190. Creep in belt is due to
 (a) material of the belt
 (b) material of the pulley
 (c) uneven extension and contraction due to varying load
 (d) difference of speed

191. The wire ropes make contact at
 (a) bottom of groove of the pulley
 (b) sides of groove of the pulley
 (c) sides and bottom of groove the pulley
 (d) anywhere in the groove of the pulley

192. When the length of the journal is equal to the diameter of the journal, then the bearing is said to be a
 (a) short bearing
 (b) long bearing
 (c) medium bearing
 (d) square bearing

193. When two non-intersecting and non-coplanar shafts are connected by gears, the arrangements are known as
 (a) spur gearing
 (b) helical gearing
 (c) bevel gearing
 (d) spiral gearing

194. The size of the gear is usually specified by
 (a) pressure angle
 (b) pitch circle diameter
 (c) circular pitch
 (d) diametral pitch

195. The difference between the tooth space and the tooth thickness as measured on the pitch is called
 (a) working depth
 (b) backlash
 (c) total depth
 (d) none of these

196. If the centre distance of the mating gears having involute teeth is increased, then the pressure angle
 (a) increases
 (b) decreases
 (c) remains unchanged
 (d) varies exponentially

197. Surface endurance limit of gear material is dependent upon
 (a) elastic strength
 (b) coefficient of elasticity
 (c) Brinell hardness number
 (d) toughness

198. In helical gears, the distance parallel to the axis, between similar faces of adjacent teeth is called
 (a) normal pitch
 (b) axial pitch
 (c) diametral pitch
 (d) module

199. The dynamic tooth load is due to
 (a) inaccuracies of tooth spacing
 (b) irregularities in tooth profile
 (c) deflection of teeth under load
 (d) all of the above

200. When bevel gears having equal teeth and equal pitch angles connect two shafts whose axes intersect at right angle, then they are known as
 (a) angular bevel gears
 (b) crown bevel gears
 (c) internal bevel gears
 (d) none of these

* * * * * * *

1. The ratio of moment of inertia of a rectangle and that of a triangle, having same base and height with respect to their bases will be
 (a) 2:1
 (b) 3:1
 (c) 4:1
 (d) 5:1

2. The distance of the centroid of a semicircle of radius 'r' from its base is
 (a) $4r/3\pi$
 (b) $3\pi/4r$
 (c) $4\pi/3r$
 (d) none of these

3. A ball is dropped from a height of 2.25 m on a smooth floor and it rises to a height of 1 m after the first bounce. The coefficient of restitution between the ball and the floor is
 (a) 0.57
 (b) 0.44
 (c) 0.33
 (d) 0.67

4. The angular momentum of a system is conserved if there are
 (a) no forces present
 (b) no magnetic forces present
 (c) no net forces present
 (d) no torques present

5. A person standing on a uniformly rotating turn table has his arms held closed to his chest. If he outstretches his arms
 (a) the moment of inertia will decrease
 (b) the angular momentum will increase
 (c) the speed of rotation will decrease
 (d) the angular velocity will remain constant

6. A mass of 1Kg is attached to the middle of a rope, which is being pulled from both ends in the opposite direction. Taking g=10 m/sec^2 the minimum pull required to completely straighten the rope will be
 (a) 5N
 (b) 20N
 (c) 25N
 (d) infinity

7. Two cars are moving in the same direction with a speed of 45km/hr and a distance of 10km separates them. If a car coming from the opposite direction meets these two cars at an interval of 6 mins, its speed would be
 (a) 45km/hr
 (b) 55km/hr
 (c) 65km/hr
 (d) 75km/hr

8. A body of mass 10kg moving with a velocity of 1m/sec is acted upon by a force of 50N for 2 secs. The final velocity is
   - (a) 22m/sec
   - (b) 1m/sec
   - (c) 11m/sec
   - (d) none of these

9. A person standing on a moving elevator feels 20% heavier than when at rest. The elevator is accelerating upward at
   - (a) $2m/sec^2$
   - (b) $12m/sec^2$
   - (c) $20m/sec^2$
   - (d) $6m/sec^2$

10. For a projectile of range R, the kinetic energy is minimum after the projectile covers (from start) a distance equal to
    - (a) 0.25R
    - (b) 0.5R
    - (c) 0.75R
    - (d) R

11. The length of a Seconds pendulum is
    - (a) 56.3cm
    - (b) 74.8cm
    - (c) 99.4cm
    - (d) 124.7cm

12. The outside diameter of a hollow shaft is twice it's inside diameter. The ratio of its torque carrying capacity to that of a solid shaft of the same material and the same outside diameter is
    - (a) 15/16
    - (b) 3/4
    - (c) 1/2
    - (d) 1/16

13. Two shafts A and B are made of same material. The diameter of shaft B is twice that of A. The ratio of power which can be transmitted by A to that of B is
    - (a) 1/2
    - (b) 1/4
    - (c) 1/8
    - (d) 1/16

