10.1. The unit of force in S.I. units is
(a) kilogram
(b) newton
(c) watt
(d) dyne
(e) joule.

Ans: b

10.2. The unit of work or energy in S.I. units is
(a) newton
(b) pascal
(c) kilogram metre
(d) watt
(e) joule.

Ans: e

10.3. The unit of power in S.I. units is
(a) newton metre
(b) watt
(c) joule
(d) kilogram metre/sec.
(e) pascal per sec.

Ans: b

10.4. Forces are called concurrent when their lines of action meet in
(a) one point
(b) two points
(c) plane
(d) perpendicular planes
(e) different planes.
Ans: a

10.5. Forces are called coplanar when all of them acting on body lie in
(a) one point

(b) one plane
(c) different planes
(d) perpendicular planes
(e) different points.
Ans: b

10.6. A force acting on a body may
(a) introduce internal stresses
(b) balance the other forces acting on it
(c) retard its motion
(d) change its motion
(e) all of the above.
Ans: e

10.7. Which is the correct statement about law of polygon of forces ?
(a) if any number of forces acting at a point can be represented by the sides of a polygon taken in order, then the forces are in equilibrium
(b) if any number of forces acting at a point can be represented in direction and magnitude by the sides of a polygon, then the forces are in equi¬librium
(c) if a polygon representing forces acting at a point is closed then forces are in equilibrium
(d) if any number of forces acting at a point can be represented in direction and magnitude by the sides of a polygon taken in order, then the forces are in equilibrium
(e) none of the above.
Ans: d

10.8. Effect of a force on a body depends upon
(a) magnitude
(b) direction
(c) position or line of action
(d) all of the above
(e) none of the above.
Ans: d

10.9. If a number of forces act simultaneously on a particle, it is possible
(a) not a replace them by a single force
(b) to replace them by a single force

(c) to replace them by a single force through C.G.
(d) to replace them by a couple
(e) to replace them by a couple and a force.
Ans: b

10.11. A force is completely defined when we specify
(a) magnitude
(b) direction
(c) point of application
(d) all of the above
(e) none of the above.
Ans: d

10.12. If two equal forces of magnitude P act at an angle 9°, their resultant will be
(a) P/2 cos 9/2
(b) IP sin 9/2
(c) 2P tan 9/2
(d) IP cos 9/2
(e) Psin 9/2.
Ans: d

10.13. The algebraic sum of the resolved parts of a number of forces in a given direction is equal to the resolved part of their resultant in the same direction. This is as per the principle of
(a) forces
(b) independence of forces
(c) dependence of forces
(d) balance of force
(e) resolution of forces.
Ans: e

10.14. The resolved part of the resultant of two forces inclined at an angle 9 in a given direction is equal to
(a) the algebraic sum of the resolved parts of the forces in the given direction
(b) the sum of the resolved parts of the forces in the given direction
(c) the difference of the forces multiplied by the cosine of 9
(d) the sum of the forces multiplied by the sine of 9
(e) the sum of the forces multiplied by the tangent of 9.

Ans: a

10.15. Which of the following do not have identical dimensions ?

(a) Momentum and impulse

(b) Torque and energy

(c) Torque and work

(d) Kinetic energy and potential energy

(e) Moment of a force and angular momentum.

Ans: e

10.16. Which of the following is not the unit of distance ?

(a) angstrom

(b) light year

(c) micron

(d) millimetre

(e) milestone.

Ans: e

10.17. Which of the following is not the unit of power ?

(a) kW (kilowatt)

(b) hp (horse power)

(c) kcal/sec

(d) kg m/sec

(e) kcal/kg sec.

Ans: e

10.18. Which of the following is not the unit of work, energy and heat ?

(a) kcal

(b) kg m

(c) kWhr

(d) hp

(e) hp hr.

Ans: d

10.19. Which of the following is not the unit of pressure ?

(a) kg/cm

(b) ata

(c) atmosphere

(d) mm of wcl

(e) newton.

