

Code No: RA161223

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I B. Tech II Semester Regular/Supplementary Examinations, April/May - 2018
ENGINEERING MECHANICS
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

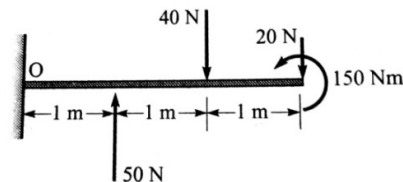
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

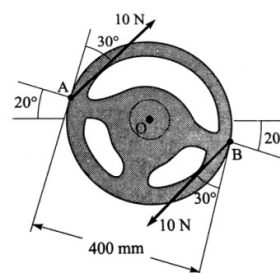
1. a) Explain the condition for an impending motion. (2M)
- b) Define the free body diagram. (2M)
- c) Mention the methods to determine centroid and centre of gravity. (2M)
- d) State transfer formula for the product of inertia. (2M)
- e) What are the parameters that define rectilinear motion? State the relationship between these parameters. (2M)
- f) Explain under what situations, it is better to apply the principle of impulse-momentum rather than the principle of work-energy. (2M)
- g) What do you understand by central force motion? (2M)

PART -B

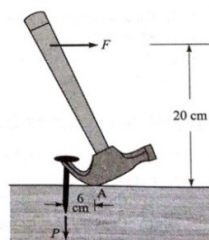
2. a) The three parallel forces and one couple act on a cantilever beam, as shown in the figure. Determine the resultant of the three forces and the couple. (7M)



- b) While taking a steady right turn, a car driver exerts forces on the steering wheel, as shown in the figure. Though the two 10 N forces are parallel, but each has a tangential component and a radially inward component. Determine the moment exerted on the steering at 'O'. (7M)



3. a) A horizontal force F of 10 N is applied to the hammer to pull the nail from the horizontal floor, as shown in the figure. Assuming that the hammer pivots at the point A, determine the force exerted on the vertical nail. (7M)

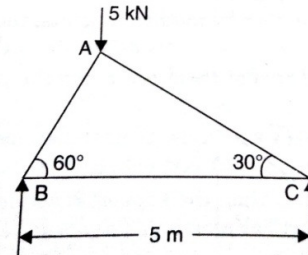


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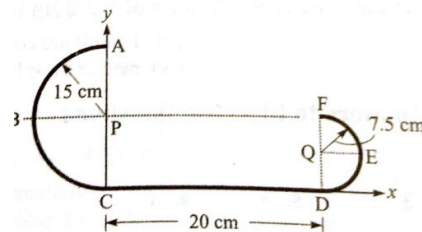
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- b) Find the forces in the members AB, AC and BC of the truss shown in the figure. (7M)



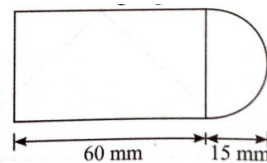
4. a) A wire has been bent into the shape as shown in figure. Determine the position of centroid of the wire. (7M)



- b) Determine the centre of gravity of a hemisphere of radius 'r'. (7M)

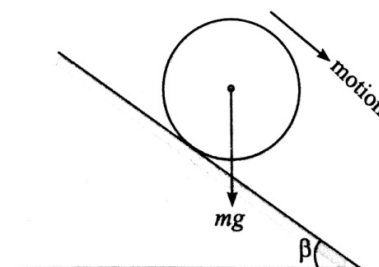
5. a) Find the moment of inertia of a semi-circle of radius 50mm about its centroidal XX and YY axes. (7M)

- b) Determine the moment of inertia of the following figure about centroidal axis. (7M)



6. a) A car A is travelling on a straight level road with a uniform speed of 60 km/h. It is followed by another car B that is moving with a speed of 70 km/h. When the distance between them is 2.5km, the car B is given a deceleration of 20 km/h². After what distance and time will the car B catch up with the car A? (7M)

- b) A solid cylinder of mass m and radius r is released from rest and rolls down on an inclined plane as shown in figure. Find the i) acceleration of the centre of mass, ii) the maximum inclination for which rolling without slipping occurs. (coefficient of friction, $\mu=0.2$) (7M)



7. A bullet of 81 g mass fired with a speed of 300 m/s penetrates to a depth of 10 cm, into a block of wood. Find the force of resistance of the block, assuming it to be uniform throughout. If the same bullet with the same speed were fired into a similar block of 5 cm thick wood, with what speed would it emerge from the block. (14M)