14. The buckling load in a steel column is
    - (a) related to the length
    - (b) directly proportional to the slenderness ratio
    - (c) inversely proportional to the slenderness ratio
    - (d) non-linearly proportional to the slenderness ratio

15. The bending moment M and torque T is applied on a solid circular shaft. If the maximum bending stress equals to maximum shear stress developed, then M is equal to
    - (a) T/2
    - (b) T
    - (c) 2T
    - (d) 4T

16. The maximum allowable compressive stress corresponding to lateral buckling in a discretely laterally supported symmetrical I-beam, does not depend upon
    - (a) modulus of elasticity
    - (b) radios of gyration about the minor axis
    - (c) ratio of span and length of beam
    - (d) ratio of overall depth to thickness of the flange

178. In thick film hydrodynamic journal bearings, the coefficient of friction
     - (a) increases with increase in load
     - (b) is independent of load
     - (c) decreases with increase in load
     - (d) may increase or decrease with load

179. The bolts in a rigid flanged coupling connecting two shafts transmitting power are generally subjected to
     - (a) shear force and bending moment
     - (b) axial force
     - (c) torsion
     - (d) torsion and bending moment

180. A solid shaft can resist a bending moment of 3.0kNm and a twisting moment of 4.0kNm together, then the maximum torque that can be applied is
     - (a) 7.0kNm
     - (b) 3.5kNm
     - (c) 4.5kNm
     - (d) 5.0kNm

181. The difference between the tight side and slack sides of a belt drive is 3000N. if the belt speed is 15m/sec, the transmitted power in kW is
     - (a) 45
     - (b) 22.5
     - (c) 90
     - (d) 100

182. The largest diameter of an external or internal screw thread is known as
     - (a) minor diameter
     - (b) major diameter
     - (c) pitch diameter
     - (d) none of the above

183. In flange coupling, the bolts are subjected to
     - (a) tensile stress
     - (b) compressive stress
     - (c) shear stress
     - (d) none of these

184. The draw of cotter should not be more than
     - (a) 3 mm
     - (b) 6 mm
     - (c) 8 mm
     - (d) 12 mm

185. A cotter joint is used to connect two rods when they are positioned at
     - (a) coaxial
     - (b) perpendicular
     - (c) parallel
     - (d) none of these

186. In steam engine, the valve rod is connected to an eccentric rod by means of
     - (a) cotter joint
     - (b) knuckle joint
     - (c) universal joint
     - (d) flange coupling

187. If D is the diameter of shaft or diameter of hole in the hub, then the usual proportion for the width of key is
     - (a) D/8
     - (b) D/6
     - (c) D/4
     - (d) D/2

188. A key made from a cylindrical disc having segmental cross section is known as
     - (a) feather key
     - (b) gib-head key
     - (c) wood ruff key
     - (d) saddle key

189. The sleeve or muff coupling is designed as a
     - (a) thin cylinder
     - (b) thick cylinder
     - (c) solid shaft
     - (d) hollow shaft

167. The most suitable bearing for carrying very heavy loads with slow speed is

(a) hydrodynamic bearing
(b) ball bearing
(c) roller bearing
(d) hydrostatic bearing

168. The efficiency of self locking screw is

(a) > 50%
(b) < 50%
(c) equal to 50%
(d) none of these

169. A transmission shaft subjected to bending loads must be designed on the basis of

(a) maximum normal stress theory
(b) maximum shear stress theory
(c) maximum normal stress and maximum shear stress theory
(d) fatigue theory

170. In designing a plate clutch, assumption of uniform wear conditions is made because

(a) it is closer to real life situation
(b) it leads to a safer design
(c) it leads to cost effective design
(d) none of the above

171. A radial ball bearing has a basic load rating of 50kN. If the desired rating life of the bearing is 6000 hours, what equivalent radial load can the bearing carry at 500 R.P.M.

(a) 18.85kN
(b) 8.85kN
(c) 12.5kN
(d) 14.25kN

172. During shearing failure of the key, the area under shear is

(a) length
(b) width
(c) both length and width
(d) length and thickness

173. In involute gears, the pressure angle is

(a) dependent on the size of teeth
(b) dependent on the size of gears
(c) always constant
(d) always variable

174. In belt drive if the pulley diameter is doubled keeping the tension and belt width constant, then it will be necessary to

(a) increase the key length
(b) increase the key depth
(c) increase the key width
(d) decrease the key length

175. A circular shaft can transmit a torque of 5kN-m. If the torque is reduced to 4kN-m, then the maximum value of bending moment that can be applied to the shaft is

(a) 3kNm
(b) 4kNm
(c) 2kNm
(d) 1kNm

176. The bearing characteristic number in a hydrodynamic bearing depends on

(a) length, width and load
(b) length, width and speed
(c) viscosity, speed and load
(d) viscosity, speed and bearing pressure

177. Spherical roller bearings are normally used

(a) for increased radial load
(b) for increased thrust load
(c) when there is less radial space
(d) for both increased radial and thrust load

