%
  - (C) 41%
  - (D) 50%
252. For a floating body, buoyant force acts at the
- (A) Centroid of the floating body
  - (B) Center of gravity of the body
  - (C) Centroid of the fluid vertically below the body
  - (D) Centroid of the displaced fluid
253. A plastic sleeve of outer radius  $r_0 = 1$  mm covers a wire (radius  $r = 0.5$  mm) carrying electric current. Thermal conductivity of the plastic is  $0.15$  W/m-K. The heat transfer coefficient on the outer surface of the sleeve exposed to air is  $25$  W/m<sup>2</sup>-K. Due to the addition of the plastic cover, the heat transfer from the wire to the ambient will
- (A) Increase
  - (B) Remain the same
  - (C) Decrease
  - (D) Be zero
254. The “Jominy test” is used to find
- (A) Young’s modulus
  - (B) Hardenability
  - (C) Yield strength
  - (D) Thermal conductivity



255. The part of a gating system which regulates the rate of pouring of molten metal is  
(A) Pouring basin (B) Runner  
(C) Choke (D) Ingate
256. The non-traditional machining process that essentially requires vacuum is  
(A) Electron beam machining  
(B) Electro chemical machining  
(C) Electro chemical discharge machining  
(D) Electro discharge machining
257. A shaft with a circular cross-section is subjected to pure twisting moment. The ratio of the maximum shear stress to the largest principal stress is  
(A) 2.0 (B) 1.0  
(C) 0.5 (D) 0
258. A thin cylindrical pressure vessel with closed-ends is subjected to internal pressure. The ratio of circumferential (hoop) stress to the longitudinal stress is  
(A) 0.25 (B) 0.50  
(C) 1.0 (D) 2.0
259. Assuming constant temperature condition and air to be an ideal gas, the variation in atmospheric pressure with height calculated from fluid statics is  
(A) Linear (B) Exponential  
(C) Quadratic (D) Cubic
260. The internal energy of an ideal gas is a function of  
(A) Temperature and pressure (B) Volume and pressure  
(C) Entropy and pressure (D) Temperature only
261. When the cutting edge of the tool is dull, then during machining  
(A) Discontinuous chips are formed  
(B) Continuous chips are formed  
(C) Continuous chips with built-up edge are formed  
(D) No chips are formed.
262. A dense structure of a grinding wheel is used for  
(A) Hard materials (B) Brittle materials  
(C) Finishing cuts (D) All of these
263. Plastic bottles are manufactured using the process of  
(A) Blow moulding (B) Injection moulding  
(C) Atomizing (D) Die casting

264. The Laser Beam Machining process can be carried out, when the media for energy transfer between tool and workpiece is  
(A) Air (B) Liquid  
(C) Vacuum (D) Any of the above medium
265. V-blocks (Vee locators) are used for clamping as well as locating when faces are inclined upto  
(A) 30 degree (B) 12 degree  
(C) 9 degree (D) 3 degree
266. What does N, P and L mean in N.P.L. Gauge interferometer?  
(A) Nikon pulsed laser (B) Nuclear plasma laboratory  
(C) National Physics Laboratory (D) Nuclear physics laboratory
267. What is swing over carriage?  
(A) The maximum diameter of workpiece that can be rotated over the bed ways  
(B) The minimum diameter of workpiece that can be rotated over the bed ways  
(C) The maximum diameter of workpiece that can be rotated over lathe saddle  
(D) The minimum diameter of workpiece that can rotated over lathe saddle
268. Nodular cast iron is produced by adding \_\_\_\_\_ to the molten cast iron.  
(A) Copper (B) Chromium  
(C) Nickel (D) Magnesium
269. An alloy steel which is work hardenable and which is used to make the blades of bulldozers, bucket wheel excavators and other earth moving equipment contain iron, carbon and  
(A) Silicon (B) Magnesium  
(C) Manganese (D) Chromium
270. Smelting is the process of  
(A) Expelling moisture, carbon dioxide, sulphur and arsenic from the iron ore by heating in shallow kilns  
(B) Removing the impurities like clay, sand etc. from the iron ore by washing with water  
(C) Reducing the ore with carbon in the presence of a flux  
(D) All of the above

271. Closed packed hexagonal space lattice is found in  
(A) Alpha-iron, tungsten, chromium and molybdenum  
(B) Gamma-iron, aluminium, copper, lead, silver and nickel  
(C) Zinc, magnesium, cobalt, cadmium, antimony and bismuth  
(D) None of the above
272. What will happen in winter to a large cylindrical vessel which was sealed in summer?  
(A) It buckles and collapses  
(B) It becomes lighter  
(C) It explodes  
(D) Nothing happens to it
273. The reason why the pressure vessels are not made of rectangular shape is  
(A) These are difficult to fabricate  
(B) It has been a practice to use cylindrical vessels  
(C) They are not economical  
(D) None of the above
274. A beam will have uniform strength if  
(A) Bending stress is same at every section along its longitudinal axis  
(B) Deflection is same throughout the beam  
(C) Bulk modulus is same throughout the beam  
(D) None of the above
275. If both the length and the diameter of a steel column are doubled, the elastic buckling load of the column will increase by a factor of  
(A) 2  
(B) 4  
(C) 8  
(D) 16
276. In a beam, the neutral plane  
(A) Lies at the bottom most fibre  
(B) Is one whose length remains unchanged during the deformation  
(C) Is in the middle  
(D) None of the above
277. In linear programming the shadow prices are  
(A) The values assigned to one unit of capacity  
(B) Maximum cost per item  
(C) Cost of bought out items  
(D) Cost of items manufactured in the plant