Ans: e

10.20. The weight of a body is due to

(a) centripetal force of earth

(b) gravitational pull exerted by the earth

(c) forces experienced by body in atmos-phere

(d) force of attraction experienced by par-ticles

(e) gravitational force of attraction towards the centre of the earth.

Ans: e

10.21. The forces, which meet at one point, but their lines of action do not lie in a plane, are called

(a) coplanar non-concurrent forces

(b) non-coplanar concurrent forces

(c) non-coplanar non-concurrent forces

(d) intersecting forces

(e) none of the above.

Ans: b

10.22. When trying to turn a key into a lock, following is applied

(a) coplanar force

(b) non-coplanar forces

(c) lever

(d) moment

(e) couple.

Ans: e

10.23. Which of the following is not a scalar quantity

(a) time

(b) mass

(c) volume

(d) density

(e) acceleration.

Ans: e

10.24. According to principle of transmissibility of forces, the effect of a force upon a body is
(a) maximum when it acts at the centre of gravity of a body
(b) different at different points in its line of action
(c) the same at every point in its line of action
(d) minimum when it acts at the C.G. of the body
(e) none of the above.
Ans: c

10.25. Which of the following is a vector quantity
(a) energy
(b) mass
(c) momentum
(d) angle
(e) speed.
Ans: c

10.26. The magnitude of two forces, which when acting at right angle produce resultant force of VlOkg and when acting at 60° produce resultant of Vl3 kg. These forces are
(a) 2 and V6
(b) 3 and 1 kg
(c) V5andV5
(d) 2 and 5
(e) none of the above.
Ans: c

10.27. A number of forces acting at a point will be in equilibrium if
(a) their total sum is zero
(b) two resolved parts in two directions at right angles are equal
(c) sum of resolved parts in any two per-pendicular directions are both zero
(d) all of them are inclined equally
(e) none of the above.
Ans: c

10.28. Two non-collinear parallel equal forces acting in opposite direction
(a) balance each other
(b) constitute a moment
(c) constitute a couple

(d) constitute a moment of couple
(e) constitute a resultant couple.
Ans: c

10.29. According to principle of moments
(a) if a system of coplanar forces is in equilibrium, then their algebraic sum is zero
(b) if a system of coplanar forces is in equilibrium, then the algebraic sum of their moments about any point in their plane is zero
(c) the algebraic sum of the moments of any two forces about any point is equal to moment of theiwesultant about the same point
(d) positive and negative couples can be balanced
(e) none of the above.
Ans: b

10.30. Which of the following is not a vector quantity
(a) weight
(b) velocity
(c) acceleration
(d) force
(e) moment.
Ans: a

10.31. According to law of triangle of forces
(a) three forces acting at a point will be in equilibrium
(b) three forces acting at a point can be represented by a triangle, each side being proportional to force
(c) if three forces acting upon a patticle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equi¬librium
(d) if three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two
(e) none of the above.
Ans: c

1033. If a rigid body is in equilibrium under the action of three forces, then
(a) these forces are equal
(b) the lines of action of these forces meet in a point
(c) the lines of action of these forces are parallel

(d) (b) and (c) above
(e) none of the above.
Ans: d

1036. D' Alembert's principle is used for
(a) reducing the problem of kinetics to equivalent statics problem
(b) determining stresses in the truss
(c) stability of floating bodies
(d) designing safe structures
(e) solving kinematic problems.
Ans: a

1037. A heavy ladder resting on floor and against a vertical wall may not be in equilibrium, if
(a) the floor is smooth, the wall is rough
(b) the floor is rough, the wall is smooth
(c) the floor and wall both are smooth sur¬faces
(d) the floor and wall both are rough sur-faces
(e) will be in equilibrium under all condi-tions.
Ans: c

1038. According to Lami's theorem
(a) three forces acting at a point will be in equilibrium
(b) three forces acting at a point can be represented by a triangle, each side being proportional to force
(c) if three forces acting upon a particle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium
(d) if three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two
(e) none of the above.
Ans: d

1039. Two coplanar couples having equal and op-posite moments
(a) balance each other
(b) produce a couple and an unbalanced force
(c) are equivalent
(d) produce a moment of couple
(e) can not balance each other.