17. The buckling load will be maximum for a column, if

(a) one end of the column is clamped and the other end is free
(b) both ends of the column are clamped
(c) both ends of the column are hinged
(d) none of these

18. Under torsion, brittle materials generally fail

(a) along the plane perpendicular to its longitudinal axis
(b) in the direction of minimum tension
(c) along surfaces forming a 45º angle with the longitudinal axis
(d) not in any specific manner

19. A Mohr's circle reduces to a point when the body is subjected to

(a) pure shear
(b) uni-axial stress only
(c) equal and opposite axial stresses on two mutually perpendicular planes
(d) equal axial stresses on two mutually perpendicular planes, the planes being free of shear

20. If the value of Poisson's ratio is zero, then it means that

(a) the material is rigid
(b) the material is perfectly plastic
(c) there is no longitudinal strain in the material
(d) none of these

21. When two mutually perpendicular principal stresses are unequal but alike, the maximum shear stress is represented by

(a) the diameter of Mohr's circle
(b) half the diameter of Mohr's circle
(c) one third the diameter of Mohr's circle
(d) one fourth the diameter of Mohr's circle

22. A column of length L is hinged at both the ends and restrained from lateral displacement at mid height. The critical load is given by

(a) $\pi^2 EI/L^2$
(b) $2\pi^2 EI/L^2$
(c) $4\pi^2 EI/L^2$
(d) $\pi^2 EI/4L^2$

23. Four vertical columns of the same material, height and weight have the same end conditions. The buckling load will be the largest for

(a) solid square
(b) thin hollow circle
(c) solid circle
(d) I-section

24. Design of shaft made of brittle materials is based on

(a) Guest's theory
(b) Rankine's theory
(c) St. Venant's theory
(d) Von Mises theory

25. For the design of a cast iron member, the most appropriate theory of failure is

(a) Mohr's theory
(b) Rankine's theory
(c) maximum strain theory
(d) none of these

26. All the failure theories give nearly the same results
   (a) when one of the principal stresses at a point is larger in comparison to the other
   (b) when shear stresses act
   (c) when both the principal stresses are numerically equal
   (d) none of these

27. For ductile materials, the most appropriate failure theory is
   (a) maximum shear stress theory   (b) maximum principal stress theory
   (c) maximum principal strain theory   (d) shear strain energy theory

28. Cracks in helical springs used in railway carriages usually starts on the inner side of the coil because
   (a) it is subjected to higher stress than the outer side
   (b) it is subjected to a higher cyclic loading than the outer side
   (c) it has a lower curvature than the outer side
   (d) none of these

29. Euler load for a column is 1000KN and crushing load is 1500KN. The Rankine load is
   (a) 600KN   (b) 1000KN
   (c) 1500KN   (d) 2500KN

30. The number of strain readings (using strain gauges) needed on a plane surface to determine the principal strain and their direction is
   (a) 1   (b) 2
   (c) 3   (d) 4

31. In a two hinged arch, an increase in temperature induces
   (a) no bending moment in the arch rib   (b) uniform bending moment in the arch rib
   (c) maximum bending moment at the crown   (d) minimum bending moment at the crown

32. A circular shaft can transmit a torque of 5KNm. If the torque is reduced to 4KNm, then the maximum value of bending moment that can be applied to the shaft is
   (a) 1KNm   (b) 2KNm
   (c) 3KNm   (d) 4KNm

33. A compound cylinder with inner radius 5cm and outer radius 7cm is made by shrinking one cylinder on to the other cylinder. The junction radius is 6cm and the junction pressure is $11kgf/cm^2$. The maximum hoop stress developed in the inner cylinder is
   (a) $36kgf/cm^2$ compression   (b) $36kgf/cm^2$ tension
   (c) $72kgf/cm^2$ compression   (d) $72kgf/cm^2$ tension

34. If failure in shear along 45º planes is to be avoided, then a material subjected to uniaxial tension should have its shear strength equal to at least
   (a) tensile strength
   (b) compressive strength
   (c) half the difference between the tensile and compressive strength
   (d) half the tensile strength

155. Shaft is subjected to which of the following stresses?
   (a) bending   (b) torsional
   (c) bending and torsional   (d) none of these

156. The longitudinal joint in a boiler shell is usually
   (a) butt joint   (b) lap joint
   (c) butt joint with two cover plates   (d) butt joint with single cover plate

157. In hydro-static bearing the starting friction is
   (a) very low   (b) more
   (c) either more or less   (d) uncertain

158. The rated life of a bearing varies
   (a) directly as load   (b) inversely as square of load
   (c) inversely as cube of load   (d) inversely as fourth power of load

159. Which of the following bearing is suitable for fluctuating demands?
   (a) needle roller bearing   (b) ball bearing
   (c) tapered bearing   (d) cylindrical bearing

160. For large reduction of speed which of the following gear is used?
   (a) warm gear   (b) hypoid gear
   (c) spiral gear   (d) helical gear

