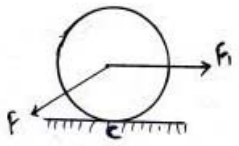
ME1002 - ENGINEERING MECHANICS

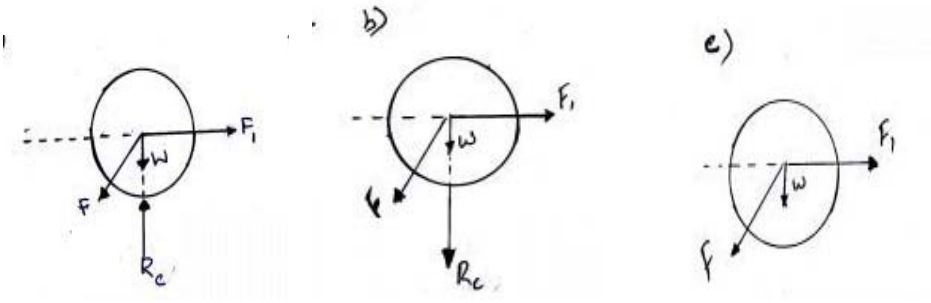
1. In mechanics, a particle is said to have _____
   a. Mass and requires space to occupy
   b. No mass and requires space to occupy
   c. Mass and requires no space to occupy
   d. None of these Ans: C

2. Find the magnitude of the two forces, such that if they act at right angles, their resultant is √10 N. But if they act at 60°, their resultant is √13 N.
   a) 3N, 1N
   b) 4N, 2N
   c) 2N, 1N
   d) None of the these Ans: A

3. A roller of weight 'W' that lies on ground is being pulled by a force 'F_1'. It is kept in equilibrium by another force 'F'as shown in figure. The free body diagram is



Ans: A



d) None of these

4. When a force **F** is defined in three-dimensional space by its magnitude *f* and two points *M* and *N* on its line of action then the scalar component of the force '**F**' along 'x' axis is given by (d_x – scalar component of vector MN & d – distance from M to N)

   a. $(fd) / d_x$ b. $(fd_x) / d$ c. $d_x / (fd)$ d. $d / (fd_x)$ Ans: B

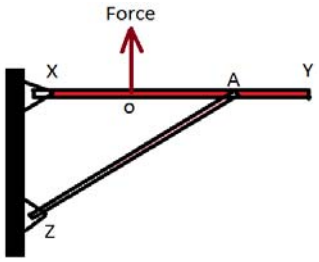
5. The number of independent equations to be satisfied for static equilibrium of a plane structure is

   a) 1 b)2 c) 3 d) 6 Ans: C

6. Consider a joint of a truss where three members are connected and there is no external load or support at that joint. If two of those members are collinear, then the third member is a _____ force member.

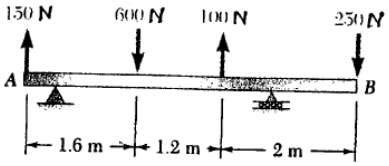
   a. Two b. Four c. Zero d. Five Ans: C

7. Identify the three force members from the figure below:



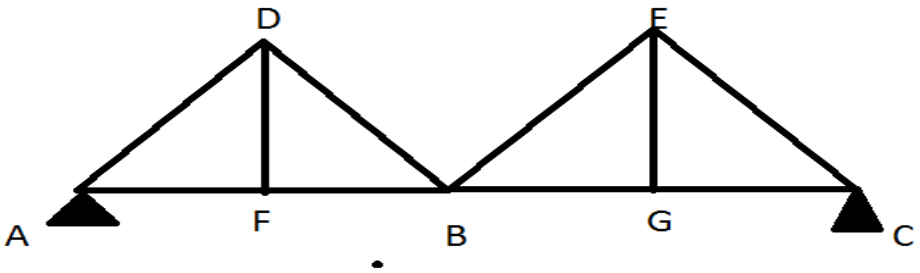
   a. XY b. ZA c. Both XY and ZA d. None of these Ans: A

8. What will be the magnitude of force and moment, after reducing it into a single force and couple at A?



   a) 600 N and 1880 Nm Ans: A
   b) 500 N and 940 Nm
   c) 600 N and 940 Nm
   d) 500 N and 1880 Nm

9. Identify the zero force members in the truss shown below



   a. AB,BC b. DF,EG c. AD,BE d. DB,BE Ans: B

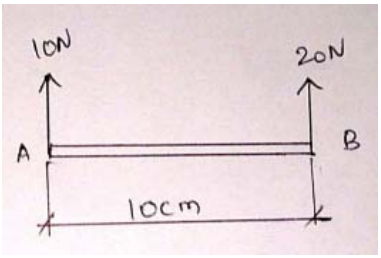
10. The truss members are usually long and slender & can withstand large axial loads but can't resist _____
    a. Moments b. Lateral Loads c. Both Moments & lateral loads

Ans: C

11. Rigid body is defined as a body which have _____
    a. Mass and dimensions.
    b. No deformation when force is applied
    c. Deformation when force is applied
    d. Both (a) and (b) Ans: D

12. Find the magnitude of the two forces, such that if they act at right angles, their resultant is √10 N. But if they act at 60°, their resultant is √13 N.
    e) 3N, 1N
    f) 4N, 2N
    g) 2N, 1N
    h) None of the these Ans: A

13. From the given diagram, the location of the resultant force with respect to point A is_____ cm



    (a) 3.3 (b) 6.6 (c) 7.2 (d) 2.8 Ans: B

14. A couple is formed by two forces having
    a) Same magnitude and opposite direction
    b) Same magnitude and different line of action
    c) Same magnitude, direction and parallel line of action
    d) Opposite direction , same magnitude and parallel line of action Ans: D

15. The number of independent equations to be satisfied for static equilibrium of a plane structure is
    b) 1 b)2 c) 3 d) 6 Ans: C

16. Degree of static indeterminacy of a rigid jointed plane frame having 18 members, 3 reaction components and 10 joints is

a) 2 b) 3 c) 1 d) 8 Ans: C

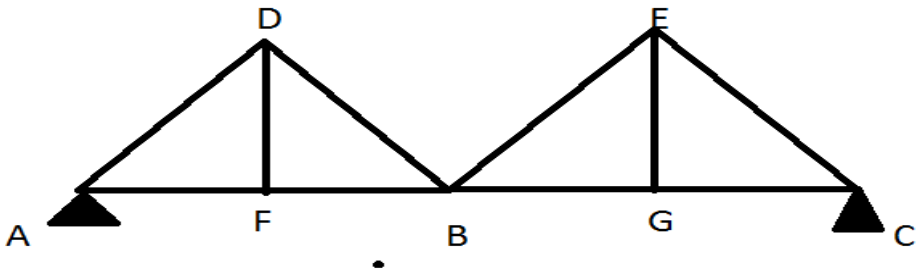
17. Find the resultant of two forces equal to 50N and 30N acting at an angle of 60°.

a) 50N b) 70N c) 60N d) 80N Ans: B

18. For a fixed support, there are___ reaction components.

a. 1 b. 2 c. 3 d. 4 Ans: C

19. Identify the zero force members in the truss shown below

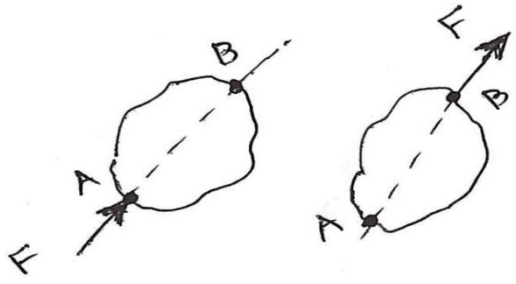


b. AB,BC b. DF,EG c. AD,BE d. DB,BE Ans: B

20. An ideal truss is an assembly of _____ Members.

a. Zero force b. Two force c. Three force d. Four force Ans: B

21. The following sketch refers to '_____'.

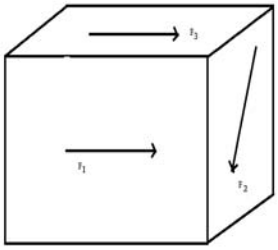


a. Principle of force system
b. Principle of moment system
c. Principle of transmissibility Ans: C
d. Both principles of force & moment systems.

22. In Mechanics, which of the following is expressed as a scalar?

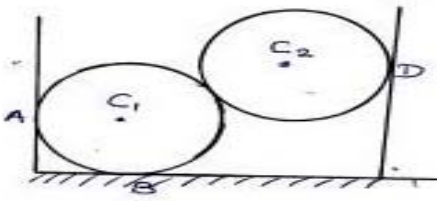
a. Mass b. Volume c. Force d Both mass & volume Ans: D

23. What type of force is acting in the following figure?

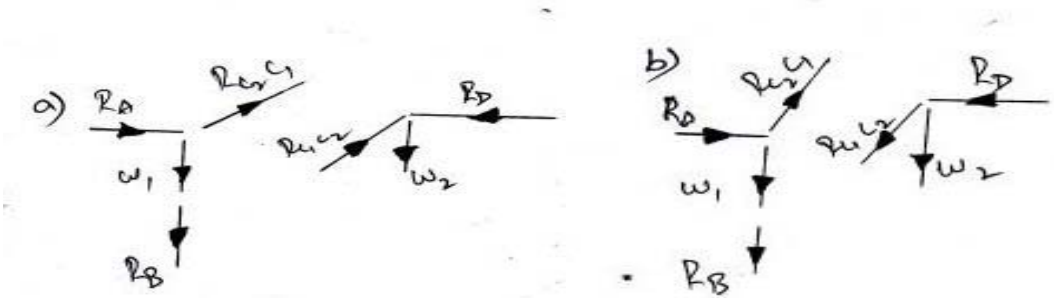


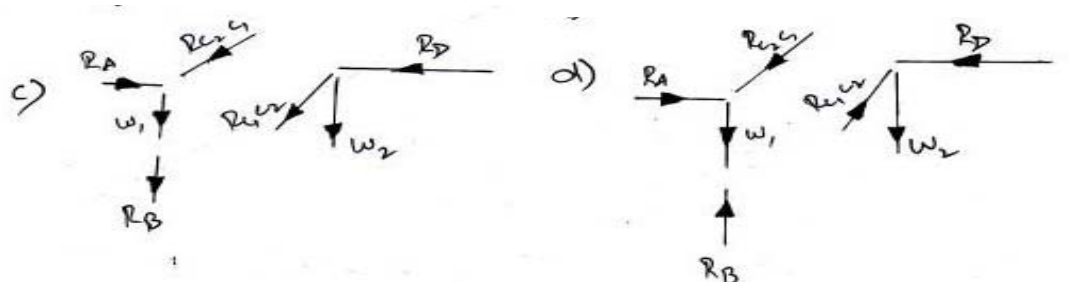
a) Coplanar , Non – concurrent
b) Non – coplanar, Non – concurrent
c) Non – coplanar, concurrent
d) coplanar, concurrent Ans: B

