

Code No: R161111

R16
SET - 1

I B. Tech I Semester Supplementary Examinations, May - 2018
ENGINEERING MECHANICS

(Com. to CE,EEE,ME,Aero E,Auto E,Bio-Tech,Chem E, Min E,Metal E, PE, PChem E)

Time: 3 hours

Max. Marks: 70

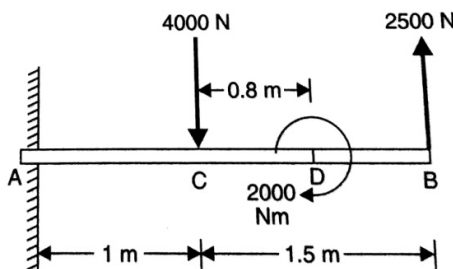
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

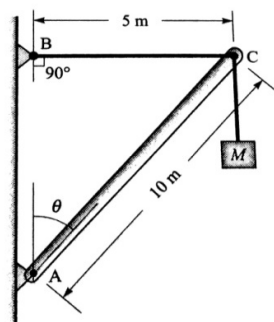
1. a) Explain (i) coefficient of friction; (ii) cone of friction. (2M)
- b) Two forces are acting on a body and the body is in equilibrium. What conditions should be fulfilled by these two forces? (2M)
- c) Define centriod and centre of gravity. (2M)
- d) Define mass moment of inertia and explain the transfer formula for mass moment of inertia. (2M)
- e) What are the parameters that define rectilinear motion? State the relationship between these parameters. (2M)
- f) State the law of conservation of momentum. (2M)
- g) State the assumptions made while studying projectile motion. (2M)

PART -B

2. a) What do you understand by the term 'Couple'? Discuss the characteristics of a couple. (6M)
- b) Figure shows two vertical forces and a couple of moment 2000 N-m acting on a horizontal rod which is fixed at end A. Determine the resultant of the system. (8M)



3. a) State and Prove Lami's theorem. (6M)
- b) A 10 m boom supports a load of 600 kg, as shown in the figure. The cable BC is horizontal and 5m long. Determine the forces in the boom and the cable. (8M)



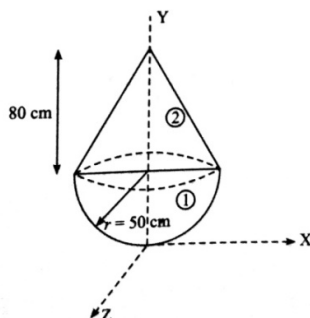
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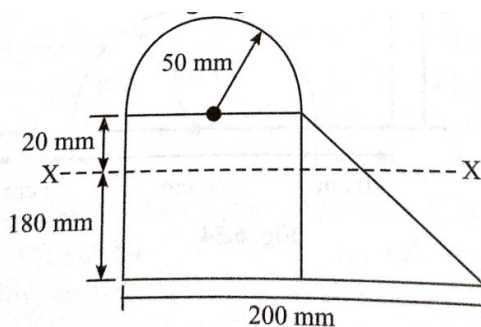
4. a) State and prove Pappus theorems of area and volume. (6M)

- b) Determine the centre of gravity of the following figure. (8M)



5. a) An isosceles triangle section ABC has a base of 100mm and 60mm height. Determine the moment of inertia of triangle about the centroid and about base. (6M)

- b) Find the moment of inertia of the following figure about the given XX-axes. (8M)



6. a) A stone, dropped from a certain height, can reach the ground in 5s. It is stopped after 3 seconds of its fall and then allowed to fall again. Find the time taken by the stone to reach the ground for the remaining distance. (6M)

- b) Two trains P and Q leave the same station on parallel lines. Train P starts at rest with uniform acceleration of 0.2 m/s^2 attains a speed of 10 m/s. Further the speed is kept constant. Train Q leaves 30 seconds later with uniform acceleration of 0.5 m/s^2 from rest and attains a maximum speed of 20 m/s, when will train Q overtake train P. (8M)

7. a) Determine the work done by an electric motor in winding up a uniform cable which hangs from a hoisting drum if its free length is 20m and weighs 800N. The drum is rotated by the motor. (6M)

- b) A 20 kg block starting from rest slides up a 30° inclined plane under the action of a 175 N force directed along the inclined plane. The coefficient of kinetic friction between the block and the plane is 0.2. Determine the (i) speed of the block after it slides 4.5 m and (ii) the distance travelled by the block when its speed becomes 4.5 m/s. (8M)