161. Lewis equation in gear design is used to find
   (a) tensile stress   (b) compressive stress in bending
   (c) contact stress   (d) fatigue stress

162. Condition for maximum power transmission is
   (a) increase in the angle of wrap of the belt
   (b) the centrifugal tension is one third of maximum tension
   (c) the centrifugal tension is three times the tight side tension
   (d) none of the above

163. The length of the belt in open belt drive is
   (a) variable   (b) constant
   (c) more   (d) less

164. Power transmitted by increasing the initial tension is
   (a) more   (b) less
   (c) same   (d) all of these

165. In V-belt drive when one of the set of belts break then
   (a) one belt should be replaced   (b) entire set should be replaced
   (c) no need of replacement   (d) none of these

166. In the assembly of pulley, key and shaft, which one is true?
   (a) pulley is made the strongest   (b) key is made the weakest
   (c) key is made the strongest   (d) all are designed for equal strength

145. Power of a governor is the
    (a) mean force exerted at the sleeve for a given percentage change of speed
    (b) work done at the sleeve for maximum equilibrium speed
    (c) mean force exerted at the sleeve for maximum equilibrium speed
    (d) work done at the sleeve for a given percentage change of speed

146. Balancing of rotating and reciprocating parts of an engine is necessary when it runs at
    (a) high speed   (b) low speed
    (c) moderate speed   (d) all the above

147. For dynamic balancing of a shaft
    (a) the net dynamic force acting on the shaft is equal to zero
    (b) net couple due to dynamic force acting on the shaft is equal to zero
    (c) the net acceleration due to dynamic force acting on the shaft is equal to zero
    (d) both (a) and (b)

148. The primary unbalanced force is maximum when the angle of inclination of the crank with the line of stroke is
    (a) 0º   (b) 90º
    (c) 180º   (d) both (a) and (c)

149. The unbalanced force due to revolving masses
    (a) varies in magnitude but constant in direction
    (b) varies in direction but constant in magnitude
    (c) varies both in magnitude and direction
    (d) remains constant both in magnitude and direction

150. In locomotive reciprocating engine, the ratio of the connecting rod length to the crank radius is kept very large in order to
    (a) minimize the effect of primary forces   (b) minimize the effect of secondary forces
    (c) to start the locomotive quickly   (d) in order to attain perfect balancing

151. The property of a material which enables it to be drawn into wire with the application of tensile force is called
    (a) plasticity   (b) elasticity
    (c) malleability   (d) ductility

152. The material commonly selected for the design of machine tool bodies is
    (a) mild steel   (b) aluminium
    (c) brass   (d) cast iron

153. Which of the following type of materials obey Guest's theory of failure?
    (a) brittle   (b) ductile
    (c) elastic   (d) plastic

154. Rankine's theory of failure is applicable for which of the following type of materials?
    (a) brittle   (b) ductile
    (c) elastic   (d) plastic

35. A small element at the critical section of a component is in a bi-axial state of stress with the two principal stresses being 360MPa and 140MPa. The maximum working stress according to Distortion Energy Theory is
    (a) 220MPa   (b) 110MPa
    (c) 314MPa   (d) 330MPa

36. For the case of a slender column of length L and flexural rigidity EI built in at its base and free at the top, the Euler's critical buckling load is
    (a) $4\pi^2 EI/L^2$ (b) $2\pi^2 EI/L^2$
    (c) $\pi^2 EI/L^2$ (d) $\pi^2 EI/4L^2$

37. When bending moment M and torque T is applied on a shaft, then equivalent torque is
    (a) $M+T$ (b) $\sqrt{M^2+T^2}$
    (c) $\dfrac{\sqrt{M^2+T^2}}{2}$ (d) none of these

38. A metal pipe of 1m diameter contains a fluid having a pressure of 10Kgf/cm². If the permissible tensile stress in the metal is 200Kgf/cm², then the thickness of the metal required for making the pipe would be
    (a) 5mm   (b) 10mm
    (c) 20mm   (d) 25mm

39. Principal stress at a point in a plane stressed element are $\sigma_x = \sigma_y = 500$Kg/cm². Normal stress on the plane inclined at 45º to x-axis will be
    (a) 0   (b) 500Kg/cm²
    (c) 707Kg/cm²   (d) 1000Kg/cm²

40. The shear stress distribution over a rectangular cross section of a beam follows
    (a) a straight line path   (b) a circular path
    (c) a parabolic path   (d) an elliptical path

41. A circular shaft subjected to torsion undergoes a twist of 1º in a length of 120cm. If the maximum shear stress induced is limited to 1000Kg/cm² and if the modulus of rigidity G is equal to 0.8×10^6, then the radius of the shaft should be
    (a) $\pi/18$ (b) $\pi/27$
    (c) $18/\pi$ (d) $27/\pi$

42. Hook's law holds good up to
    (a) proportional limit   (b) yield point
    (c) elastic limit   (d) plastic limit

43. The property of a material by virtue of which a body returns to its original shape after removal of the load is known as
    (a) ductility   (b) plasticity
    (c) elasticity   (d) resilience