24. Two balls weighing W_1 N and W_2 N in a trough as shown in figure. The free body diagram is



Ans: D





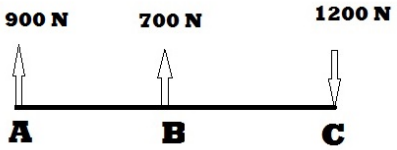
25. Find the resultant of two forces equal to 50N and 30N acting at an angle of 60°.

a) 50N b) 70N c) 60N d) 80N Ans: B

26. The vector AC passing through A (-1, 0, 2) & C (-1,3,-2) is

a. -2i + 3j b. 3j – 4k c. 3i + 2j d. 4j – 2k Ans: B

27. If AB = 5 m; BC = 5 m, what will be the magnitude of force and moment, after reducing it into a single force and couple at A



a) 400N and 7500 Nm b) 400N and 8500 Nm
b) 500N and 8500 Nm d) 500N and 7500 Nm Ans: B

28. The truss members are usually long and slender & can withstand large axial loads but can't resist _____

b. Moments b. Lateral Loads c. Both Moments & lateral loads

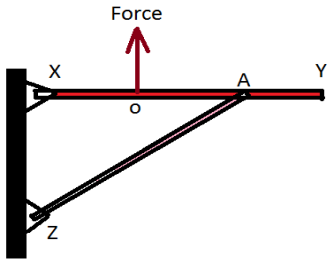
Ans: C

29. A over rigid frame is formed if it satisfies _____
(Where m – no. of members & j – no. of joints)

a. $m > 2j - 3$ b. $m = 2j - 3$ c. $m < 2j - 3$ d. None of these

Ans: A

30. Identify the two force members from the figure below:



a. XY b. ZA c. Both XY and ZA d. None of these Ans: B

1. In the method of sections, the sectioned portion of the truss is in equilibrium under the action of non-concurrent system of forces.

a. True b. false **Ans: A**

2. The force of friction between two bodies in contact

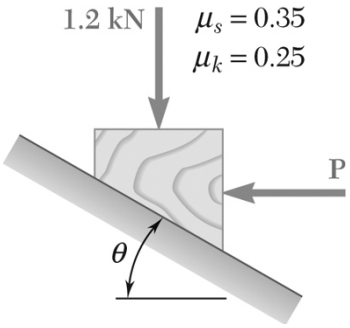
A. Depends upon their area of the contact

B. Depends upon the relative velocity between them

C. is always normal to the surface of the contact

D. Depends on both the area of contact and relative velocity. **Ans: C**

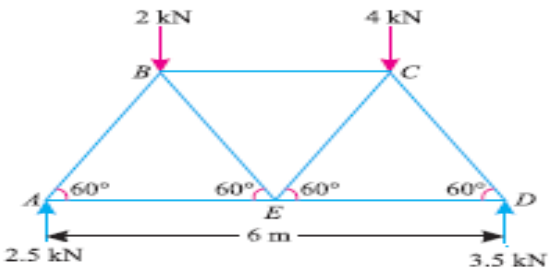
3. Determine the magnitude of the frictional force when θ = 25° and P = 750N



A. 172.6N B. 491.2N C. 750N D. 211.4N **Ans: A**

4. For the truss shown, find the force in the member AB and mention its nature.

(C- Compression and T – Tension)



A. 2.887KN (T) B. 2.887KN (C) C. 1.44KN (T) D. 1.44KN (C) **Ans: B**

5. Whenever a body lying on a horizontal or an inclined surface is in equilibrium, its weight acts _____ through its centre of gravity.

A. Vertically upwards B. Parallel to the inclined surface towards right

C. Vertically downwards D. Parallel to the inclined surface towards Left **Ans: C**

6. A 200Kg automobile runs on a road with diameter of the tyre as 1000mm. If the coefficient of rolling friction between the tyre and the road is 0.03, find its coefficient of rolling resistance.

A. 30mm B. 15mm C. 20mm D. 60mm **Ans: B**

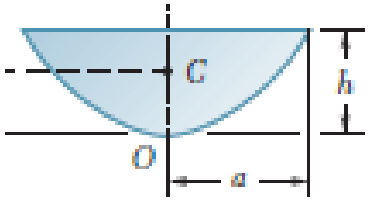
7. A rope is wound round thrice a post and it has to support a load of 10000N at one end. The coefficient of friction is 0.3 Find the force to be applied at the other end of the rope to prevent slip.

A. 50N B. 65N C. 20N D. 35N **Ans: D**

8. If the centriod of an area is located on a coordinate axis then the first moment of an area with respect to that axis is _____

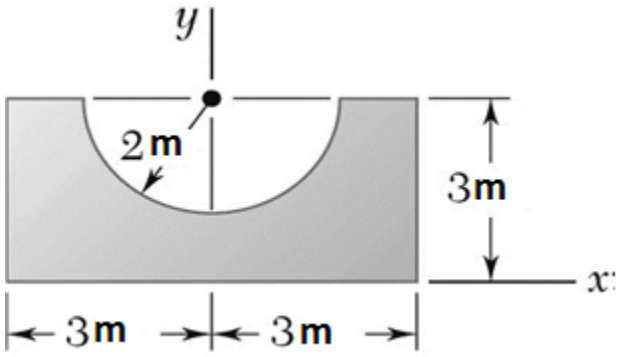
A. $\bar{x}A$ B.Zero C. $\bar{y}A$ D. $\int \bar{y}\, dA$ **Ans: B**

9. The centre of gravity for the parabolic area as shown is



A. 3a/4, 3h/5 B. 3h/5, 3a/4 C. 3h/5, 0 D. 0, 3h/5 **Ans: D**

10. Locate the centriod for the semicircular element as shown in the figure.



A. (0, 2.151) B. (3, 2.151) C. (3, 1) D. (0, 1) **Ans: A**

11) In methods of section, the section line should not pass through more than_____members

A.1 B.2 C.3 D.5 Answer: C 3

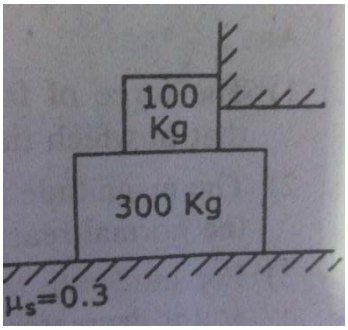
12) The force of friction between two bodies in contact _____

(a) Depends upon contact area,(b) depends on relative velocity,(c)is always normal to the contact surface,(d) all of the above. Answer: c) is always normal to the contact surface,

13) The magnitude of the friction between two bodies in contact depends upon the roughness of the_____

(a) Upper body, (b) lower body, (c) both bodies, (d) none. Answer: c) both bodies

4) In the given figure, if the coefficient of friction between all the surface is 0.3,what is the horizontal force required to move the 300kg block in right side.



a.882.9N b. 850.6N c. 912.5N d. 989.3N Answer: a.882.9N

5. Centroid is the term referred to.

a. One and two dimensional objects
b. Three dimensional objects.
c. One dimensional object.
d. None of these. Answer: A.

6. Static friction is always _____ dynamic friction.

A. equal to

B. less than

C. greater than

Answer c

7.Tangent of angle of friction is equal to

A.kinetic friction

B.limiting friction

C.angle of repose

D.coefficient of friction ANSWER : D. coefficient of friction

8.The point, through which the whole weight of the body acts, irrespective of its position, is known as

A.centre of percussion

B.moment of inertia

C.centre of gravity

D.centre of mass Answer: C.centre of gravity

9.The centre of gravity of a semi-circle lies at a distance of _____ from its base measured along the vertical radius.

A.8r/3

B.3r/8

C.3r/4π

D.4r/3π Answer: D.4r/3π

10.A body of weight W is required to move up on rough inclined plane whose angle of inclination with the horizontal is α. The effort applied parallel to the plane is given by(where μ = tanφ = Coefficient of friction between the plane and the body.)

