26-11-15

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR

B.TECH-M.TECH DUAL DEGREE 1st SEMESTER (CS, EE, ET, IT) EXAMINATION, 2015

MECHANICS (AM-1201)

FULL MARKS: 70 TIME: 3 Hrs

One mark is kept for neatness

Part A

(Answer any three Questions)

1. The two 50 wedges as shown in Fig. Q.1. are used to adjust the position of the column under a vertical load of 5 kN. Determine the magnitude of forces P required to lower the column if the coefficient of friction for all surfaces is 0.35. *12*
2. Determine the magnitude and nature of force in the member BF of the loaded truss shown in Fig. Q.2. *12*
3. A lifting device for transporting 135-kg steel drums is shown in Fig. Q.3. Calculate the magnitude of the force exerted on the drum at support points E and F. *12*
4. Determine the vertical distance of the centroid from the bottom of the base plate for the built-up structural section as shown in Fig.Q.4. *12*
5. Calculate the moment of inertia of the shaded area about the x-axis as shown in Fig.Q.5. *12*

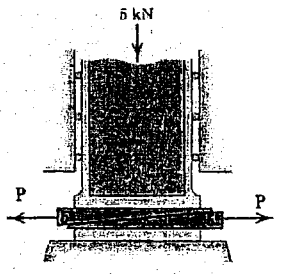

Fig.Q.1

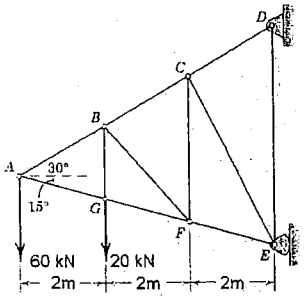

Fig.Q.2

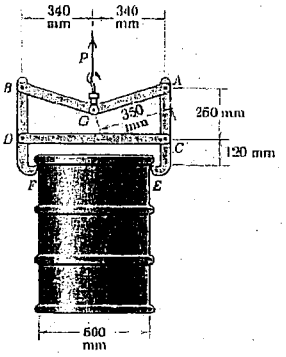

Fig. Q.3

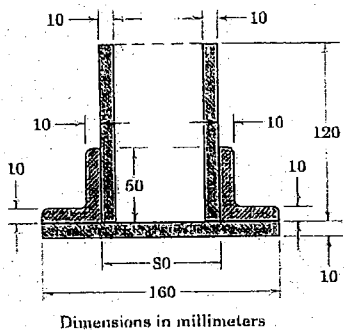

Fig. Q.4

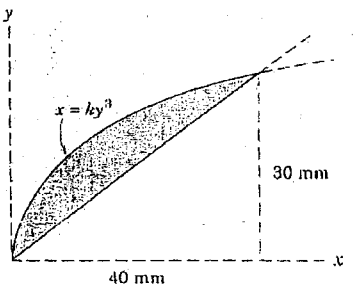

Fig. Q.5

Part B

(Answer any three Questions)

6. The preliminary design for a rapid transit system calls for the train velocity to vary with time as shown in the plot as the train runs the 3.2 km between stations A and B as shown in Fig. Q.6. The slopes of the cubic transition curves (which are form a $+bt+ct^2+dt^3$) are zero at the end points. Determine the total run time t between the stations and the maximum acceleration. *11*

Continued in next page.....