44. The work done in producing strain on a material per unit volume is called
    (a) resilience   (b) ductility
    (c) elasticity   (d) plasticity

45. If a beam is fixed at both the ends, it is called
  (a) fixed beam   (b) built in beam
  (c) encastered beam   (d) any one of the above

46. In a fixed beam, temperature variation produces
  (a) large stresses   (b) small stresses
  (c) zero stress   (d) none of these

47. In a simply supported beam the temperature variation produces
  (a) large stresses   (b) small stresses
  (c) zero stress   (d) none of these

48. For the same loading, the maximum deflection for a fixed beam as compared to simply supported beam is
  (a) more   (b) same
  (c) less   (d) none of the above

49. A cantilever of length L carries a load whose intensity varies uniformly from zero at the free end to W per unit length at the fixed end, the bending moment diagram will be
  (a) straight line curve   (b) parabolic curve
  (c) cubic curve   (d) combination of (a) and (b)

50. Generally a rivet joint fails by
  (a) shearing of rivet   (b) crushing of rivet
  (c) tearing of plate   (d) any one of the above

51. A strut is defined as
  (a) member of a structure which carries a tensile load
  (b) member of a structure which carries an axial compressive load
  (c) vertical member of a structure which carries a tensile load
  (d) none of the above

52. The material, of which rivets are made, should be
  (a) hard   (b) ductile
  (c) tough   (d) none of these

53. A coil is having stiffness K. It is cut into two pieces, then the stiffness of the cut coil will be
  (a) same   (b) half
  (c) double   (d) one fourth

54. The bending moment on a section is maximum where shearing force is
  (a) minimum   (b) maximum
  (c) zero   (d) changing sign

55. The point of contra-flexure occurs only in
  (a) continuous beam   (b) cantilever beam
 (c) over hanging beam   (d) none of the above

135. The ratio of maximum fluctuation of energy into the work done per cycle is called
  (a) fluctuation of energy   (b) maximum fluctuation of energy
  (c) coefficient of fluctuation of energy   (d) none of the above

136. The height of a Watt's governor in meters can be expressed as
  (a) $8.95/N^2$ (b) $895/N^2$
  (c) $89.5/N^2$ (d) $8950/N^2$

137. When the sleeve of a Porter governor moves upwards, the governor speed
  (a) increases   (b) decreases
  (c) remains constant   (d) none of these

138. When the sleeve of a Porter governor moves downwards, the governor speed
  (a) first increases then decreases   (b) first decreases then increases
  (c) remains constant   (d) decreases

139. A Hartnell governor is a
  (a) dead weight governor   (b) spring loaded governor
  (c) pendulum type governor   (d) inertia type governor

140. If S_1 and S_2 are spring forces exerted on the sleeve at maximum and minimum radii of rotation and H is the compression of the spring in a Hartnell governor, then the stiffness of the spring is given by
  (a) $(S_1+S_2)/H$ (b) $(S_1-S_2)/H$
  (c) $(S_1+S_2)/2H$ (d) $(S_1-S_2)/2H$

141. Sensitiveness of the governor is defined as the ratio of the
  (a) mean speed to maximum equilibrium speed
  (b) mean speed to minimum equilibrium speed
  (c) difference of maximum & minimum equilibrium speeds to the mean speed
  (d) sum of maximum & minimum equilibrium speeds to the mean speed

142. A governor is said to be stable, if the
  (a) radius of rotation of balls increases as the equilibrium speed decreases
  (b) radius of rotation of balls increases as the equilibrium speed increases
  (c) radius of rotation of balls decreases as the equilibrium speed decreases
  (d) radius of rotation of balls decreases as the equilibrium speed increases

143. In a Hartnell governor, if the spring of greater stiffness is used, then the governor will be
  (a) less sensitive   (b) more sensitive
  (c) unaffected of sensitivity   (d) isochronous

144. When the speed of the engine fluctuates continuously above and below the mean speed, the governor is said to be
  (a) stable   (b) unstable
  (c) isochronous   (d) hunting

124. When two links are connected by a pin joint, their instantaneous centre lies
  (a) on their point of contact   (b) at the centre of curvature
  (c) at the centre of circle   (d) at the pin joint

125. The relative velocity of B with respect to A in a rigid link AB is
  (a) parallel to AB   (b) perpendicular to AB
  (c) along AB   (d) at 45º to AB

126. The component of the acceleration, parallel to the velocity of the particle, at the given instant is called
  (a) radial component   (b) tangential component
  (c) coriolis component   (d) none of the above

127. The component of the acceleration, perpendicular to the velocity of the particle, at the given instant is called
  (a) radial component   (b) tangential component
  (c) coriolis component   (d) none of the above

128. The angle of inclination of the plane, at which the body begins to move down the plane is called
  (a) angle of friction   (b) angle of repose
  (c) angle of projection   (d) none of the above