A.P = W tanα

B.P = W (cosα + μsinα)

C.P = W tan(α + φ)

D.P = W (sinα + μcosα) Answer: D.P = W (sinα + μcosα)

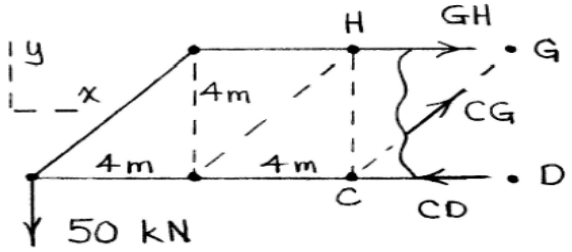
1. A 10kg steel wheel has a radius of 100mm and rests on an inclined plane made of wood. If θ is increased so that the wheel begins to roll down the incline with constant velocity, when θ = 1.2˚ its coefficient of rolling resistance is
   a. **2.09 mm** c. 3.20 mm
   b. 1.20 mm d. 0 ~~mm~~

2. Dynamic friction as compared to static friction is
   a. Same c. **less**
   b. More d. unpredictable

3. Coulomb friction is the friction between
   a. Bodies having relative motion
   b. Two dry surfaces
   c. Solids and liquids
   d. Two Wet Surfaces

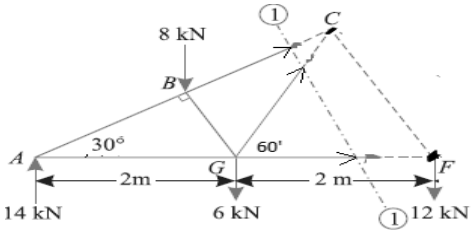
4. The angle at which the body over an inclined plane tends to move down is known as
   a. angle of Static friction
   b. angle of repose
   c. angle of kinetic friction
   d. Angle of inclined Plane

5. What is the force acting on the member CG of the given truss (Note: Distance between CD=4 m)



a. CG=150kN(T)
c. CG=70.7kN(C)
b. CG=150kN(C)
d. **CG=70.7kN(T)**

6. What is the force acting on the member BC of the truss shown in the figure



a. BC=27.7kN(C)
c. BC=24kN(T)
b. BC=27.7kN(T)
d**. BC=24kN(C)**

7. The point where the whole weight of the body is assumed to act is known as
   a. Centroid
   b. Centre of gravity
   c. Mass moment of inertia
   d. Polar moment of inertia

8. The centre of gravity of aright circular solid cone of height h lies at _____distance from the base
   a. h/2
   b. h/6
   c. h/4
   d. h/3

9. A 200 kg of mass is lifted by a rope, rolling on a cylinder of 300 mm diameter. If the coefficient of friction is 0.3 and the contact angle is 180̊, the force required to lift the mass is
   a. 764.5 N
   b. 500.5 N
   c. 200.4 N
   d. 300.5 N

10. A circular hole of radius (r) is punched out from a circular disc of radius (2r) in such a way that the diagonal of the punched hole is the radius of the disc. The centre of gravity of the section lies at
    a. Centre of the hole
    b. Centre of the disc
    c. Somewhere in the hole
    d. Somewhere in the disc

1. The friction experienced by a body, when in motion, is known as_____
    a. Rolling friction b. Dynamic friction
    c. Limiting friction d. Static friction **Ans: (b)**

2. The force required to move the body up the plane will be minimum if it makes an angle with the inclined plane _____ the angle of friction.
    a. equal to
    b. less than
    c. greater than **Ans: (a)**
    d. less than or equal to

3. Static friction is always _____ dynamic friction.
    a. equal to
    b. less than
    c. greater than
    d. less than or equal to **Ans: (C)**

4. A body will begin to move down an inclined plane if the angle of inclination of the plane is _____ the angle of friction.
    a. equal to
    b. less than **Ans: (C)**
    c. greater than
    d. less than or equal to

5. The maximum frictional force, which comes into play, when a body just begins to slide over the surface of the other body, is known as_____
    a. static friction
    b. dynamic friction
    c. limiting friction
    d. coefficient of friction

    Ans: (C)

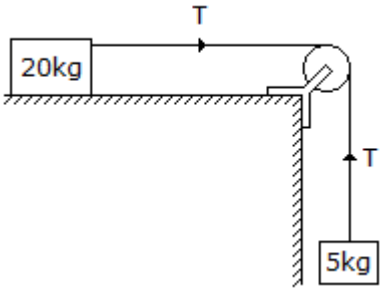
6. The point, through which the whole weight of the body acts, irrespective of its position, is known as_____
   a. moment of inertia
   b. centre of gravity
   c. centre of percussion
   d. centre of mass

Ans: (b)

7. The static friction
   a. bears a different ratio to the normal reaction between the two surfaces
   b. is dependent of the area of contact between the two surfaces
   c. is independent of the area of contact between the two surfaces and always acts in a direction, opposite to that in which the body tends to move
   d. is dependent of the area of contact between the two surfaces and always acts in a direction, opposite to that in which the body tends to move

Ans: (c)

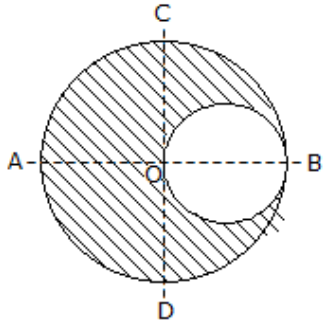
8. A block of mass 20 kg lying on a rough horizontal plane is connected by a light string passing over a smooth pulley to another mass 5 kg, which can move freely in the Vertical direction, as shown in the below figure. The tensions in the string will be _____ with the increase in coefficient of friction.



   a. increased
   b. decreased
   c. remaining same
   d. Zero

Ans: (a)

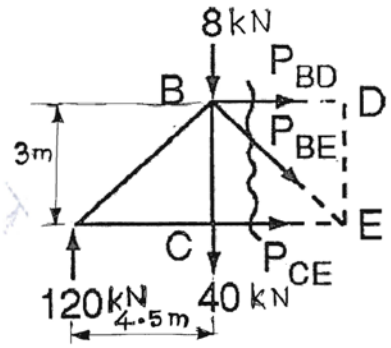
9. A circular hole of 50 mm diameter is cut out from a circular disc of 100 mm diameter as shown in the below figure. The centre of gravity of the section will lie



a. in the shaded area
b. in the hole
c. at 'O'
d. outside the big circle

Ans: (a)

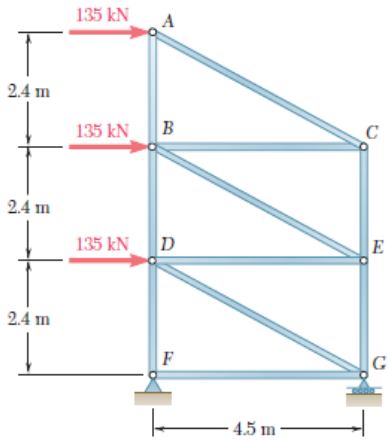
10. With reference to FBD shown below, Force (P_{CE}) in member CE is_____



a. 180kN (Compression)
b. 180kN (Tension)
c. 80kN (Tension)
d. 80kN (Compression)

Ans: (b)

1. The force in member EG is:



a. 459(Tension)
b. 459(Compression)
c. 216 (Tension)
d. 216 (Compression)

Ans: d, 216 (Compression)

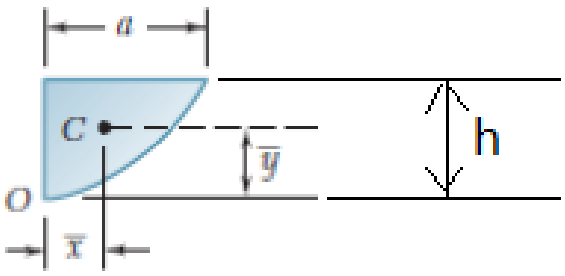
2. Dry friction is also known as:
   a. Fluid friction
   b. Coulomb friction
   c. Coulomb fluid friction
   d. Viscoelastic friction

Ans: (b)

3. if the centroid of an area is located on a coordinate axis, the first moment of the area with respect to that axis
   a. Is Zero.
   b. Is One
   c. Is Infinity
   d. Cannot be determined

Ans: (a)

4. In a semi-parabolic area shown the centroid would be:



a. $\frac{3a}{8}, \frac{3h}{8}$

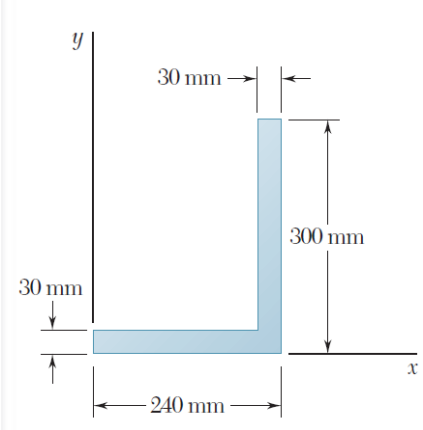
b. $\frac{3h}{8}, \frac{3a}{8}$

c. $\frac{4a}{3\pi}, 0$

d. $\frac{3h}{8}, \frac{4a}{3\pi}$

Ans: (a)

5. Locate the centroid of the plane area



a. 175.6 mm, 94.4mm
b. 182.6 mm,94.4mm
c. 94.4mm,150mm
d. 15mm,175.6mm

Ans: a

6. Journal bearings are used to provide
   a. Lateral support to rotating shafts and axles
   b. Axial support to rotating shafts and axles
   c. Tangential support to rotating shafts and axles
   d. Axial and tangential support to rotating shafts and axles.

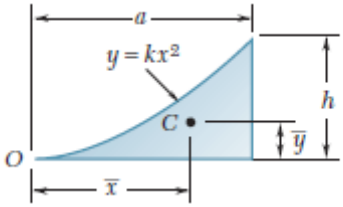
   Ans: (a)

7. Which of the following statement is correct?
   a. In journal bearings , the reaction does not pass through the centre of the shaft or axle which is being supported.

b. In journal bearings the magnitude of couple required to overcome frictional resistance is equal to the sum of the moments of the kinetic friction forces exerted on the elements of the end of the shaft.
c. In journal bearings , the reaction passes through the centre of the shaft or axle which is being supported.
d. In thrust bearings the magnitude of couple required to overcome frictional resistance is equal to the sum of the potential energies.