Ans: e

10.40. A framed structure is perfect if it contains members equal to

(a) 2n-3

(b) n-1

(c) '2n-1

(d) n - 2

(e) 3n-2.

where n = number of joints in a frame

Ans: a

10.42. The product of either force of couple with the arm of the couple is called

(a) resultant couple

(b) moment of the forces

(c) resulting couple

(d) moment of the couple

(e) none of the above.

Ans: d

10.43. In detennining stresses in frames by methods of sections, the frame is divided into two parts by an imaginary section

drawn in such a way as not to cut more than

(a) two members with unknown forces of the frame

(b) three members with unknown forces of the frame

(c) four members with unknown forces of the frame

(d) three members with known forces of the frame

(e) four members with two known forces.

Ans: b

10.44. The centre of gravity of a uniform lamina lies at

(a) the centre of heavy portion

(b) the bottom surface

(c) the mid point of its axis

(d) all of the above

(e) none of the above.

Ans: c

10.45. Centre of gravity of a solid cone lies on the axis at the height
(a) one-fourth of the total height above base
(b) one-third of the total height above base
(c) one-half of the total height above base
(d) three-eighth of the total height above the base
(e) none of the above.
Ans: a

10.46. Centre of percussion is
(a) the point of C.G.
(b) the point of metacentre
(c) the point of application of the resultant of all the forces tending to cause a body to rotate about a certain axis
(d) point of suspension
(e) the point in a body about which it can rotate horizontally and oscillate under the influence of gravity.
Ans: c

10.47. Centre of gravity of a thin hollow cone lies on the axis at a height of
(a) one-fourth of the total height above base
(b) one-third of the total height above base
(c) one-half of the total height above base
(d) three-eighth of the total height above the base
(e) none of the above.
Ans: b

10.48. The units of moment of inertia of an area are
(a) kg m2
(b) m4
(c) kg/m2
(d) m3
(e) kg/m4.
Ans: b

10.49. The centre of percussion of the homogeneous rod of length L suspended at the top will be
(a) L/2
(b) L/3

(c) 3L/4
(d) 2L/3
(e) 3L/8.
Ans: d

10.50. The centre of gravity of a triangle lies at the point of
(a) concurrence of the medians
(b) intersection of its altitudes
(c) intersection of bisector of angles
(d) intersection of diagonals
(e) all of the above.
Ans: a

10.51. The units of moment of inertia of mass are
(a) kg m2
(b) m4
(c) kg/m2
(d) kg/m
(e) m2/kg.
Ans: a

10.52. The possible loading in various members of framed structures are
(a) compression or tension
(b) buckling or shear
(c) shear or tension
(d) all of the above
(e) bending.
Ans: a

10.53. A heavy string attached at two ends at same horizontal level and when central dip is very small approaches the following curve
(a) catenary
(b) parabola
(c) hyperbola
(d) elliptical
(e) circular arc.
Ans: b

10.54. A trolley wire weighs 1.2 kg per metre length. The ends of the wire are attached to two poles 20 metres apart. If the horizontal tension is 1500 kg find the dip in the middle of the span

(a) 2.5 cm

(b) 3.0 cm

(c) 4.0 cm

(d) 5.0 cm

(e) 2.0 cm.

Ans: c

10.55. From a circular plate of diameter 6 cm is cut out a circle whose diameter is a radius of the plate. Find the e.g. of the remainder from the centre of circular plate

(a) 0.5 cm

(b) 1.0 cm

(c) 1.5 cm

(d) 2.5 cm

(e) 0.25 cm.

Ans: a

10.58. Pick up the incorrect statement from the following :

(a) The C.G. of a circle is at its centre

(b) The C.G. of a triangle is at the inter¬section of its medians

(c) The C.G. of a rectangle is at the inter-section of its diagonals

(d) The C.G. of a semicircle is at a dis¬tance of r/2 from the centre

(e) The C-G. of an ellipse is at its centre.

Ans: d

10.59. The centre of percussion of a solid cylinder of radius r resting on a horizontal plane will be

(a) r/2

(b) 2r/3

(c) r/A

(d) 3r/2

(e) 3r/A.

