

Engineering Mechanics objective

Questions :-

1. The unit of force in S.I. units is

- (a) kilogram
- (b) newton
- (c) watt
- (d) dyne
- (e) joule.

Ans: b

2. The unit of work or energy in S.I. units is

- (a) newton
- (b) pascal
- (c) kilogram meter
- (d) watt
- (e) joule.

Ans: e

3. The unit of power in S.I. units is

- (a) newton meter
- (b) watt
- (c) joule
- (d) kilogram meter/sec.
- (e) pascal per sec.

Ans: b

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

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

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

7) 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

8) If a number of forces act simultaneously on

a particle, it is possible

- (a) not to 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

9) 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) If two equal forces of magnitude P act at an angle 90° , their resultant will be

(a) $P/2 \cos 90/2$

(b) $2P \sin 90/2$

(c) $2P \tan 90/2$

(d) $2P \cos 90/2$

(e) $P \sin 90/2$.

Ans: d

11) 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

12) The resolved part of the resultant of two forces inclined at an angle θ 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 θ
- (d) the sum of the forces multiplied by the sine of θ
- (e) the sum of the forces multiplied by the tangent of θ .

Ans: a

13) 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

14) Which of the following is not the unit of distance ?

- (a) angstrom
- (b) light year
- (c) micron
- (d) millimetre
- (e) milestone.

Ans: e

15) 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

16) 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

17) 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

18) 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 atmosphere
- (d) force of attraction experienced by particles
- (e) gravitational force of attraction towards the center of the earth.

Ans: e

19) 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



20) 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

21) Which of the following is not a scalar quantity

- (a) time
- (b) mass
- (c) volume
- (d) density
- (e) acceleration.

Ans: e

22) Which of the following is a vector quantity

(a) energy

(b) mass

(c) momentum

(d) angle

(e) speed.

Ans: c

23) The magnitude of two forces, which when acting at right angle produce resultant force of $\sqrt{10}$ kg and when acting at 60° produce resultant of $\sqrt{13}$ kg. These forces are

(a) 2 and $\sqrt{6}$

(b) 3 and 1 kg

(c) $\sqrt{5}$ and $\sqrt{5}$

(d) 2 and 5

(e) none of the above.

Ans: c

24) 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

25) 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 their resultant about the same point
- (d) positive and negative couples can be balanced
- (e) none of the above.

Ans: b

26) 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

27) 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

28) 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

29) 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

30) The center of gravity of a uniform lamina lies at

- (a) the center 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

31) Center 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

32). Center 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

33) The units of moment of inertia of an area are

- (a) kg m^2
- (b) m^4
- (c) kg/m^2
- (d) m^3
- (e) kg/m^4 .

Ans: b

34). The center 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

- 35) The center 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

- 36) The units of moment of inertia of mass are
- (a) kg m^2
 - (b) m^4
 - (c) kg/m^2
 - (d) kg/m
 - (e) m^2/kg .

Ans: a

- 37) 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

38) 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

39) A trolley wire weighs 1.2 kg per meter length. The ends of the wire are attached to two poles 20 meters 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

40) Pick up the incorrect statement from the following :

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

(b) The C.G. of a triangle is at the intersection of its medians

(c) The C.G. of a rectangle is at the intersection of its diagonals

(d) The C.G. of a semicircle is at a distance of $r/2$ from the center

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

Ans: d

41) The center 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

42). 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

43). 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

44) If a suspended body is struck at the
center of percussion, then the pressure on
the 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

45) 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 center 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

46) 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
- (b) 20 kg, + ve sense
- (c) 10 kg, + ve sense
- (d) 10 kg, - ve sense
- (e) 45 kg, + ve sense.

Ans: a

47.) Angle 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 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

48) 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

49) Least force required to draw a body up the inclined plane is $W \sin(\text{plane inclination} + \text{friction angle})$ applied in the direction

- (a) along the plane
- (b) horizontally
- (c) vertically
- (d) at an angle equal to the angle of friction to the inclined plane
- (e) unpredictable.

Ans: d

50) 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

51) 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

52) 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

53) 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

54) 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

55) 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 surfaces

(e) none of the above is wrong statement.

Ans: c



56) A particle moves along a straight line such that distance (x) traversed in t seconds is given by $x = t^2(t - 4)$, the acceleration of the particle will be given by the equation

- (a) $3t^2 - 4t$
- (b) $3t^2 + 2t$
- (c) $6t - 8$
- (d) $6t - 4$
- (e) $6t^2 - 8t$.

Ans: c

57) If rain is falling in the opposite direction of the movement of a pedestrian, 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

58) A projectile is fired at an angle θ to the vertical. Its horizontal range will be maximum when θ is

- (a) 0°
- (b) 30°
- (c) 45°
- (d) 60°
- (e) 90° .

Ans: c

- 59) Limiting force of friction is the
- (a) tangent of angle between normal-reaction and the resultant of normal reaction 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

- 60) 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

- 61) Dynamic friction as compared to static friction is
- (a) same
 - (b) more
 - (c) less
 - (d) may be less or more depending on nature of surfaces and velocity
 - (e) has no correlation.

Ans: c



- 62) 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

- 63) Kinetic friction is the
- (a) tangent of 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) dynamic friction.

Ans: d

64) A particle inside a hollow sphere of radius r , having coefficient of friction μ can rest upto height of

- (a) $r/2$
- (b) r/μ
- (c) r/μ^2
- (d) $0.134 r$
- (e) $3r/8$.

Ans: d

65) 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

66) 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

67). 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

68) 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

69) The co-efficient of friction depends upon

- (a) nature of surfaces
- (b), area of contact
- (c) shape of the surfaces
- (d) all of the above.
- (e) (a) and (b) above.

Ans: a

70). 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