129. Two parallel and coplanar shafts are connected by gears having teeth parallel to the axis of the shaft, this arrangement is known as
  (a) spur gear   (b) helical gear
  (c) bevel gear   (d) spiral gear

130. The size of a gear is usually specified by
  (a) pressure angle   (b) circular pitch
  (c) pitch circle   (d) pitch circle diameter

131. The ratio of number of teeth to the pitch circle diameter in millimetres is called
  (a) circular pitch   (b) diametral pitch
  (c) module   (d) none of the above

132. The product of the diametral pitch and circular pitch is equal to
  (a) 1   (b) $1/\pi$
  (c) π (d) 2π

133. The minimum number of teeth on the pinion which will mesh with any gear without interference for 20º full depth involute teeth will be
  (a) 12   (b) 14
  (c) 18   (d) 24

134. When the axes of the first and last wheels are co-axial, then the gear train is known as
  (a) simple train of wheels   (b) compound train of wheels
  (c) reverted gear train   (d) epicyclic gear train

56. The shear force and bending moment are zero at the free end of a cantilever, if it carries
  (a) point load at the free end
  (b) uniformly distributed load over the whole length
  (c) point load in the middle of its length
  (d) none of the above

57. The ratio of linear stress to linear strain is known as
  (a) poisons ratio   (b) bulk modulus
  (c) modulus of rigidity   (d) modulus of elasticity

58. The ratio of modulus of rigidity to bulk modulus for a poisons ratio of 0.25 is
  (a) 2/3   (b) 2/5
  (c) 3/5   (d) 1

59. If D is diameter of a sphere then volumetric strain is equal to
  (a) two times the strain of diameter   (b) 1.5 times the strain of diameter
  (c) three times the strain of diameter   (d) the strain of diameter

60. In a tensile test of a specimen, the ratio of maximum load to the original cross sectional area of the test piece is called
  (a) ultimate stress   (b) safe stress
  (c) breaking stress   (d) none of these

61. A cantilever of length L carries a point load W at the free end. The shear force diagram will be
  (a) two equal and opposite rectangles   (b) one rectangle
  (c) two equal and opposite triangles   (d) one triangle

62. A cantilever of length L carries a uniformly distributed load over the whole length. The shear force diagram will be
  (a) two equal and opposite rectangles   (b) one rectangle
  (c) two equal and opposite triangles   (d) one triangle

63. The diameter of a mild steel round bar, on which tensile test is performed, at fracture point will
  (a) increase   (b) decrease
  (c) same   (d) none of these

64. The shear stress required to cause plastic deformation of solid metal is called
  (a) proof stress   (b) flow stress
  (c) ultimate stress   (d) none of these

65. The statement 'If unit loads rest on a beam at the two points A and B, then the deflection at A due to unit load at B is equal to the deflection at B due to unit load at A' is given by
  (a) Mohr   (b) Castigliano
  (c) Maxwell   (d) none of these

66. A short column of rectangular section carries a point load W acting with an eccentricity 'e'. The shape of Kernel area is
 (a) square   (b) rectangle
  (c) circle   (d) rhombus

67. A short column of circular section carries a point load W acting with an eccentricity 'e'. The shape of Kernel area is

(a) square   (b) rectangle

(c) circle   (d) rhombus

68. Every cross section of a shaft, which is subjected to a twisting moment is under

(a) compressive stress   (b) shear stress

(c) tensile stress   (d) bending stress

69. The torsional rigidity of a shaft is defined as the torque needed to produce

(a) maximum twist   (b) maximum shear stress

(c) minimum twist   (d) a twist of 1 radian per unit length

70. A cylindrical vessel is said to be thin if the ratio of its internal diameter to the wall thickness is

(a) less than 20   (b) equal to 20

(c) more than 20   (d) none of these

71. The circumferential strain in case of thin cylinder when subjected to internal pressure is

(a) more than diametral strain   (b) less than diametral strain

(c) equal to diametral strain   (d) none of these

72. A welded joint as compared to riveted joint has

(a) less strength   (b) more strength

(c) same strength   (d) none of these

73. The maximum axial compressive load which a column can take without failure by lateral deflection is

(a) critical load   (b) buckling load

(c) crippling load   (d) any one of the above

74. A loaded column fails due to

(a) stress due to direct load   (b) stress due to bending

(c) both (a) and (b)   (d) none of these

75. The ratio of lateral strain to longitudinal strain is called

(a) Poisson's ratio   (b) bulk modulus

(c) modulus of rigidity   (d) modulus of elasticity

76. In theory of machine, which deals with the relative motion between the various links of the machines is known as

(a) kinetics   (b) kinematics

(c) dynamics   (d) statics

77. In theory of machine, which deals with the forces and their effects between the various links of the machines is known as