Ans: d

10.62. In the equation of virtual work, following force is neglected

(a) reaction of any smooth surface with which the body is in contact

(b) reaction of a rough surface of a body which rolls on it without slipping
(c) reaction at a point or an axis, fixed in space, around which a body is con-strained to turn
(d) all of the above
(e) none of the above.
Ans: d

10.63. If a suspended body is struck at the centre of percussion, then the pressure on die axis passing through the point of suspension will be
(a) maximum
(b) minimum
(c) zero
(d) infinity
(e) same as the force applied.
Ans: c

10.65. The resultant of the following three couples 20 kg force, 0.5 m arm, $ ve sense 30 kg force, 1 m arm, - ve sense 40 kg force, 0.25 m arm, + ve sense having arm of 0.5 m will be
(a) 20 kg, - ve sense
(ft) 20 kg, + ve sense
(c) 10 kg, + ve sense
(d) 10 kg, - ve sense
(e) 45 kg, + ve sense.
Ans: a

10.68. Angle oT friction is the
(a) angle between normal reaction and the resultant of normal reaction and the limiting friction
(b) ratio of limiting friction and normal reaction
(ey the ratio of minimum friction force to the friction force acting when the body is just about to move
(d) the ratio of minimum friction force to friction force acting when the body is in motion
(e) ratio of static and dynamic friction.
Ans: a

10.69. The coefficient of friction depends on
(a) area of contact
(b) shape of surfaces
(c) strength of surfaces

(d) nature of surface
(e) all of the above.
Ans: d

10.70. Least force required to draw a body up the inclined plane is W sin (plane inclination + friction angle) applied in the direction
(a) along the plane
(b) horizontally
(c) vertically
(d) at an angle equal to the angle of fric¬tion to the inclined plane
(e) unpredictable.
Ans: d

10.71. The ratio of limiting friction and normal reaction is known as
(a) coefficient of friction
(b) angle of friction
(c) angle of repose
(d) sliding friction
(e) friction resistance.
Ans: a

10.72. Which one of the following statements is not correct
(a) the tangent of the angle of friction is equal to coefficient of friction
(b) the angle of repose is equal to angle of friction
(c) the tangent of the angle of repose is equal to coefficient of friction
(d) the sine of the angle of repose is equal to coefficient to friction
(e) none of the above.
Ans: d

10.73. On a ladder resting on smooth ground and leaning against vertical wall, the force of friction will be
(a) towards the wall at its upper end
(b) away from the wall at its upper end
(c) upwards at its upper end
(d) downwards at its upper end
(e) none of the above.
Ans: c

10.74. On the ladder resting on the ground and leaning against a smooth vertical wall, the force of friction will be
(a) downwards at its upper end
(b) upwards at its upper end
(c) perpendicular to the wall at its upper end
(d) zero at its upper end
(e) none of the above.
Ans: d

10.76. Frictional force encountered after commencement of motion is called
(a) post friction
(b) limiting friction
(c) kinematic friction
(d) frictional resistance
(e) dynamic friction.
Ans: e

10.77. Coefficient of friction is the
(a) angle between normal reaction and the resultant of normal reaction and the limiting friction
(b) ratio of limiting friction and normal reaction
(c) the friction force acting when the body is just about to move
(d) the friction force acting when the body is in motion
(e) tangent of angle of repose.
Ans: b

10.78. Pick up wrong statement about friction force for dry surfaces. Friction force is
(a) proportional to normal load between the surfaces
(b) dependent on the materials of contact surface
(c) proportional to velocity of sliding
(d) independent of the area of contact sur-faces
(e) none of the above is wrong statement.
Ans: c

10.79. A body of weight W on inclined plane of a being pulled up by a horizontal force P will be on the point of motion up the plane when P is equal to
(a) W

(b) W sin (a + $)

(c) Wtan(a + <|))

(d) W\an(a-<t>)

(e) Wtana.

