

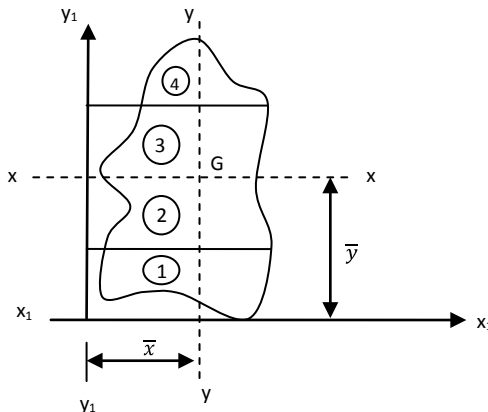
B.Tech I Year (R13) Regular & Supplementary Examinations May/June 2015
ENGINEERING MECHANICS
 (Common to CE and ME)

Time: 3 hours

Max. Marks: 70

PART – A
 (Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define equilibrium of one-dimensional rigid body.
 - What do you understand by space diagram and free-body diagram?
 - State limiting of friction with equation.
 - On what principle does the screw jack/presses work.
 - How can you locate the centroid for a given complicated regular section for the figure given below?



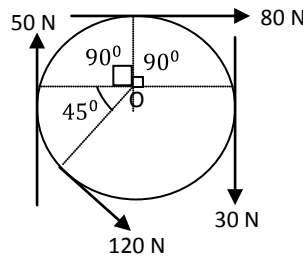
- How can you find area moment of inertia about centroidal axes for a complicated regular section?
- Differentiate between rectilinear and curvilinear motion.
- State the difference between kinematics of a particle and kinematics of a rigid body.
- What are the various types of frames?
- What do you understand by torsional vibration?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

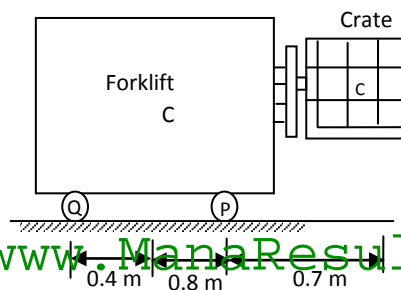
UNIT - I

- 2 Four forces act tangentially to a circle of radius 2 m as shown in figure below. Find the magnitude inclination and distance of the resultant from the centre of the circle.



(OR)

- 3 A 3000 kg forklift used to lift a 2000 kg crate as shown in figure below. Determine the reactions at each of the two (i) Front wheel P. (ii) Rear wheels Q.

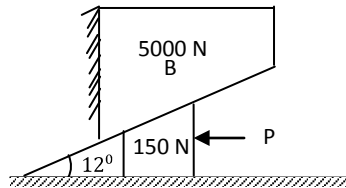


UNIT - II

4 An effort of 2200 N is required to move a certain body up a 20° inclined plane. The force is acting parallel to the plane. If the angle of inclination is changed from 20° to 25° , the effort required to move the body increases to 2500 N. Find the weight of the body and the coefficient of friction.

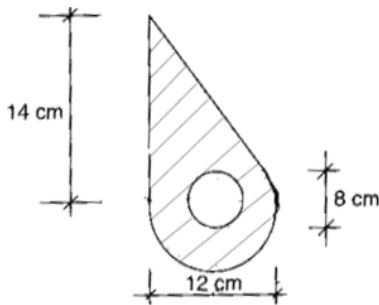
(OR)

5 A block weight 5000 N is to be raised by means of a 12° wedge as shown in figure given below. Assume coefficient of friction = 0.3 for all the surfaces of contact. What is the horizontal force P that should be applied to raise the block? Find also the normal reactions. Weight of the wedge is 150 N.



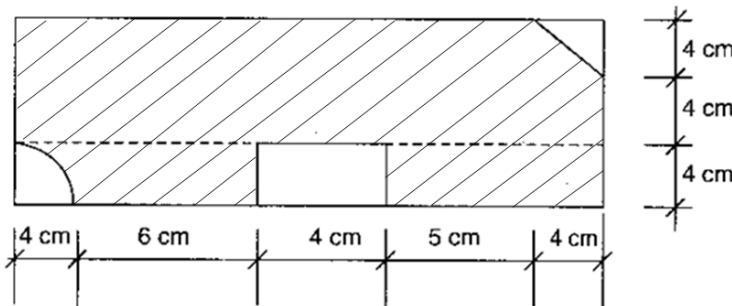
UNIT - III

6 Locate the centroid for the shaded area shown in figure below.



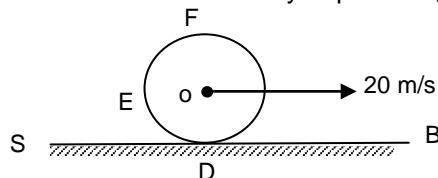
(OR)

7 Find the area moment of inertia about the centroidal axis for the shaded area shown in figure below.



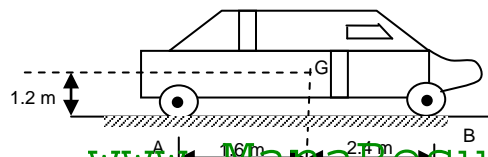
UNIT - IV

8 A cylinder of radius 1 m rolls without slipping along a horizontal plate AB as shown in figure below. Its centre has uniform velocity of 20 m/s. Find the velocity of points D, E and F on circumference of the cylinder.



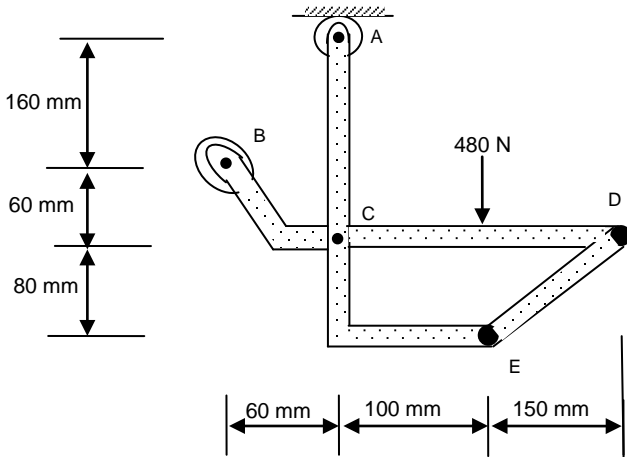
(OR)

9 The truck shown in figure below is moving with a velocity of 10 m/s and experiences a suddenly applied brake. It was observed that the truck skidded to rest in 7.5 m. If the mass of the truck is 3000 kg, determine the magnitude of the normal reaction and frictional force on each wheel when the truck skidded to rest.



UNIT - V

- 10 In the frame shown in figure below, members ACE and BCD are connected by a pin at C and by the link DE. For the loading shown, determine the force in link DE and components of the force exerted at C on member BCD.



(OR)

- 11 A motor of mass 200 kg is supported by four springs, each having a constant of 150 kN/m. The unbalance of the rotor is equivalent to a mass of 30 g located 150 mm from the axis of rotation. Knowing that the motor is constrained to move vertically, determine:
- (i) The speed in rpm at which resonance will occur.
 - (ii) The amplitude of the vibration of the motor at a speed of 1200 rpm.