(a) kinetics   (b) kinematics

(c) dynamics   (d) statics

117. A disk of mass m is attached to a spring of stiffness k as shown in the figure. The disc rolls without slipping on the horizontal surface. The natural frequency of vibration of the system is
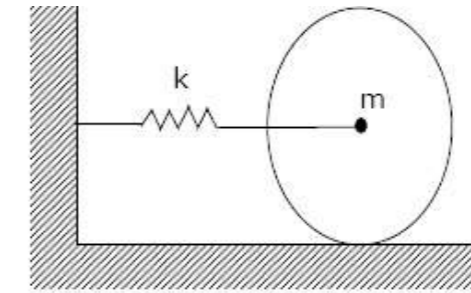
(a) $\dfrac{1}{2\pi}\sqrt{\dfrac{k}{m}}$ (b) $\dfrac{1}{2\pi}\sqrt{\dfrac{2k}{m}}$

(c) $\dfrac{1}{2\pi}\sqrt{\dfrac{2k}{3m}}$ (d) $)\dfrac{1}{2\pi}\sqrt{\dfrac{3k}{2m}}$

118. A 1kg block is resting on a surface with coefficient of friction $\mu = 0.1$. A force of 0.8N is applied on the block as shown in the figure. The friction force is
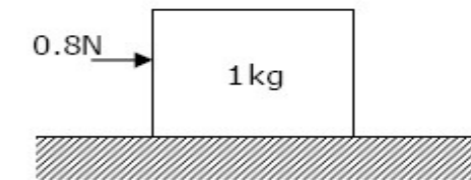
(a) 0   (b) 0.8N

(c) 0.98N   (d) 1.2N

119. If two moving elements allows only a rectilinear translation between two links, then it is termed as

(a) Cylindrical pair   (b) Turning pair

(c) Sliding pair   (d) Rolling pair

120. The motion of a shaft in a circular hole is an example of

(a) completely constrained motion   (b) incompletely constrained motion

(c) partially constrained motion   (d) none of these

121. An automobile steering gear is an example of

(a) sliding pair   (b) rolling pair

(c) lower pair   (d) higher pair

122. If the number of links in a mechanism is L, then the number of possible inversions is equal to

(a) L-2   (b) L-1

(c) L   (d) L+2

123. When a body moves with simple harmonic motion, the product of its periodic time and frequency is equal to

(a) zero   (b) one

(c) $\pi / 2$ (d) π

110. In a single degree of freedom vibration system, the ratio between undamped natural frequency and damped natural frequency is

(a) > 1 (b) $= 1$

(c) < 1 (d) none of these

111. The equation $\dfrac{d^2x}{dt^2} + \dfrac{k}{m}x = 0$ represents

(a) free vibration   (b) forced vibration

(c) periodically forced vibration   (d) free vibration with viscous damping

112. For a vibrating system as the value $\dfrac{w}{w_n}$ increases above unity, the simplification factor, irrespective of the value of damping factor has tendency to move towards

(a) above unity   (b) near unity

(c) near infinity   (d) near zero value

113. Critical damping is a function of

(a) mass and stiffness   (b) mass and damping coefficient

(c) stiffness and natural frequency   (d) natural frequency and damping coefficient

114. For critical damping, the damping factor will be

(a) > 1 (b) < 1

(c) $= 1$ (d) none of these

115. Two identical ball bearings P and Q are operating at loads 30 kN and 45 kN respectively. The ratio of the life of bearing P to that of life of bearing Q is

(a) 81/16   (b) 27/8

(c) 9/4   (d) 3/2

116. A mass of 1kg is attached to two identical springs K=20kN/m as shown in the figure below. Under frictionless condition, the natural frequency of the system in Hz is close to
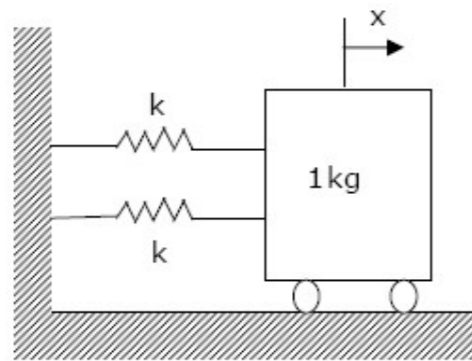
(a) 32   (b) 23

(c) 16   (d) 11

78. In theory of machine, which deals with the inertia force due to combined effect of the mass and motion of the various links of the machines is known as

(a) kinetics   (b) kinematics

(c) dynamics   (d) statics

79. A link which does not undergo any deformation while transmitting motion is called

(a) rigid link   (b) fluid link

(c) flexible link   (d) soft link

80. Connecting rod, crank etc. of a reciprocating engine are popular examples of

(a) rigid link   (b) fluid link

(c) flexible link   (d) soft link

81. Belts, ropes and chains used for the power transmission system are the popular examples of

(a) rigid link   (b) fluid link

(c) flexible link   (d) soft link

82. A pair of links having surface or area contact between the members is known as a

(a) higher pair   (b) lower pair

(c) end pair   (d) bottom pair

83. A pair of links having point or line contact between the members is known as a

(a) higher pair   (b) lower pair

(c) end pair   (d) bottom pair

84. For a rigid body, the degrees of freedom is

(a) 0   (b) 2

(c) 4   (d) 6

85. The relation between the number of links (L) and the number of joints (J) which constitute a kinematic chain is given by the expression