Ans: c

10.80. A particle moves along a straight line such that distance (x) traversed in t seconds is given by x = t2 (t - 4), the acceleration of the particle will be given by the equation

(a) 3t2-lt

(b) 3t2+2t

(c) 6f-8

(d) 6f-4

(e) 6t2-8t.

Ans: c

10.81. If rain is falling in the opposite direction of the movement of a pedestrain, he has to hold his umbrella

(a) more inclined when moving

(b) less inclined when moving

(c) more inclined when standing

(d) less inclined when standing

(e) none of the above.

Ans: d

10.86. A projectile is fired at an angle 9 to the vertical. Its horizontal range will be maximum when 9 is

(a) 0°

(b) 30°

(c) 45°

(d) 60°

(e) 90°.

Ans: c

10.88. Limiting force of friction is the

(a) tangent of angle between normal-reac-tion and the resultant of normal reac-tion and limiting friction

(b) ratio of limiting friction and normal reaction

(c) the friction force acting when the body is just about to move
(d) the friction force acting when the body is in motion
(e) minimum force of friction.
Ans: c

10.89. Coulomb friction is the friction between
(a) bodies having relative motion
(b) two dry surfaces
(c) two lubricated surfaces
(d) solids and liquids
(e) electrically charged particles.
Ans: a

10.90. Dynamic friction as compared to static friction is
(a) same
(b) more
(c) less
(d) may be less of more depending on na-ture of surfaces and velocity
(e) has no correlation.
Ans: c

10.92. Tangent of angle of friction is equal to
(a) kinetic friction
(b) limiting friction
(c) angle of repose
(d) coefficient of friction
(e) friction force.
Ans: d

10.93. Kinetic friction is the
(a) tangent of angle between normal reac-tion and the resultant of normal reac-tion and the limiting friction
(b) ratio of limiting friction and normal reaction
(c) the friction force acting when the body is just about to move
(d) the friction force acting when the body is in motion
(e) dynamic friction.
Ans: d

95. The effort required to lift a load W on a screw jack with helix angle a and angle of friction <j) is equal to
(a) Wtan(a + <)>)
(b) Wtan(a-<)>)
(c) Wcos(a + <t>)
(d) Wsin(a + <(>)
(e) W (sin a + cos <j>).
Ans: a

10.96. A semi-circular disc rests on a horizontal surface with its top flat surface horizontal and circular portion touching down. The coefficient of friction between semi-cricular disc and horizontal surface is \i. This disc is to be pulled by a horizontal force applied at one edge and it always remains horizontal. When the disc is about to start moving, its top horizontal force will
(a) remain horizontal
(b) slant up towards direction of pull
(c) slant down towards direction of pull
(d) unpredictable
(e) none of the above.
Ans: c

10.97. A particle inside a hollow sphere of radius r, having coefficient of friction -rr can rest upto height of
(a) r/2
(b) r/A
(c) r/%
(d) 0.134 r
(e) 3r/8.
Ans: d

10.98. The algebraic sum of moments of the forces forming couple about any point in their plane is
(a) equal to the moment of the couple
(b) constant
(c) both of above are correct
(d) both of above are wrong
(e) none of the above.
Ans: a

10.99. A single force and a couple acting in the
same plane upon a rigid body
(a) balance each other
(b) cannot balance each other
(c) produce moment of a couple
(d) are equivalent
(e) none of the above.
Ans: b

10.100. If three forces acting in one plane upon a rigid body, keep it in equilibrium, then they must either
(a) meet in a point
(b) be all parallel
(c) at least two of them must meet
(d) all the above are correct
(e) none of the above.
Ans: d

10.101. The maximum frictional force which comes into play when a body just begins to slide over another surface is called
(a) limiting friction
(b) sliding friction
(c) rolling friction
(d) kinematic friction
(e) dynamic friction.
Ans: a

10.102. The co-efficient of friction depends upon
(a) nature of surfaces
(b), area of contact
(c) shape of the surfaces
(d) ail of the above.
(e) (a) and (b) above.
Ans: a

10.104. The necessary condition for forces to be in equilibrium is that these should be

(a) coplanar

(b) meet at one point ;

(c) both (a) and (b) above

(d) all be equal

(e) something else.