Ans: (a)

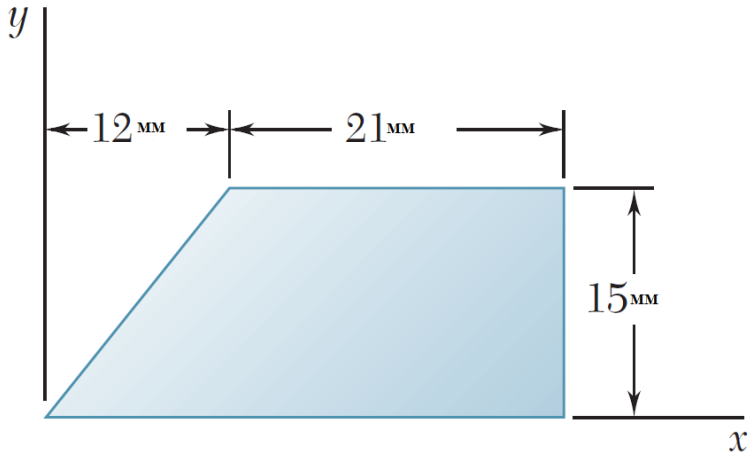
8. In a parabolic spandrel shown, the centroids would be:



a. $\frac{3a}{4}, \frac{3h}{10}$
b. $\frac{3h}{4}, \frac{3a}{10}$
c. $\frac{ah}{4}, \frac{3h}{10}$
d. $\frac{ah}{4}, \frac{3ah}{10}$

Ans: (a)

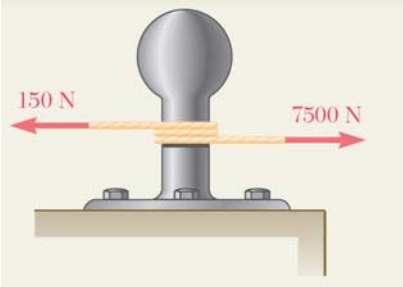
9. Locate the centroid of the plane area shown in figure:



a. 19.28 mm, 6.94 mm
b. 5 mm , 16.5 mm
c. 19.28 mm, 16.5 mm
d. 6.94 mm, 4 mm

Ans: a

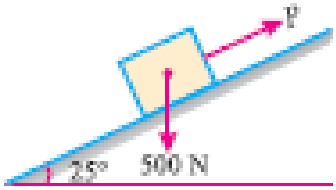
10. A hawser thrown from a ship to a pier is wrapped two full turns around a bollards. The tension in the hawser is 7500 N; by exerting a force of 150N on its free end , a dockworker can just keep the hawser from slipping. Determine the co-efficient of friction between the hawser and bollard.



a. 0.311
b. 0.121
c. 1
d. Zero

Ans: a

1. For the diagram shown, determine the minimum value of the effort 'P' required for which the equilibrium can exist if the angle of friction is 20°?



A. 35.62N B. 46.4 N C. 376.23N D. 465.6N **Ans: B**

2. The maximum value of frictional force which comes into play, when a body just begins to slide over the surface of the other body is known as _____

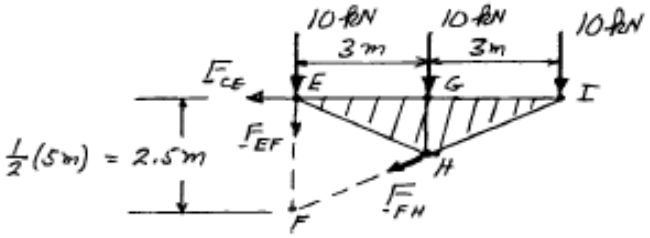
A. Static Friction B. Dynamic Friction

C. Kinetic Friction D. Limiting Friction **Ans: D**

3. In the method of sections, the section must pass through not more than ____ members in the truss.

A. 3 B. 2 C. 1 D. 4 **Ans: A**

4. For the Free body diagram of the truss shown, find the force F_{CE}



A. 30KN B. 36KN C. 20KN D. 12.5KN **Ans: B**

5. A body of weight 'W' on an inclined plane of angle 'α' is being pulled by horizontal force P the motion impends when P = (where ϕ – Angle of Friction)

A. W tan α B. W tan (α-ϕ) C. W tan (α+ϕ) D. W tan ϕ **Ans: C**

6. The diameter of wheel of a vehicle is 600mm. The weight is 1000KN. The coefficient of rolling friction between the wheel and ground is 0.35mm. Find the force required for constant speed.

A. 0.75KN B. 1.5 KN C. 0.62KN D. 0.58KN **Ans: D**

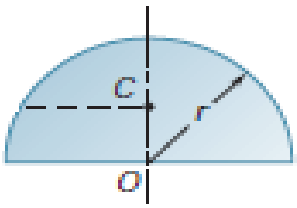
7. If the pulley has groove with a groove angle 'α' then the ratio of tensions on the belt is
(θ = Angle of wrap & μ = coefficient of friction between contact surfaces)

A. $e^{\mu\theta}$ B. $e^{\mu\theta \operatorname{cosec}(\alpha/2)}$ C. $e^{\mu\theta \operatorname{cosec}\alpha}$ D. $e^{\mu\theta \sin(\alpha/2)}$ **Ans: B**

8. The first moment of an area with respect to 'X' axis is _____

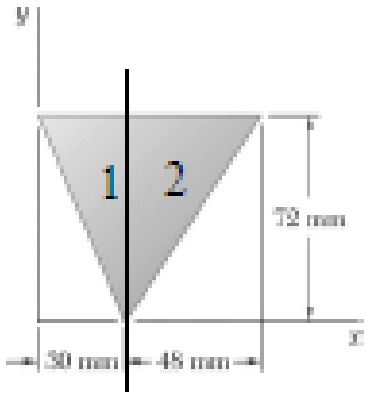
A. $\bar{X}A$ B. $\int XdA$ C. $\bar{Y}A$ D. $\int \bar{Y}\,dA$ **Ans: C**

9. The centre of gravity for the semicircular area as shown is



A. 0, 4r/3Π B. 4r/3Π, 0 C. 4r/3Π, 4r/3Π D. 0,2r/Π **Ans: A**

10. Locate the centriod in 'mm' for the element 1 as shown in the figure.



A. (20, 36) B. (20, 48) C. (36, 48) D. (10, 48) **Ans: B**

1. The forces of action and reaction between bodies in contact have the same magnitude, same line of action, and opposite sense.
   a.true b.False

2. In practice, the portion of the truss to be utilized is obtained after by passing a section through _____ members of the truss.
   a.two b.three c.four d.one

3. The forces applied to the body do not tend to move it along the surface of contact; there is

   a.static friction b.kinetic friction c.fluid friction d.no friction

4. _____ depend strongly on nature of the surfaces in contact.
   a. μ_s b. μ_k c.both μ_s and μ_k

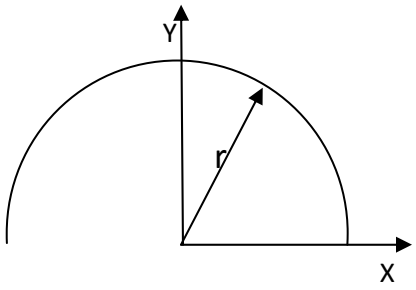
5. For metal on leather, what is the approximate value of coefficient of static friction for dry surface?
   a.0.15-0.6 b.0.2-0.6 c.0.3-0.6 d.0.4-0.7

6. The angle of static friction (φ_s) is _____
   a.$F_m N$ b. F_m/N c. N/F_m d. R/F_m
   where F_m-friction force, N-normal reaction, R-resultant of N and F_m

7. What is the unit of coefficient of rolling resistance?
   A.no unit b.Newton c.Newton/meter d.millimeters

8. What is the centroid of quarter- circular area having a radius of r
   a.(0,0) b. (4r/3π,0) c. (0,4r/3π) d. (4r/3π, 4r/3π)

9. What is the centroid of semicircular wire as shown in fig?



   a.(0,0) b.(2r/π,0) c. (2r/π,2r/π) d. (0,2r/π)

10. The value of the angle of inclination corresponding to impending motion is called the _____
    a.angle of friction b.angle of repose

1. Whenever a body lying on a horizontal or an inclined surface is in equilibrium, its weight acts _____ through its centre of gravity.
   A. Vertically upwards B. Parallel to the inclined surface towards right
   C. Vertically downwards D. Parallel to the inclined surface towards Left **Ans: C**

2. The frictional force is ____ of the area of contact but ___ on the degree of roughness between the two bodies taken under consideration.
(a)Dependent, Independent (b) Independent, Independent (c) Independent, Dependent
(d) Dependent, Dependent **Ans: C**

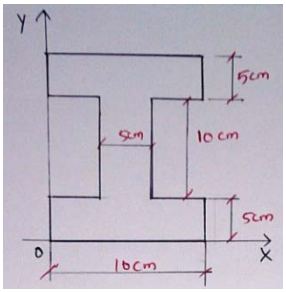
3. The ratio of limiting friction to the normal reaction is known as ___
   (a)Coefficient of rolling resistance(b)Coefficient of resistance (c) Coefficient of friction
   Ans: C

4. The state of motion of body which is just about to move or slide is called as ____ motion(a)Impending(b)Rolling(c)Sliding(d)Limiting **Ans: A**

5. The angle of inclined plane at which the body tends to slide down is known as ___(a)Angle of static friction(b)Angle of repose(c)Angle of limiting friction(d)Angle of dynamic friction **Ans: B**

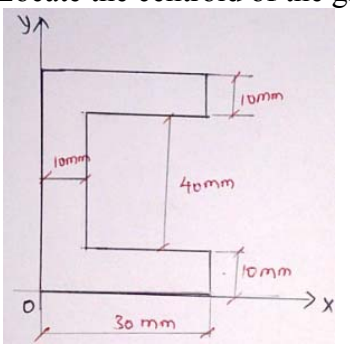
6. A wheel of weight 2000N and diameter 300mm is required to move on a horizontal surface. if the Coefficient of rolling resistance is 15mm .Calculate the force required in Newton to roll the wheel without slipping.(a)150(b)120(c)180(d)200 **Ans: D**

7. Locate the centroid of the given section below in cm



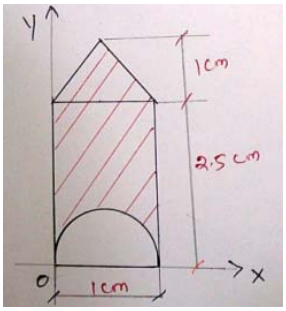
(a)5,10 (b)10,5 (c)11,6 (d)6,11 **Ans; A**

