

Code No: 51003

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May - 2016

ENGINEERING MECHANICS

(Common to CE, ME, MMT, AE, AME, MIE, PTE)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) State and discuss Newton's law of gravitation.
b) Three forces of $2P$, $3P$ and $4P$ act along three sides of an equilateral triangle of side 100 mm taken in order. Find the magnitude and position of the resultant force. [7+8]
- 2.a) Define free body diagram, Transmissibility of a force and resultant of a force.
b) Two identical rollers, each of weight 100N , are supported by an inclined plane and a vertical wall as shown in figure 1 assuming smooth surfaces, find the reactions induced at the points of support A, B and C. [7+8]

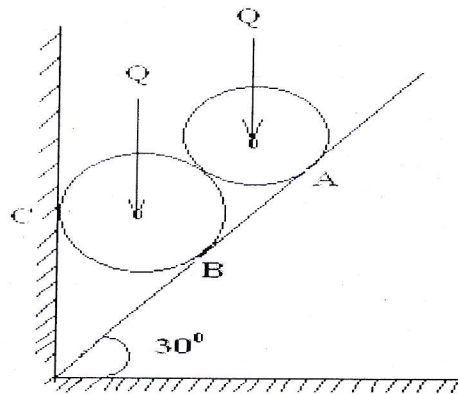


Figure: 1

- 3.a) Describe various methods of finding out the center of gravity of a body.
b) Determine the coordinates of the centroid of the plane area shown in figure 2 with reference to the axis shown take $x = 40$ mm. [7+8]

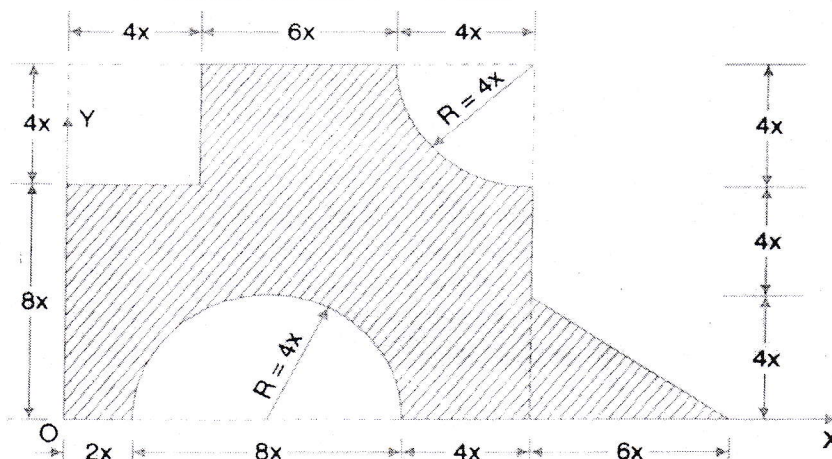


Figure: 2

4. Determine the moment of inertia of the section shown in figure 3 about the vertical centroidal axis. [15]

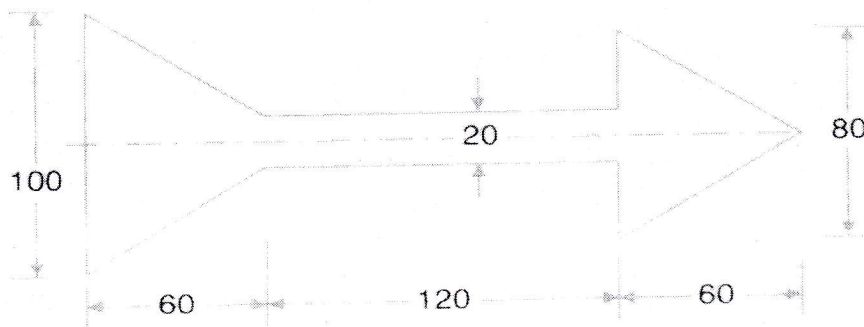


Figure: 3

5. North light roof truss with wind loads acting on it as shown in figure 4, determine the reactions at P and Q. [15]

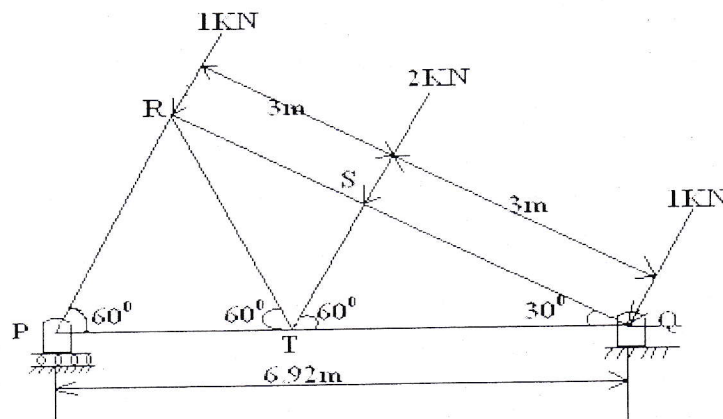


Figure: 4

- 6.a) Distinguish clearly between the speed and velocity. Give examples.
 b) A train travelling at 96 kmph has to slow down on account of work being done on the line. Instead of continuing at constant speed, it therefore moves with a constant retardation of 1.6 kmph per second until the speed is reduced to 24 kmph. It is then travels at a constant speed for 400 meters and then accelerates at 0.8 kmph per second until speed is once more 90 kmph find the delay period. [7+8]
- 7.a) What is impulse and momentum?
 b) A canon weighing 150 tonnes fires a one ton of projectile with a muzzle velocity of 3600 m/s. The gun is nested in springs having a total spring constant $k = 150$ tonnes/m. Assuming that the explosion is over before the gun it has a chance to move perspectivevly how far will it recoil after the explosion. [7+8]
- 8.a) How will you apply the principle of virtual work in finding out the forces in a framed structure?
 b) A road roller of weight 11772N and radius 0.5m is pulled with a force of 2000N on a ground. If the roller starts from rest and rolls without slipping, find the distance moved by the centre of the roller at which the roller acquires a velocity of 4 m/s. [7+8]