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)

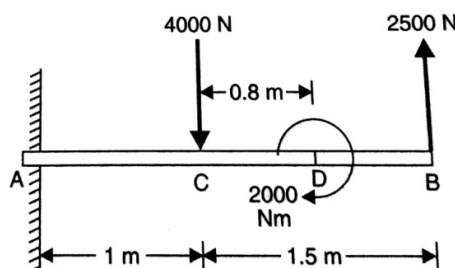Time: 3 hours   Max. Marks: 70

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**
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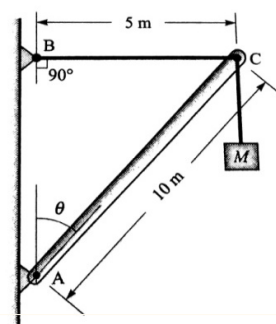
PART –A

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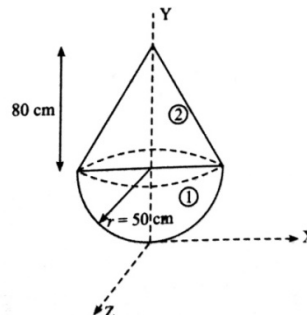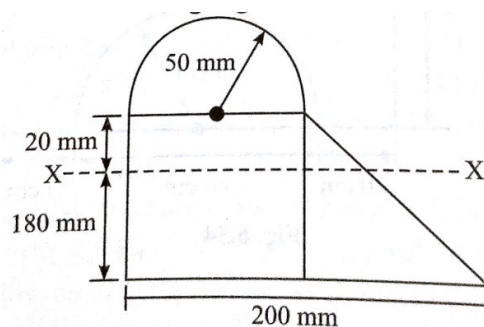
4. a) State and prove Pappus theorems of area and volume. (6M)

   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 rad/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 30^0 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)