Code No: PT32051/RA **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, April - 2018

ENGINEERING MECHANICS

(Civil 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 **THREE** Questions from **Part-B**

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PART –A

1 a) What is limiting friction? [3M]

b) Write equilibrium equations for coplanar systems. [4M]

c) Distinguish between centroid and centre of Gravity. [4M]

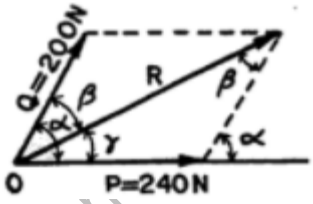
d) What is products of Inertia. [4M]

e) A particle, starting from rest, moves in a straight line, whose equation of motion is given by : $S = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 5 seconds. [3M]

f) Write the applications of Work – energy method. [4M]

PART -B

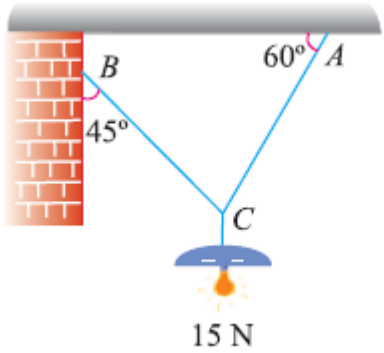
2 a) Two forces of magnitude 240 N and 200 N are acting at a point O as shown in fig. below. If the angle between the force is 60^0, Determine the magnitude of the resultant force. Also determine the angle β and γ as shown in fig. below [8M]



b) A load of 500 N is lying on an inclined plane, whose inclination with the horizontal is 30°. If the coefficient of friction between the load and the plane is 0.4, find the minimum and maximum horizontal force, which will keep the load in equilibrium. [8M]

3 a) State and Prove Lami's Theorem. [8M]

b) An electric light fixture weighting 15 N hangs from a point C, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45° to the horizontal as shown in Fig.Using Lami's theorem, or otherwise, determine the forces in the strings AC and BC. [8M]



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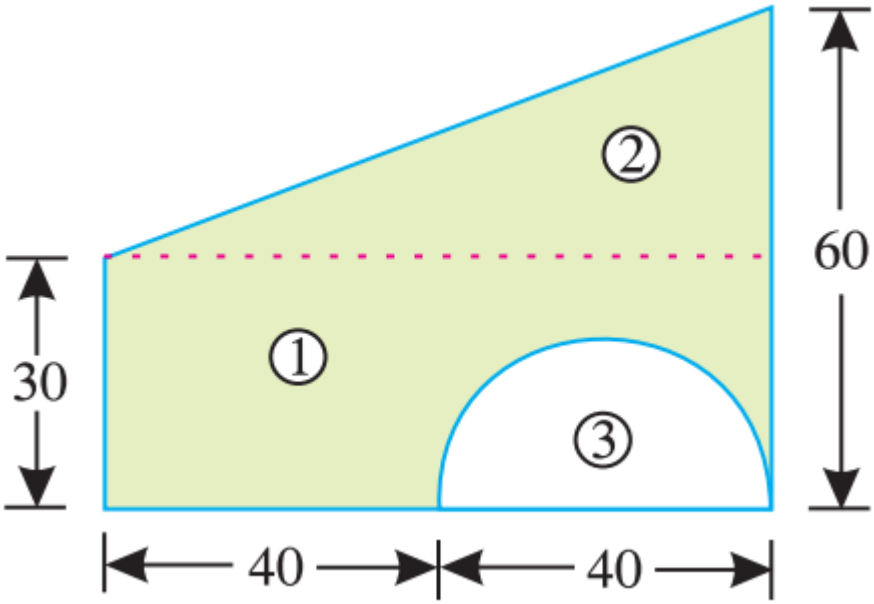
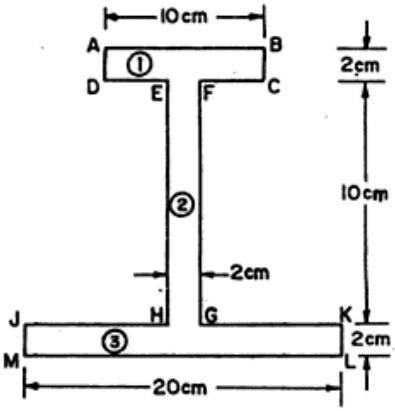
4 Determine the centroid for the following figure: [16M]



5 Find the moment of inertia of the section as shown in the fig about centroidal axis XX perpendicular to the web. [16M]



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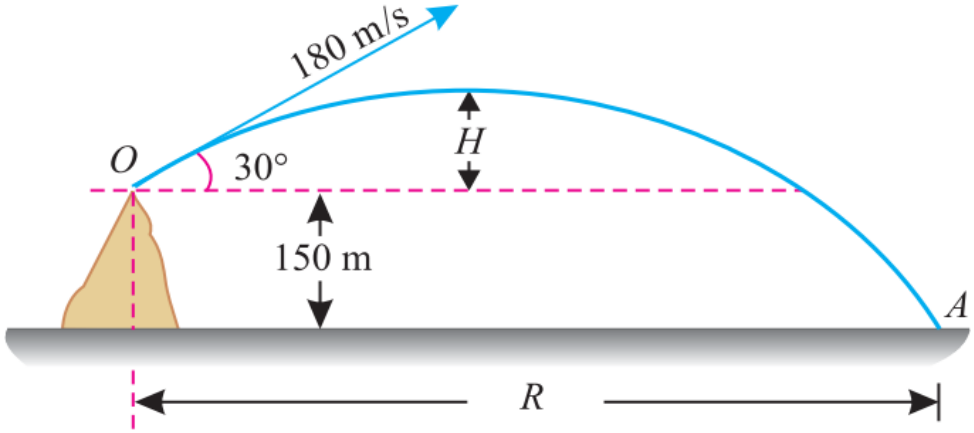
6 A projectile fired from the edge of a 150 m high cliff with an initial velocity of 180 m/s at an angle of elevation of 30° with the horizontal. Neglecting air resistance find [16M]
(i) The greatest elevation above the ground reached by the projectile
(ii) Horizontal distance from the gun to the point, where the projectile strikes the ground



7 A body of weight 1 KN is on the horizontal surface of a table. This weight is connected to another body of weight 2 KN by a string passing over a smooth pulley fixed at the corner of the table. The coefficient of friction between 1 KN weight and the table surface is 0.20. If the system is released from rest, find the velocity of 2 KN weight after it has moved 1.2 m using the work-energy method. [16M]

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