8. Locate the centroid of the given section below in mm



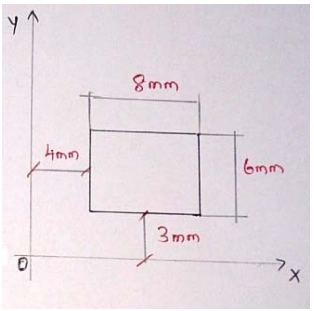
(a)10,8(b)11,30(c)30,11(d)8,10 **Ans: B**

9. Locate the centre of gravity of a bullet of 1cm diameter with cone in the front end, a hemisphere cut from the back as shown below. Assume the material to be homogenous



(a) 0.5, 1.59 (b)0.5,2.59 (c)0.5,1.1 (d)0.5,10 **Ans: A**

10. The centroid of the given block in mm are



(a)6,8 (b)8,6 (c)4,3 (d)3,4 **Ans: B**

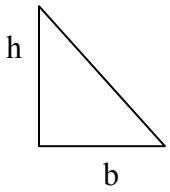
1. Three turns of rope around a horizontal post will hold a 300 kg mass with a pull of 30 N. The coefficient of friction between the rope and the post is
   a. 0.15
   b. 0.25
   c. 0.35
   d. 0.45
2. Two equal pulleys of diameter 75 mm are connected by a belt. The tension in the tight side of the belt is 200N. If the coefficient of friction is 0.25, the tension in slack side of the belt, when the belt is about to slip is
   a. 91
   b. 100
   c. 80
   d. 71

3. The disk of weight W and radius R is held in equilibrium on the circular surface by a couple M. If the coefficient of static friction between the disk and the surface is μ, then the largest value of M can have without causing the disk to slip, is
   a. $M = \frac{\mu_s RW}{\sqrt{1+\mu_s^2}}$
   b. $M = \frac{RW}{\mu_s\sqrt{1+\mu_s^2}}$
   c. $M = \frac{\mu_s W}{R\sqrt{1-\mu_s^2}}$
   d. $M = \frac{\mu_s RW}{\sqrt{1-\mu_s^2}}$
4. The first moment of an area with respect to axis of symmetry is
   a. Unity
   b. Zero
   c. Constant
   d. Non zero value

5. If an area posses two lines of symmetry, its centroid lies at
   a. Anywhere in the plane area
   b. Point of intersection of lines of symmetry
   c. Anywhere at the lines of symmetry
   d. Cannot say

6. The concept of the first moment of an area is used to locate the _____
   a. Centre of gravity
   b. Moment of inertia
   c. Centroid
   d. Centre of the object

7. Centroid of a triangular section shown in figure having breath of b and height of h is
   a. (b/2,h/2)
   b. (b/2,h/3)
   c. (b/3,h/3)
   d. (b/3,h/2)



8. Centroid of a straight line lies at
   a. L
   b. L/3
   c. L/2
   d. L/4

9. For an object resting on an incline, the normal force is
   a. Less than the weight
   b. More than the weight
   c. Equal to the weight
   d. Cannot say

10. To solve a truss by method of section, the number of unknowns at a section should not be
    a. Less than 2
    b. Less than 3
    c. More than 2
    d. More than 3

1. The forces of action and reaction between bodies in contact have the same magnitude, same line of action, and opposite sense.
   a. True b.False

2. When two surfaces in contact, _____ will always develop if one attempts to move on the surface with respect to the other.
   a. normal force b.friction force c.compression force d.tensile force

3. The forces applied to the body do not tend to move it along the surface of contact; there is
   a. static friction b.kinetic friction c.fluid friction d.no friction

4. The angle of static friction (φ_s) is _____
   a. F_mN b. F_m/N c. N/F_m d. R/F_m
   Where F_m-friction force, N-normal reaction, R-resultant of N and F_m

5. What is the unit of coefficient of rolling resistance?
   a. No unit b.N c.N/m d.m

6. What is the centroid of a quarter- circular area having radius r
   a. (0,0) b. $(4r/3\pi,0)$ c. $(0,4r/3\pi)$ d. $(4r/3\pi, 4r/3\pi)$
7. The centroid of parabolic area is_____, where h is the height of the parabola from the vertex.
   a. (0,0) b.(0,3h/5) c.(3h/5,0) d. (3h/5, 3h/5)
8. In method of section, the cutting line should pass through a maximum of _____ members in a truss.
   a) 3 b) 4 c) 2 d) 5
9. The value of kinetic friction force will always be _____ maximum friction force (F_m)
   a) equal to b)greater than c) less than
10. If a 2D section is symmetric about only y axis, then (Q_y , Q_x - first moment of area)
    a) $Q_y = 0$ b) $Q_x = 0$ c) Both Q_y and Q_x d) $Q_y = Q_x$

1. The maximum frictional force which comes into play when a body just begins to slide over the surface of the other body is known as
   (a) Static friction (b) dynamic friction (c) limiting friction (d) coefficient of friction
   Ans: C

2 (1) The ratio of maximum frictional force and normal force is always a constant

(2) The coefficient of friction is dependent on area of contact

(3) Dynamic friction is always lesser than the limiting coefficient of static friction

Which of the following is true?

(a) 1 only
(b) 1&2
(c) 1&3
(d) 2 only **Ans: C**

3 The angle of inclination of the plane at which the body begins to move down the plane

Without any external force

(a) Angle of friction (b) angle of repose (c) angle of projection (d) friction angle **Ans: B**

4 The point through which the whole weight of the body acts, irrespective of its position is
(a) Moment of inertia (b) centre of gravity (c) centre of percussion (d) centre of mass Ans**: B**

5. The centre of gravity of a semi circle lies at a distance of _____ from its base measured along the vertical Axis

(a) 3r/8 (b) 4r/3π (c) 8r/π (d) 3r/π **Ans: B**

6. A block is sliding on a horizontal surface. The friction can be increased by

(a) by decreasing the mass of the block (b) by polishing the surface (c) decreasing the area of contact with the surface (d) by adding another block on the top **Ans: D**

7. Method of section is used to find out the forces in all the members in a truss

(a) True (b) False **Ans: B**

8. Which of the following statement is NOT True?

(a) Friction produces heat (b) Friction makes the things slow down (c) Friction can stop the Moving object (d) Friction is not useful **Ans: D**

9. A force of 98N is required to just start moving a body of 100kg over ice. The coefficient of static friction is

(a) 0.6 (b) 0.2 (c) 0.4 (d) 0.1 **Ans: D**

10. In method of section the section plane should pass through _____members in a truss

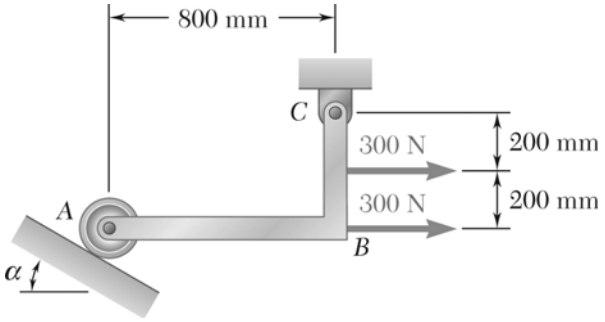
(a) Maximum 3 (b) maximum 4 (c) only one (d) maximum 5 **Ans: A**

Two Forces act an angle of 120°. The bigger force is of 40N and the resultant is perpendicular to the smaller one. Find the smaller force.
A. 25N
B. 20N
C. 15N
D. 30N
ANSWER: B

A pair of two equal and unlike parallel forces is known as a
A. Coplanar forces
B. Arm of a couple
C. Couple
D. Moment of a couple
ANSWER: C

A force 'F' of 500N forms angles of 60°, 45° and 120° respectively with the x, y and z axes. The components of the force in 'N' is given by
A. 250i+354j-250k
B. 250i-354j+250k
C. 433i+354j-433k
D. 433i-354j+433k
ANSWER: A

Determine the reactions at A when α = 30°



A. 225N↑
B. 365N↑
C. 225N↓
D. 365N↓
ANSWER: B

An object of weight 100N is kept in an inclined plane of 30° to the horizontal pushed by a horizontally applied force 'F'. If μ = 0.25, find the minimum magnitude of 'F'
A. 28.67N
B. 42.44N
C. 32.22N
D. 24.5N
ANSWER: A

A framed structure of a triangular shape is _____ frame.
A. Imperfect
B. Deficient

C. Redundant
D. Perfect
ANSWER: D

If m+r >2n (where m – no. of members, r – no. of reaction components and 2n – no.of independent equilibrium equations), then the truss is said to be
A. Determinate
B. Indeterminate
c. Partially constrained
d. Completely constrained
ANSWER: B

If the pulley has groove with a groove angle 'α' then the ratio of tensions on the belt is (θ = Angle of wrap & μ = coefficient of friction between contact surfaces)
A. $e^{\mu\theta}$
B. $e^{\mu\theta\text{cosec }(\alpha/2)}$
C. $e^{\mu\theta\text{cosec}\alpha}$
D. $e^{\mu\theta\sin(\alpha/2)}$
ANSWER:B

Find the centre of gravity of a channel section 100mm x 50mm x 15mm
A. X = 27.5mm
B. Y = 27.5mm
C. X = 17.8mm
D. Y = 17.8mm
ANSWER: C

The centre of gravity of an equilateral triangle with each side (a) is _____ from any of the three sides.
A. $(a\sqrt{3}) / 2$
B. $(a\sqrt{2}) / 3$
C. $a / 2\sqrt{3}$
D. $a/ 3\sqrt{2}$
ANSWER: C

The moment of inertia of a triangular section of base 'b' and height 'h'about an axis through its CG and parallel to the base is given by the relation
A. $bh^3/12$
B. $bh^3/24$
C. $bh^3/48$
D. $bh^3/36$
ANSWER: D

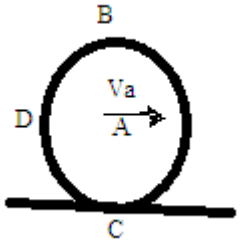
The mass moment of inertia of slender rod of mass 'm' and length 'l' about its longitudinal axis is
A. Zero
B. $ml^2/12$
C. $m^2l/12$
D. $ml^2/24$
ANSWER: A

