A Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Static friction is always _____ dynamic friction.   CO1- R

   (a) same   (b) more

   (c) less   (d) may be less or more depending on the surfces

2. The rate of change of momentum is directly proportional to the   CO1- R
   impressed force, and takes place in the same direction in which the
   force acts. This statement is known as

   (a) Newton's first law   (b)Newton's second law

   (c) Newton's third law   (d) none of the above

3. A body which is isolated from the surrounding is called   CO2- R

   (a) black body   (b) rigid body   (c) free body   (d) isolated body

4. Force× perpendicular distance is called   CO2- R

   (a) Moment   (b) Couple   (c) Truss   (d) Resultant force

5. The geometrical center of the body whereas center of gravity is the   CO3- R
   point through which weight of the body acts.

   (a) centroid   (b) centre of gravity   (c) moment of inertia   (d) all of the above

6. The center of gravity of a body is always calculated with referrer   CO3- R
   to some assumed axis known as

   (a) axis of reference   (b) axis of rotation   (c) axis of rolling   (d) all of the above

7. The force system consisting of external forces and inertia force can be considered to keep the particle in equilibrium.since the resultant force externally acting on the particle is not zero ,the particle is said to be

CO4- R

(a) dynamic condition

(b) static condition

(c) equilibrium condition

(d) all of the above

8. The capacity of doing work is known as

CO4- R

(a) work

(b) energy

(c) power

(d) all of the above

9. The co-efficient of kinetic friction is _____ to the co-efficient of friction

CO5- R

(a) Equal

(b) Greater

(c) Lesser

(d) All of the above

10. Angle of repose is equal to_____

CO5 -R

(a) Angle of friction

(b) Frictional force

(c) Co-efficient of friction

(d) Normal reaction

PART – B (5 x 2= 10Marks)

11. Recall the term resolution of force. CO1- R

12. What is a moment of a couple? CO2- U

13. Distinguish between centroid and center of gravity. CO3- U

14. Define D'Alembert's principle CO4- U

15. Define friction CO5- R

PART – C (5 x 16= 80Marks)

16. (a) Determine the tension in cables BC & AC to hold 40 Kg load shown in fig. CO1- E (16)


Or

2
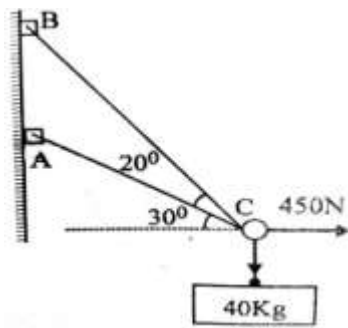
(b) A string attached to two fixed points A and D has two equal   CO1- E   (16)
weights of 1000N attached to it B and C. The weights rest with
the portions AB and CD inclined at angles of 30 ○ and
60 respectively, to the vertical shown in fig. find the tensions in
the portions AB, BC and CD of the string, if the inclination of the
portion   BC with the
vertical is   120
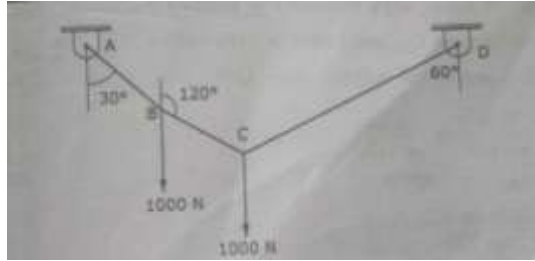
17. (a) Two identical rollers, each of weight 60 N, are supported by an   CO2 -E   (16)
inclined plane and a vertical wall as shownin fig. find the
reactions at   the
points of
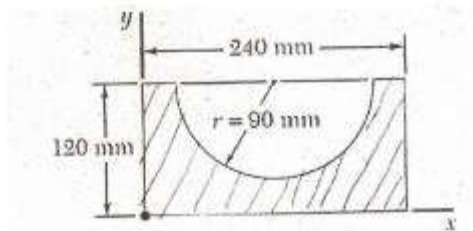supports A,   B and
C
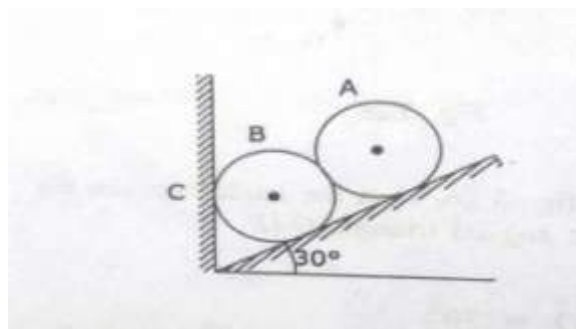
Or

(b) A system of parallel forces are acting on rigid bar as shown in fig.   CO2 -E   (16)

reduce the system to

(i)   A single force   (ii) a single force and a couple at A
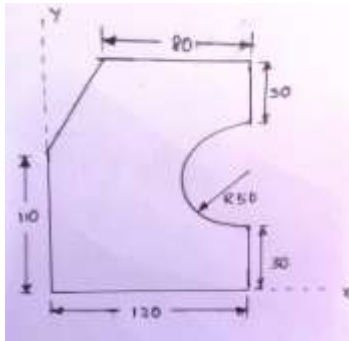
(iii) a single force and a couple at B
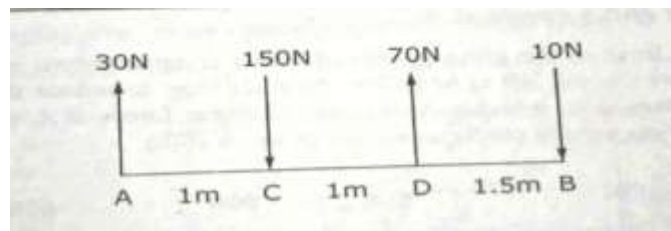
18. (a) Determine the moment of inertia of the shaded are as shown   CO3- E   (16)
in figure with respect to the x axis

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Or

(b) Locate the centroid of the area shown in figure below. The dimensions are in mm. CO3 -E (16)

19. (a) A train starts from rest and attains a velocity of 45 km per hour in 2 minutes, with uniform acceleration. Find (i) acceleration (ii) distance travelled in this time, 2 min (iii) time required to reach a velocity of 36 km per hour CO4- Ana (16)

Or

(b) The motion of the particle along a curved path is given by the equations. CO4 -Ana (16)

$$X = t^2 + 8t + 4, \text{ and } y = t^3 + 3t^2 + 8t + 4$$

Determine (i) initial velocity of the particle (ii) velocity of the particle at t= 2 sec (iii) acceleration of the particle at t=0, (iv) acceleration of the particle at t= 2 sec.

20. (a) Draw and explain the concept of rolling resistance with neat sketches. CO5- APP (16)

Or

(b) A man can pull horizontally with a force of 450 N .A mass of 350 kg is resting on a horizontal surface for which the coefficient of friction is 0.4. The vertical cable of a crane is attached to the top of the block as shown in fig. what will be the tension in the cable if the man is just able to start the block to the right. CO5- APP (16)

4

Cable

450N

350kg

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