Code No: 09A1BS05 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech I Year Examinations, December-2012

ENGINEERING MECHANICS

(Common to CE, ME, CHEM, MCT, MMT, AE, AME, MIE, MIM, PTME)

Time: 3 hours **Max. Marks: 7**

Answer any five questions

All questions carry equal marks

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1. A horizontal line ABCD measuring 9 m is acted upon by forces of magnit 400, 600, 400 and 200N at points A, B, C and D respectively with downward direction. These points are so located that AB=BC=CD=3m. The lines of action of the forces are inclined at 90^0, 60^0, 45^0 and 30^0 respectively with AB. Make calculations for the magnitude, position and the direction of the resultant. [15]

2. Ladder AB of length 4 m and weight 200 N is held in position by applying force P as shown in Figure 1. Assuming smooth wall and floor, determine the force P. If instead of force P for preventing from slipping, a horizontal rope is tied at a distance of 1 m from A, what is the tension in the rope? [15]

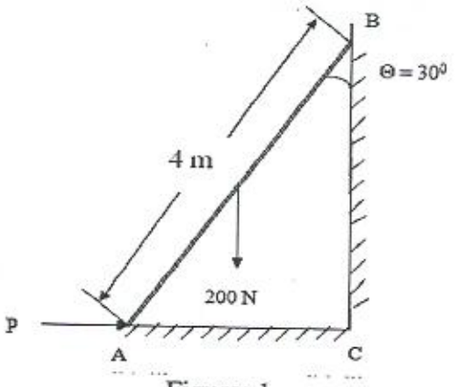

Figure: 1

3. The corner of the plate is cut-off and a hole of diameter 50 mm is punched as shown in Figure 2 below. The centre of circle is at a distance of 50 mm from left and bottom edges of the plate. Calculate the position of centroid. [15]

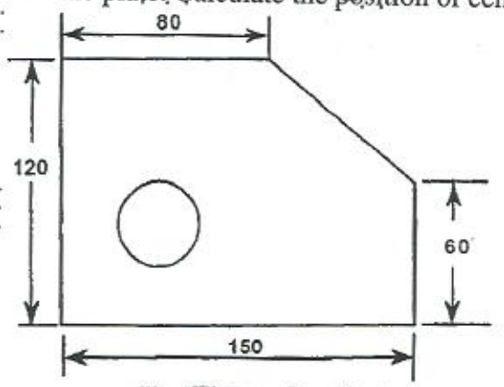

Figure: 2

4. Locate the centroid of given parabola bounded by x- axis the line x = a. as shown in the figure 3. [15]

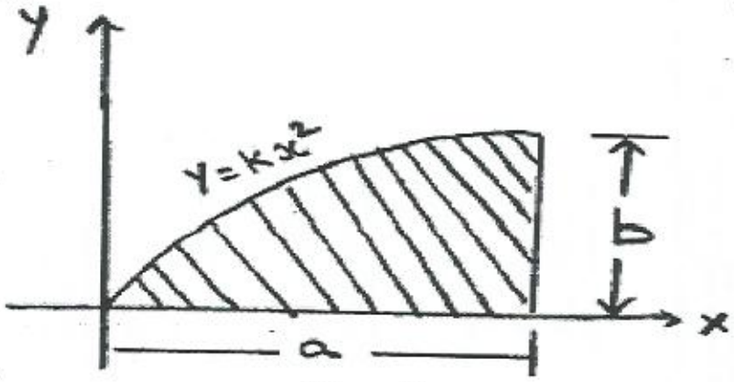

Figure: 3

5. Find the moment of inertia about the horizontal centroidal axis and about the base AB for the lamina shown in figure 4. [15]

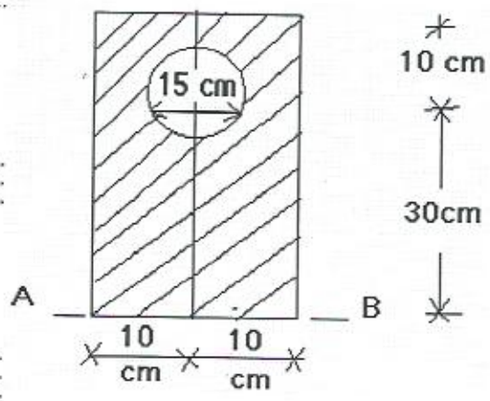

Figure: 4

6. A car is traveling on a curved section of a track of radius 1000 m at a speed of 100 km/h. The breakers are then suddenly applied causing the car to slow down at a constant rate. After 10 sec the speed has been reduced to 60 km/h. Determine the acceleration of the car immediately after the breakers have been applied. [15]

7. a) Define work, energy, kinetic energy and potential energy give one example individually and determine application of each term.

b) A fly wheel 50KN and having radius of gyration is 1m and its speed from 400rpm to 280rpm in 2 min calculate the

i) Torque acting on it
ii) Changing in Kinetic energy
iii) Change if angular momentum. [8]

8. Determine reaction at suppoits using the principle of virtual work as shown in figure 5. [15]

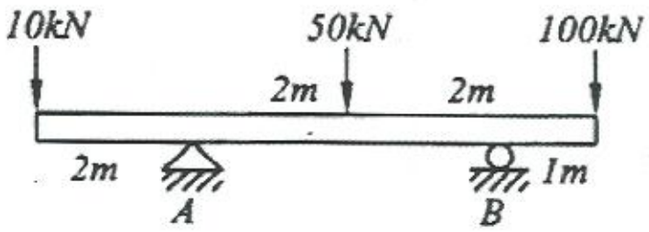

Figure: 5