A bus travels the 100kms between A and B at 50Kmph and then another 100kms between B and C at 70kmph. The average speed of the bus for the entire 200kms trip is
A. 60kmph
B. 75kmph
C. 44kmph
D. 58kmph
ANSWER: D
A particle starts from rest and moves along a straight line with an acceleration a = 3t+5. The velocity after 4 seconds is
A. 3 m/s
B. 44 m/s
C. 5 m/s
D. 32 m/s
ANSWER: B

A boat of mass 5000kg initially at rest is pull by a force of 30KN through a distance of 4m. Assuming that the resistance due to water is negligible, the velocity of the boat is
A. 4 m/s
B. 6 m/s
C. 7 m/s
D. 9 m/s
ANSWER: C

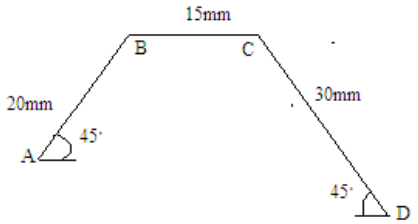
Two masses of 2kg and 5kg are moving with equal kinetic energies. The ratio of magnitudes of respective linear momenta is
A. 0.632
B. 0.457
C. 0.826
D. 0.238
ANSWER: A

A wheel of 0.4m diameter rolls on a plane without slipping at a speed of Va = 5 m/s as shown in fig. The speed of B is



A. 15 m/s
B. 2 m/s
C. 1 m/s
D. 10 m/s
ANSWER: D

The linkage ABCD shown below moves in a vertical plane, at the instant shown, crank AB has a clockwise angular velocity of 10 rad/s. Find the angular velocity of the link CD.

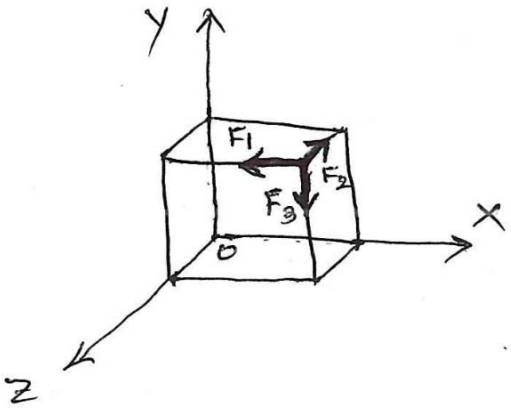


A. 18.8 rad/s
B. 6.6 rad/s
C. 5.4 rad/s
D. 2.6 rad/s
ANSWER: B

A ball is dropped from a height of 1m. If the coefficient of restitution between the surface and the ball is 0.65, the ball rebounds to a height of _____
A. 0.65m
B. 0.92m
C. 0.54m
D. 0.83m
ANSWER: A

Any general displacement of a rigid body can be represented by a continuation of translation and rotation motion, and this theorem is known as_____
A. D-Alembert's Theorem
B. Chasle's Theorem
C. Pappus-Guldinus theorem
D. Lame's Theorem
ANSWER: B

Name the type of force system shown in the below sketch.



A. Coplanar, Concurrent

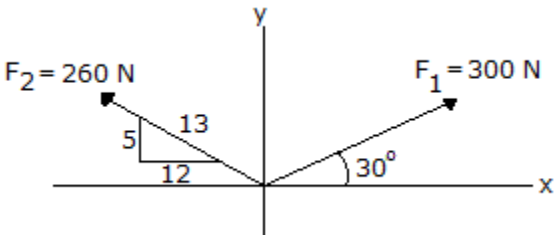
B. Non-coplanar, Collinear

C. Non-coplanar, Non-concurrent

D. Non-coplanar, Concurrent

ANSWER: D

Determine the magnitude and direction of the resultant force.



A. R = 251 N, θ= 85.5° CCW

B. R = 251 N, θ = 94.5° CCW

C. R = 421 N, θ= 67.7° CCW

D. R = 421 N, θ= 112.3° CCW

ANSWER: A

The principle of transmissibility of forces states that, when a force acts upon a body, its effect is

A. maximum, if it acts at the centre of gravity of the body

B. same at every point on its line of action

C. minimum, if it acts at the centre of gravity of the body

D. different at different points on its line of action

ANSWER: B

Varignon's theorem of moments states that if a number of co-planer forces acting on a particle are in equilibrium, then

A. their algebraic sum is zero

B. the algebraic sum of their moments about any point in their plane is zero

C. their lines of action are at equal distances

D. the algebraic sum of their moments about any point is equal to the moment of their resultant force about the same point.

ANSWER: D

A framed structure is imperfect, if the numbers of members are _____ (2j – 3), where j = number of joints in a frame.

A. equal to

B. either less than or greater than

C. greater than

D. less than

ANSWER: B

In determining 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

ANSWER: B

The coefficient of friction depends on

A. area of contact

B. shape of surfaces

C. strength of surfaces

D. nature of surface

ANSWER: D

Which one of the following statements is not correct?

A. the tangent of the angle of friction is equal to coefficient of friction

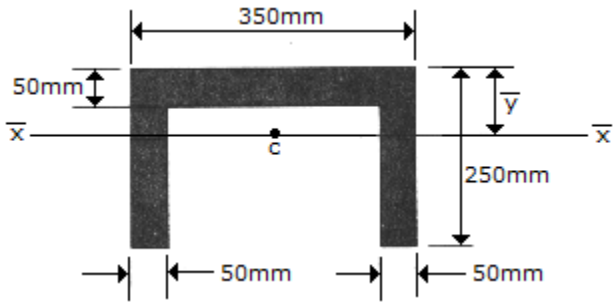
B. the angle of repose is equal to angle of friction

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

ANSWE: D

Determine the distance ȳ to the centroidal axis $\overline{x}\,\overline{x}$ of the beam's cross-sectional area.



A. ȳ= 112.3 mm

B. ȳ= 125.0 mm

C. ȳ= 100.0 mm

D. ȳ= 91.7 mm

ANSWER: D

The centre of gravity of a semi-circle is at a distance of _____ from its base when it is measured along the vertical radius.

A. 4r/ 3π

B. 3r/ 8

C. 8r/3

D. 3r/4π

ANSWER: A

The moment of inertia of a plane area about any axis parallel to the centroidal axis is

A. equal to the moment of inertia of the area about centroidal axis added to the area

B. equal to the moment of inertia of the area about centroidal axis added to the square of the area

C. equal to the moment of inertia of the area about centroidal axis added to the square of the perpendicular distance between the two parallel axes

D. equal to the moment of inertia of the area about centroidal axis added to the product of the area and square of the perpendicular distance between the two parallel axes

ANSWER: D

If the moment of inertia of the lamina with respect to x-axis is $1.3x10^6$ mm^4 and its area is 800 mm^2, then the radius of gyration about xx- axis is

A. 43.0 mm

B. 403 mm

C. 40.3 mm

D. 1625 mm

ANSWER: C

Which of the following statement is wrong in connection with projectiles?

A. The velocity with which a projectile is projected is known as the velocity of projection.

B. A path, traced by a projectile in the space, is known as projector.

C. The angle, with the horizontal, at which a projectile is projected, is known as angle of projection.

D. A path, traced by a projectile in the space, is known as trajectory.

ANSWER: B

A particle moves along a straight line such that distance 'x' transverse in't' seconds is given by $x = t^2 (t-4)$,

the acceleration of the particle will be given by the equation

(a) $3t^2 - t$

(b) $3t^2+2t$

(c) 6t - 8

(d) 6t - 4

ANSWER: C

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

ANSWER: A

Which of the following statement is correct?

A. The kinetic energy of a body before impact is more than the kinetic energy of a body after impact.

B. The kinetic energy of a body during impact remains constant.

C. The kinetic energy of a body before impact is equal to the kinetic energy of a body after impact.

D. The kinetic energy of a body before impact is less than the kinetic energy of a body after impact.

ANSWER: A

When a rigid body is subjected to either rectilinear or curvilinear translation, at any given instant all the points of the body move with

A. same velocity and different acceleration

B. different velocity and different acceleration

C. same velocity and same acceleration

D. different velocity and same acceleration

ANSWER: C

In case of uniform rotation of a rigid body

A. angular velocity is constant and angular acceleration is variable

B. angular velocity is constant and angular acceleration is zero

C. angular velocity is constant and angular acceleration is constant

D. angular velocity is variable and angular acceleration is variable

ANSWER: B

The motion of a disk rotation about a fixed point is given by relation $\theta = 2(1+t^2)$ where 'θ' is expressed in radians and 't' is in seconds. What is the angular velocity of the disk when t = 2 seconds?