278. Expending function consist keeping a watch on  
 (A) Operators activity  
 (B) Flow of material and in case of trouble locate source of trouble  
 (C) Minimizing the delays  
 (D) Making efficient dispatching
279. Initial cost for machine A is Rs. 1.5 lakh and the unit production cost on the machine is Rs. 75 each. For another machine B, the initial cost in Rs. 6 lakh, and the unit production cost on this machine is Rs. 15 only. The volume of production at the breakeven point is  
 (A) 6000 units (B) 9000 units  
 (C) 7500 units (D) 10500 units
280. An operator manufactures 75 jobs in 8 hrs. If this time includes the time for setting his machine, calculate the operator's efficiency. Standard time allowed for the job was: setting time 40 min; production time per piece 10 min.  
 (A) 115.5% (B) 164.6%  
 (C) 134.7% (D) 124.8%
281. If the unit ordering cost is doubled, then the E.O.Q. will  
 (A) Be halved (B) Be doubled  
 (C) Increase by 1.414 times (D) Decrease by 1.414 times
282. The Standard time of an operation is defined as the time taken by a  
 (A) Faster worker to perform that operation  
 (B) Slow worker to perform that operation  
 (C) Trained worker to perform that operation while working at a steady pace  
 (D) None of the above
283. If the fixed expenses of a company are Rs. 1,38,00,000 variable expenses are Rs. 270,00,000 total sales volume is Rs. 500,00,000. Break even sales volume would be  
 (A) Rs. 330,00,000 (B) Rs. 300,00,000  
 (C) Rs. 30,00,000 (D) Rs. 3,00,000
284. Performance rating is equal to  
 (A) Observed performance + normal performance  
 (B) Observed performance – normal performance  
 (C) Observed performance × normal performance  
 (D) None of the above

285. Abbreviated work factor data is applied for  
 (A) Material handling operation (B) Maintenance operation  
 (C) Packing and shipping operation (D) all of the above
286. A manufacturer produces 15000 Nos. of a consumer product which are sold at Rs. 300/- each. At this volume, fixed costs were Rs. 15.2 lakhs and variable costs were Rs. 21 lakhs. What is the break-even quantity?  
 (A) 4000 (B) 7800  
 (C) 8400 (D) 9500
287. The time taken by a normal worker for a specific task or job working under moderate condition and including other allowances such as fatigue, setting of tool and job, repairing of tool and checking of job, etc., is known as  
 (A) Speed rating (B) Performance rating  
 (C) Normal time (D) Standard time
288. If the selected time for an element is 0.30 minute, the passing rating is 110% and if the sum of all secondary adjustment amount to 20%, then the standard time will be  
 (A) 0.264 min (B) 0.327 min  
 (C) 0.396 min (D) 0.275 min
289. If a work content of 10 hrs has to be made at a rate of 400 a week, and the normal working week is 40 hrs, the number of operators required is  
 (A) 120 (B) 100  
 (C) 150 (D) 10
290. If the number of items for which material is required is 200 and the standard time per item is 5 minutes, expected efficiency is 50% and the number of hours per machine is 4, the number of machines required is  
 (A) 18 (B) 10  
 (C) 6 (D) 9
291. In an ideal inventory control system, the economic lot size for a part is 1000. If the annual demand for the part is doubled, the new economic lot size required will be:  
 (A) 500 (B) 2000  
 (C)  $1000/\sqrt{2}$  (D)  $1000\sqrt{2}$
292. Which protocol provides e-mail facility among different hosts?  
 (A) FTP (B) SMTP  
 (C) TELNET (D) SNMP

293. The basic architecture of computer was developed by  
(A) John Von Neumann (B) Charles Babbage  
(C) Blaise Pascal (D) Garden Moore
294. The magnetic storage chip used to provide non-volatile direct access storage of data and that have no moving parts are known as  
(A) Magnetic core memory (B) Magnetic tape memory  
(C) Magnetic disk memory (D) Magnetic bubble memory
295. Which of the following have low failure rate?  
(A) Mechanical devices (B) Electronic devices  
(C) Electro-mechanical devices (D) None of above
296. Easily relectable language is  
(A) Machine language (B) Assembly language  
(C) High level language (D) Medium level language
297. The output of a gas turbine is 300 KW and its efficiency is 20 percent, the heat supplied is  
(A) 600 KW (B) 6000 KW  
(C) 150 KW (D) 15 KW
298. Which of the following is not used as a refrigerant?  
(A) Ammonia (B) Carbon Monoxide  
(C) Carbon Dioxide (D) Sulphur Dioxide
299. Mandrels are used to hold  
(A) Drill Bits (B) Hollow Work Pieces  
(C) Cutting Tools (D) Face Plate
300. Brasses and bronze are welded using  
(A) Neutral Flame (B) Carburizing Flame  
(C) Reducing Flame (D) Oxidizing Flame