(a) J=5L/2 − 2   (b) J=3L/2 − 2

(c) J=4L/2 − 3   (d) J=6L/2 − 3

86. The Grubler's criterion applies to mechanism having only single degrees of freedom joints where the overall movability of the mechanism is

(a) 1   (b) 2

(c) 3   (d) 4

87. When one link is fixed in a kinematic chain, it is called a

(a) machine   (b) mechanism

(c) structure   (d) none of these

88. In a constrained kinematic chain having N number of links, the number of instantaneous centres is given by

(a) N(N+1)/2   (b) N(N-1)/2

(c) N(N+1)(N+2)/2   (d) N/2

89. The number of instantaneous centres in a four bar mechanism is

(a) 4   (b) 8

(c) 6   (d) 10

90. If three bodies move relatively to each other, then they have three instantaneous centres and they lie on a

(a) ellipse
(b) circle
(c) parabola
(d) straight line

91. Shock absorbing capacity of the bolt is increased by

(a) proper tightening
(b) use of spring washer
(c) making shank diameter equal to the core diameter
(d) preventing stress concentration anywhere in the bolt

92. Quick return mechanism is an inversion of

(a) four bar chain
(b) single slider crank chain
(c) double slider crank chain
(d) crossed slider crank chain

93. In full depth 14.5° degree involute system, the smallest number of teeth in a pinion which meshes with rack without interference is

(a) 12
(b) 16
(c) 25
(d) 32

94. Inversion of a mechanism is

(a) changing of a higher pair to lower pair
(b) obtained by fixing different links in a kinematic chain
(c) turning it upside down
(d) obtained by reversing the input and output motion

95. The turning moment diagram will have least variations in case of

(a) double acting steam engine
(b) four stroke single cylinder petrol engine
(c) 8-cylinder, 4-stroke diesel engine
(d) Pelton wheel

96. In gears, interference takes place when

(a) the tip of a tooth of a mating gear digs into the portion between base and root circle
(b) gears do not move smoothly in the absence of lubrication
(c) pitch of the gear is not same
(d) gear teeth are undercut

97. If the rotating mass of a rim type flywheel is distributed on another rim type flywheel whose mean radius is half the mean radius of the former, then the energy stored in the later at the same speed will be

(a) four times the first one
(b) same as the first one
(c) one fourth of the first one
(d) one and half times the first one

98. A flywheel is fitted to the crank shaft of an engine having E amount of indicated work per revolution and permissible limit of coefficient of fluctuation of energy and speed as K_e and K_s respectively. The kinetic energy of the flywheel is given by

(a) $2K_eE/K_s$
(b) $K_eE/2K_s$
(c) K_eE/K_s
(d) $K_sE/2K_e$

99. In involute gears, the pressure angle is

(a) dependant on the size of teeth
(b) dependant on the size of gear
(c) always constant
(d) always variable

100. In a multiple V-belt drive, when a single belt is damaged, it is preferable to change the complete set to

(a) reduce vibration
(b) reduce slip
(c) ensure uniform loading
(d) ensure proper alignment

101. Balancing of a rigid rotor can be achieved by appropriately placing balancing weights in

(a) a single plane
(b) two plane
(c) three planes
(d) four planes

102. Total slip will occur in a belt drive when

(a) angle of rest is zero
(b) angle of creep is zero
(c) angle of rest > angle of creep
(d) angle of creep > angle of rest

103. A bicycle remains stable in running through a bend because of

(a) gyroscopic action
(b) coriolis acceleration
(c) centrifugal action
(d) radius of curved path

104. Deep groove ball bearings are used for

(a) heavy load only
(b) small angular displacement of shafts
(c) radial load at high speed
(d) combined thrust and radial load at high speed

105. The dynamic load capacity of a 6306 bearing is 22kN. The maximum radial load it can sustain to operate at 600 RPM, for 2000 hours is

(a) 4.16kN
(b) 3.60kN
(c) 6.25kN
(d) 5.29kN

106. The difference between tension on the tight and slack side of a belt drive is 3000N. If the belt speed is 15m/sec, the transmitted power in kW is

(a) 45
(b) 22.5
(c) 90
(d) 1000

107. In a cam mechanism with reciprocating roller follower, the follower has a constant acceleration in the case of

(a) cycloidal motion
(b) simple harmonic motion
(c) parabolic motion
(d) polynomial motion

108. In a spur gear, the circle on which the involute is generated is called the

(a) pitch circle
(b) clearance circle
(c) base circle
(d) addendum circle

109. If speed of the Porter Governor is N, then the sensitivity is proportional to

(a) N^2
(b) N^3
(c) $1/N^2$
(d) $1/N^3$