A.10 rad/s

B. 6 rad/s

C. 4 rad/s

D. 8 rad/s

ANSWER: D

Center of percussion is

A. the point of centre of gravity

B. the point of meta centre

C. the point of application of the resultant of all the forces tending to cause a body to rotate about a certain axis

D. the point in a body about which it can rotate horizontally and oscillate under the influence of gravity.

ANSWER: C

Two forces acting at a point. The maximum resultant is 1000 N and minimum resultant is 200 N. Then the two forces are ____

a. 100, 200
b. 200, 400
c. 400, 600
d. 600, 800

ANS: C

Two forces acting at a point while making the angle of 120^0 with each other, if the resultant is perpendicular to the smaller force of magnitude 50 N, then the larger force is

a. 100 N
b. 200 N
c. 300 N
d. 400 N
Ans: a

The second moment of area about the centroidal axis is

a. Zero
b. Unity
c. Non zero value
d. Constant
ANS: C

For an object resting on an incline, the normal force is

e. Less than the weight
f. More than the weight
g. Equal to the weight
h. Cannot say
ANS: A

____ does not characterize the static friction but represent the condition of threshold of motion.

a. Static friction coefficient
b. dynamic friction coefficient
c. coefficient of rolling resistance
d. angle of contact
ANS: A

If an area posses two lines of symmetry, its centroid lies at

e. Anywhere in the plane area
f. Point of intersection of lines of symmetry
g. Anywhere at the lines of symmetry
h. Cannot say
ANS: B

The time variation of the position of a particle in rectilinear motion is given by $x=2t^3+t^2+2t$. If v is the velocity and a is the acceleration of the particle in consistent units, the motion is started with

a. v=0, a=0

b. v=2, a=0
c. v=0, a=2
d. v=2, a=2
ANS: D

A simple pendulum of length of 5 m, with a bob of mass 1 kg, is in simple harmonic motion. As it passes through its mean position, the bob has a speed of 5 m/s. The net force on the bob at mean position is

a. Zero
b. 2.5 N
c. 5 N
d. 25 N
ANS: A

The coefficient of restitution of a perfectly plastic impact is

a. 0
b. 1
c. 2
d. Infinity
ANS: A

A stone is thrown vertically upwards and reached the ground after 5 sec. The maximum height it has gone up is

a. 24.5 m
b. 30.3 m
c. 45 m
d. 40 m
ANS: B

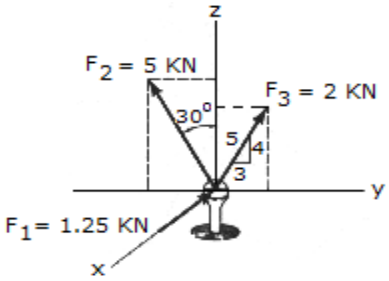
The stone is thrown with the velocity of 10 m/sec. When making the angle of 60^0 with the horizontal. The maximum height it has gone up is

a. 1.82 m
b. 2.82 m
c. 3.82 m
d. 4.82 m
ANS: C

The stone is thrown with the velocity of 10 m/sec. When making the angle of 60^0 with the horizontal. Time taken to reach the highest point is

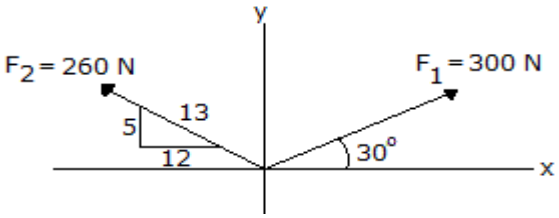
a. 0.88 sec
b. 0. 98 sec
c. 0.78 sec
d. 0.68 sec
ANS: A

The ball joint is subjected to the three forces shown. Find the magnitude of the resultant force.



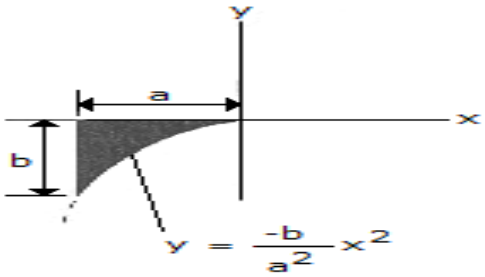
a. 5.30 kN
b. 5.74 kN
c. 5.03 kN
d. 6.20 kN
Ans: D

Determine the magnitude and direction of the resultant force.



a. R = 251 N, θ = 85.5° CCW
b. R = 251 N, θ = 94.5° CCW
c. R = 421 N, θ = 67.7° CCW
d. R = 421 N, θ = 112.3° CCW
Ans: A

Locate the centroid of the exparabolic segment of area



a. $\bar{x}$ = -4a/5, $\bar{y}$ = -b/4
b. $\bar{x}$ = -3a/4, $\bar{y}$ = -3b/10
c. $\bar{x}$ = -2a/3, $\bar{y}$ = -b/3
d. $\bar{x}$ = -5a/7, $\bar{y}$ = -3b/8
ANS: B

Which of the following statement is correct?

a. The kinetic energy of a body during impact remains constant.
b. The kinetic energy of a body before impact is equal to the kinetic energy of a body after impact.
c. The kinetic energy of a body before impact is less than the kinetic energy of a body after impact.
d. The kinetic energy of a body before impact is more the kinetic energy of a body after impact.
ANS: D

The motion of a particle round a fixed axis is

a. Translatory
b. Circular
c. Rotary
d. Translatory as well as rotary

ANS : B

Whenever a force acts on a body and the body undergoes a displacement, then

a. Power is being transmitted
b. Work is said to be done
c. Body has kinetic energy of translation
d. Body has potential energy of translation

ANS :B

The total momentum of a system of masses (i. e. moving bodies) in any one direction remains constant, unless acted upon by an external force in that direction. This statement is called

a. Newtons first law of motion
b. Newtons second law of motion
c. Principle of conservation of momentum
d. Principle of conservation of energy

ANS : C

The total energy possessed by a system of moving bodies

a. is constant at every instant
b. varies from point to point
c. is minimum in the start and maximum at the end
d. is maximum in the start and minimum at the end

ANS: A

Two equal forces act at a point. If the square of their resultant is equal to three times of their product then the angle between them is

a. 30^0
b. 45^0
c. 60^0
d. 90^0

Answer:C

What will be the moment of the force of a point which lies on the line of action of force

a. One
b. Zero
c. Product of force and the distance
d. constant

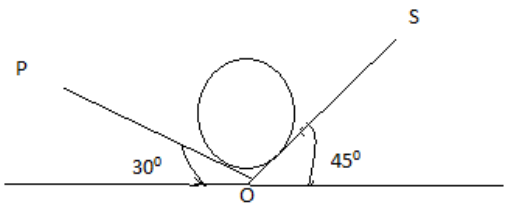
Answer: B

A force vector F = (3i + 4j – 6 k) N acts through the origin, then its magnitude is

a. 7.81N
b. 78.1 N
c. 13 N
d. 1 N

Answer: A

A ball is resting on two planes OP and OS inclined at 30^0 and 45^0 respectively as shown in figure. The reaction on plane OP will be



a. Greater than on OS
b. Less than on OS
c. Equal to that on OS
d. Will depend on weight and size of the ball

Answer: A

A framed structure is perfect if it contains members equal to (where n = number joints in the frame)

a. 2n-3
b. n-1
c. 2n-1
d. 3n-2

Answer:A

In which analysis, the part of the structure is treated as a free body in equilibrium under the action of external force.

a. Method of joint b. Method of section c. Both method of joint and method of section d. Triangle law Method

Answer:B

Rolling friction is

a. Equal to sliding friction
b. Greater than sliding friction
c. Less than sliding friction
d. May be equal to, less than or greater than depending on the situation

Answer:C

The ratio between the tension in the tight side and slack side of a flat belt drive increases

a. In direct proportional to the angle of lap
b. In direct proportional to the coefficient of friction
c. Exponentially as the angle of lap increases.
d. Proportional to the width of the belt.

Answer: C

The moment of inertia of a triangle about its base as compared to its centroidal axis parallel to base is

a. Same
b. Half.
c. One third
d. Thrice

Answer:D

_____is the force of attraction between a body and the earth and is proportional to the mass of the body.

a. Weight
b. Mass
c. Volume
d. Area

Answer: A

Moment of inertia of a semicircle about its centroidal axis is

a. $0.22r^3$
b. $0.11r^4$
c. $0.14r^4$
d. $0.2r^4$

Answer:B

A circular hole of radius (r) is punched out from a circular disc of radius (2r) in such a way that the diagonal of the punched hole is the radius of the disc. The centre of gravity of the section lies at

e. Centre of the hole
f. Centre of the disc
g. Somewhere in the hole
h. Somewhere in the disc

Answer:D

A stone initially at rest is dropped from a height of 100 m then the time the stone will take to reach the ground will be

a. 1 sec
b. 2.5 sec
c. 4.5 sec
d. 2 sec

Answer:C

A particle is moving along a circle with constant speed then the acceleration of the particle is

a. Along the circumference
b. Along the radius
c. Along the tangent
d. Zero

Answer:B

The rate of change of linear momentum of a body is directly proportional to

a. Applied force
b. Velocity
c. Acceleration
d. Displacement

Answer:A

Which of the following remains constant during flight of a projectile

a. Angle of projection
b. Horizontal component of velocity
c. Vertical component of velocity
d. Maximum velocity

Answer:B

A flywheel on a motor goes from rest to 104.71rad per sec in 6 sec. The number of revolutions made is nearly equal to

a. 25
b. 100
c. 50
d. 250

Answer:C

If the direction of motion of the mass centers of the colliding particles is along a line passing through the mass centers of the particle, then it is

a. Oblique impact
b. Central impact
c. Plastic impact
d. Elastic impact

Answer:B

A rigid body is having plane motion with point A having velocity V_a and point B having velocity V_b. If V_a and V_b are parallel and equal then the instantaneous centre will be

a. Infinity
b. Zero
c. Tangent
d. None

Answer:A

A bucket of cement of mass 40kg is tied to the end of a rope connected to a hoist. If the bucket lowered vertically downwards with a uniform acceleration of 1.4 m/s^2 then the tension in the rope will be

a. 392.4 N
b. 336.4 N
c. 408.4 N
d. 56 N

Answer:B

Non-coplanar concurrent forces are those forces which

A. do not meet at one point and their lines of action do not lie on the same plane

B. meet at one point and their lines of action also lie on the same plane

C. meet at one point, but their lines of action do not lie on the same plane

D. do not meet at one point, but their lines of action lie on the same plane Ans: C

According to the law of moments, if a number of coplanar forces acting on a particle are in equilibrium, then

A. their algebraic sum is zero

B. their lines of action are at equal distances

C. the algebraic sum of their moments about any point in their plane is zero

D. the algebraic sum of their moments about any point is equal to the moment of their resultant force about the same point. Ans: C

Varingon's theorem of moments states that if a number of coplanar forces acting on a particle are in equilibrium, then

A. their algebraic sum is zero

B. the algebraic sum of their moments about any point in their plane is zero

C. their lines of action are at equal distances

D. the algebraic sum of their moments about any point is equal to the moment of their resultant force about the same point. Ans: D

The centre of gravity a T-section 100 mm x 150 mm x 50 mm from its bottom is

A. 87.5mm

B. 75mm

C. 125mm

D. 50mm Ans: A

The friction experienced by a body, when in motion, is known as

A. rolling friction

B. dynamic friction

C. limiting friction

D. static friction Ans: B

A body of weight W is required to move up on rough inclined plane whose angle of inclination with the horizontal is α. The effort applied parallel to the plane is given by (where μ = tanϕ = Coefficient of friction between the plane and the body.)