Ans: c

10.105. If three forces acting in different planes can be represented by a triangle, these will be in

(a) non-equilibrium

(b) partial equilibrium

(c) full equilibrium

(d) unpredictable

(e) none of the above.

Ans: a

10.106. If n = number of members andy = number of joints, then for a perfect frame, n =

(a) j-2

(b)2j-1

(c) 2/-3

(d)3/-2

(e) 2/ -4.

Ans: c

10.107. A body moves, from rest with a constant acceleration of 5 m per sec. The distance covered in 5 sec is most nearly

(a) 38 m

(b) 62.5 m

(C) 96 m

(d) 124 m

(e) 240 m.

Ans: b

10.108. A flywheel on a motor goes from rest to 1000 rpm in 6 sec. The number of revolutions made is nearly equal to

(a) 25

(b) 50

(c) 100

(d) 250

(e) 500.

Ans: b

10.110. Which of the following is the locus of a point that moves in such a manner that its distance from a fixed point is equal to its distance from a fixed line multiplied by a constant greater than one

(a) ellipse

(b) hyperbola

(c) parabola

(d) circle

(e) none of the above.

Ans: b

10.111. Which of the following is not the unit of energy

(a) kg m

(b) kcal

(c) wattr

(d) watt hours

(e) kg m x (m/sec)2.

Ans: c

10.112. A sample of metal weighs 219 gms in air, 180 gms in water, 120 gms in an unknown fluid. Then which is correct statement about density of metal

(a) density of metal can't be determined

(b) metal is twice as dense as water

(c) metal will float in water

(d) metal is twice as dense as unknown fluid

(e) none of the above.

Ans: a

10.113. The C.G. of a solid hemisphere lies on the central radius 3r

(a) at distance — from the plane base 3r

(b) at distance — from the plane base 3r

(c) at distance — from the plane base 3r

(d) at distance — from the plane base or

(e) at distance — from the plane base.

Ans: d

10.117. The C.G. of a plane lamina will not be at its geometrical centre in the case of a
(a) right angled triangle
(b) equilateral triangle
(c) square
(d) circle
(e) rectangle.
Ans: a

10.119. The C.G. of a right circular solid cone of height h lies at the following distance from the base
(a) h/2
(b) J/3
(c) h/6
(d) h/4
(e) 3/i/5.
Ans: d

10.122. The M.I. of hollow circular section about a central axis perpendicular to section as compared to its M.I. about horizontal axis is
(a) same
(b) double
(c) half
(d) four times
(e) one fourth.
Ans: b

10.126. Which of the following is the example of lever of first order
(a) arm of man
(b) pair of scissors
(c) pair of clinical tongs
(d) all of the above
(e) none of the above.
Ans: d

10.127. A pair of smith's tongs is an example of the lever of
(a) zeioth order
(b) first order

(c) second order
(d) third order
(e) fourth order.
Ans: c

10.128. In the lever of third order, load W, effort P and fulcrum F are oriented as follows
(a) W between P and F
(b) F between W and P
(c) P between W and F
(d) W, P and F all on one side
(e) none of the above.
Ans: a

10.129. The angle which an inclined plane makes with the horizontal when a body placed on it is about to move down is known as angle of
(a) friction
(b) limiting friction
(c) repose
(d) kinematic friction
(e) static friction.
Ans: c

10.130. In actual machines
(a) mechanical advantage is greater than velocity ratio
(b) mechanical advantage is equal to velocity ratio
(c) mechanical advantage is less than velocity ratio
(d) mechanical advantage is unity
(e) none of the above.
Ans: c

10.131. In ideal machines
(a) mechanical advantage is greater than velocity ratio
(b) mechanical advantage is equal to velocity ratio
(c) mechanical advantage is less than velocity ratio
(d) mechanical advantage is unity
(e) none of the above.
Ans: b

10.136. A cable with a uniformly distributed load per horizontal metre run will take the following shape

(a) straight line

(b) parabola

(c) hyperbola

(d) elliptical

(e) part of a circle.

Ans: b