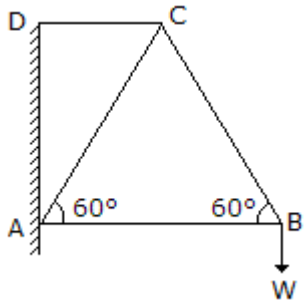
A. P = W tanα

B. P = W tan(α + ϕ)

C. P = W (sinα + μcosα)

D. P = W (cosα + μsinα) Ans: C

In a framed structure, as shown in the below figure, the force in the member *BC* is



A. *W*/3 (compression)

B. *W*/3 (tension)

C. 2*W*/3 (compression)

D. 2*W*/3 (tension)

ANS: D

A framed structure is imperfect, if the number of members are _____ (2j – 3).

A. less than

B. equal to

C. either less than or greater than

D. greater than Ans: C

The point, through which the whole weight of the body acts, irrespective of its position, is known as

A. centre of percussion

B. centre of gravity

C. moment of inertia

D. centre of mass Ans: B

The centre of gravity of a semi-circle lies at a distance of _____ from its base measured along the vertical radius.

A. 3r/ 8

B. 4r/ 3π

C. 8r/3

D. 3r/4π Ans: B

Which of the following statement is correct?

A. The kinetic energy of a body before impact is less than the kinetic energy of a body after impact.

B. The kinetic energy of a body before impact is more than the kinetic energy of a body after impact.

C. The kinetic energy of a body before impact is equal to the kinetic energy of a body after impact.

D. The kinetic energy of a body during impact remains constant. Ans:B

The time of flight (t) of a projectile on an upward inclined plane is(where u = Velocity of projection, α = Angle of projection, and β = Inclination of the plane with the horizontal.)

A. $t = \frac{g\cos\beta}{2u\sin(\alpha - \beta)}$

B. $t = \frac{2u\sin(\alpha - \beta)}{g\cos\beta}$

C. $t = \frac{g\cos\beta}{2u\sin(\alpha + \beta)}$

D. $t = \frac{2u\sin(\alpha + \beta)}{g\cos\beta}$

Ans: B

The total energy possessed by a system of moving bodies

A. is maximum in the start and minimum at the end

B. is minimum in the start and maximum at the end

C. varies from point to point

D. is constant at every instant ANS: D

The total momentum of a system of masses (i. e. moving bodies) in any one direction remains constant, unless acted upon by an external force in that direction. This statement is called

A. Newton's second law of motion

B. principle of conservation of energy

C. principle of conservation of momentum

D. Newton's first law of motion ANS C

The energy possessed by a body, for doing work by virtue of its position, is called

A. potential energy

B. kinetic energy

C. electrical energy

D. chemical energy Ans: A

The total motion possessed by a body, is called

A. impulsive force

B. mass

C. weight

D. momentum Ans: D

A flywheel is rotating at an angular velocity of 60 rad/s when the power supply is switched off, it takes 30s for the flywheel to come to rest. The angular acceleration α =

A. -2 rad/s^2
B. -4 rad/s^2
C. -2.81 rad/s^2
D. -2.81 rad/s. Ans: A

A disc has an initial angular velocity of 12 rad/s and a constant angular acceleration of 2.8 rad/s^2. Determine the number of revolution it has to make to reach an angular velocity of 16 rad/s.

A. 1.26
B. 4.24
C. 2.24
D. 3.18 Ans: D

A ball of mass 1 kg moving with a velocity of 2m/s impinges directly on a ball of mass 2 kg at rest. The first ball, after impinging, comes to rest. Calculate the coefficient of restitution.

A. 1.5
B. 0.75
C. 0.5
D. 1.25 Ans: C

A Ball moving with a velocity of 4 m/s, impinges on a fixed plane at an angle of 30°. If the Coefficient of restitution is 0.5, What is the direction of the body after impact.

A. 30°
B. 74°
C. 60°
D. 83° Ans: B

The moment about a given point *O* of the resultant of several concurrent forces is equal to the sum of the moments of the various forces about the same point *O* is called ___ theorem

A. Lame's

B. Varignon's

C. Parallel axis

D. Cosine.

ANSWER: B

A force of magnitude 40N is directed from A (1, 4) to B (6, 7).The component of force along X axis is ____N

A. 20.58

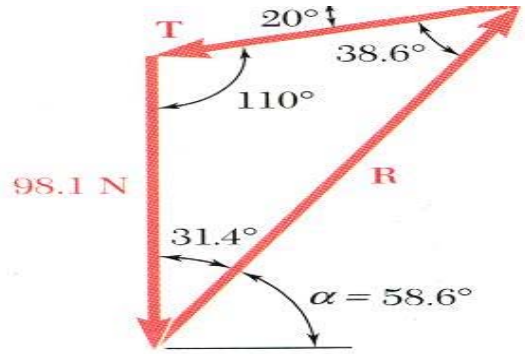
B. 34.30

C. 33.30

D. 24.30

ANSWER: B

The magnitude of the reaction force *R* for the given diagram as shown below is ___ N



o

A. 137.8

B.157.8

C. 147.8

D. 127.8

ANSWER: C.

If a number of coplanar concurrent forces are represented in magnitude and direction by the sides of a polygon taken in an order , then the resultant force is represented by the closing side of the polygon taken in the opposite order is ____law of forces

A. Triangle

B. Parallelogram

C. Polygon

D. Square

ANSWER: C

The essential condition of equilibrium for a structure to be a statically determinate is _____

A. ΣH=0, ΣV=0

B. ΣH=0, ΣV=0, ΣM=0

C. ΣH=0, ΣM=0

D. ΣV=0, ΣM=0

ANSWER: B

Coplanar, Non-Concurrent, and Non Parallel force system on a free body can be solved by____

A. Method of joints

B. Method of sections

C. Method of structure

D. Triangle law method

ANSWER: B

A wheel of weight 2000N and diameter 300mm is required to move on a horizontal surface. If the Coefficient of rolling resistance is 15mm .Calculate the force required in Newton to roll the wheel without slipping.

A. 200

B. 210

C. 300

D. 310

ANSWER: A

The angle of inclined plane at which the body tends to slide down is known as ___

A. Angle of repose

B. Angle of limiting friction

C. Angle of dynamic friction

D. Angle of static friction

ANSWER: A

The moment of inertia of a lamina about any axis in the plane of lamina is equal to the sum of the moment of inertia about parallel centroidal axes in the plane of lamina and the product of the area of the lamina and square of the distance between the two axes is ___ theorem

A. Parallel axes

B. Perpendicular axes

C. Parallelogram

D. Triangular

ANSWER: A

___ about an axis is defined as the distance from that axis at which all the elemental parts of the lamina would have to be placed such that the moment of inertia about the axis is same

A. Radius of gyration

B. Radius of curvature

C. Radius of bending

D. Radius of lamina

ANSWER: A

The ___ moment of inertia is the sum of the area moments of inertia about any two mutually perpendicular axes in its plane and intersecting on the polar axis

A. Polar

B. Area

C. Mass

D. Second

ANSWER: A

If a particle starts from a point and then if it returns to the same point, then ___is zero but __ is not zero

A. Average velocity, Average speed

B. Average speed, Average velocity

C. Average speed, Average Acceleration

D. Average Acceleration, Average velocity

ANSWER: A

A bus is moving with a velocity of 40m/s. The bus is brought to rest by applying brakes in 12 seconds, and then the retardation is ____ m/s^2

A. 4.33

B. 3.33

C. 3.73

D. 4.73

ANSWER: B

If the *resultant force* acting on a particle is not zero, the particle will have an acceleration *proportional to the magnitude of resultant* and in the *direction of the resultant* is ____

A. *Newton's first Law*

B. *Newton's Second Law*

C. *D'Alembert's principle*

D. Parallel axes theorem

ANSWER: B

If the force and displacement on a body are at right angles, then the work done is __

A. Maximum

B. Minimum

C. zero

D. Constant

ANSWER: C

The earth makes a complete revolution about its own axis in 24 hours, if the velocity at any point on its equator is 1675 km per hour, find the radius of the earth in kilometres

A. 6395.45

B. 6995.45

C. 6355.45

D. 6335.45

ANSWER: A

A body is assumed to be in a motion of pure rotation about instantaneous centre, the velocity at the instantaneous centre is ___

A. zero

B. Can't determine

C. Maximum

D. Minimum

ANSWER: A

The most general motion of a rigid body is equivalent to a translation of the body with some point of the body plus a rotation of the body about an axis passing through the point and the order of such translation and rotation is immaterial is ____theorem

A. Pappus- II

B. Pappus- I

C. Chasle's

D. *D'Alembert's principle*

ANSWER: C

When a rigid body rotates about a fixed axis, all the moving particles describe a circular path. The position of any particle of the rigid body at any instant is defined by the angle Ɵ, is known as _____ measured with respect to either X or Y axes

A. Angular Velocity

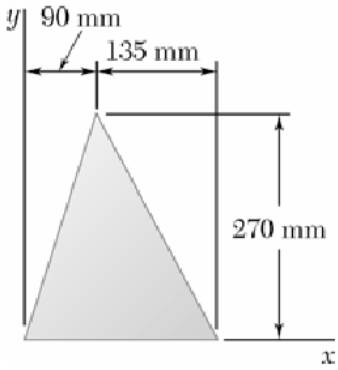
B. Angular displacement

C. Angular acceleration

D. Torsional velocity

ANSWER: B

Locate the centroid of the plane area given below(X,Y) is ___mm



A. 105, 90

B. 110, 90

C. 90,110

D. 111, 91

ANSWER: A