PVP 14

Code: ME1T6, AE1T6

I B.Tech - I Semester – Regular/Supplementary Examinations
November 2018

ENGINEERING MECHANICS - I
(Common for ME, AE)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

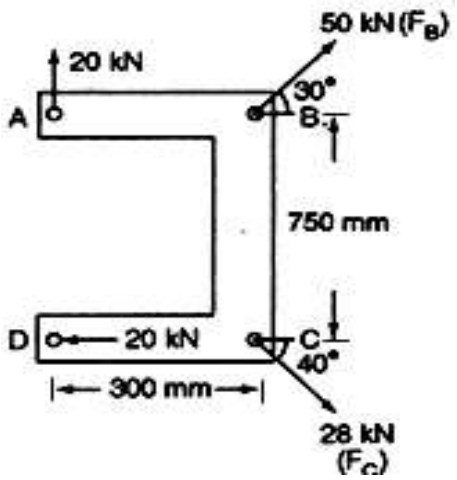
11 x 2 = 22 M

1. a) Define free body diagram and explain with an example.
   b) The greatest and least resultants of two forces P and Q are 17 N and 3 N respectively. Determine the angle between them when their resultant is $\sqrt{149}$ N.
   c) Distinguish between moment of a force and couple.
   d) Define the terms i) centroid and ii) centre of gravity.
   e) State and explain parallel axis theorem.
   f) Write the assumptions made in the analysis of perfect truss.
   g) Define truss and briefly explain how you check the perfectness of a truss.
   h) State the laws of dry friction.
   i) Define the terms i) Coefficient of friction and ii) Angle of repose.
   j) Explain how the principle of virtual work can be used in solving problems in statics.
   k) List out the advantages of principle of virtual work.

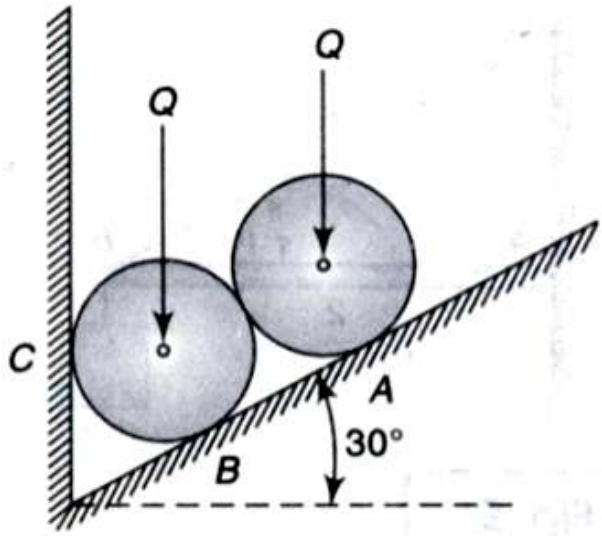
PART – B

Answer any ***THREE*** questions. All questions carry equal marks.
3 x 16 = 48 M

2. a) When four forces are applied to a plate as shown in figure. Determine i) moment of F_B about point 'A', ii) moment of F_C about point 'A' and iii) moment of all forces about point C.
8 M



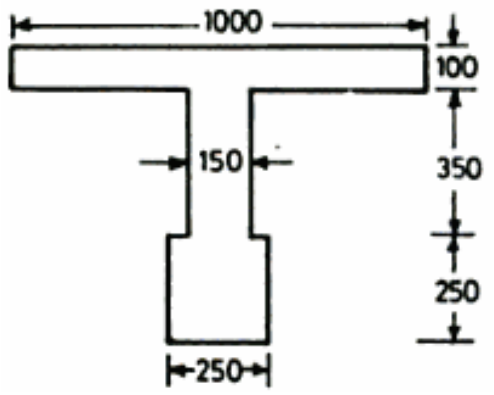
b) Two identical rollers, each of weight Q = 1000 N are supported by an inclined plane and a vertical wall as shown in figure. Assuming smooth surfaces, find the reactions at the points of support A, B and C. 8 M



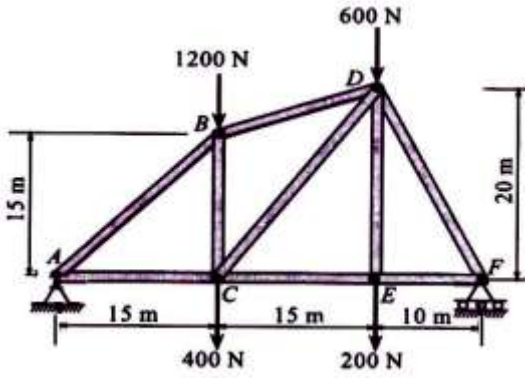
3. a) Determine the centroid coordinates of semicircular area of radius R from basic principles. 6 M

b) The cross section of a prestressed concrete beam is shown in figure. Calculate the moment of inertia of this section about the centroidal axes parallel to and perpendicular to top edge. 10 M

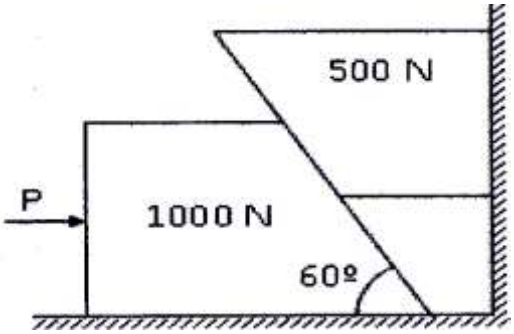
All dimensions are in mm.



4. A pin jointed truss is loaded and supported as shown in figure. Determine the forces in all the members of truss. Indicate whether the members are in tension or compression. 16 M



5. Determine the minimum horizontal force P required to hold the system shown in figure in equilibrium. Assume the coefficients of friction at the floor as 0.25, at the wall as 0.3, at the interface of the blocks as 0.2 and wedge angle is 60^0 with horizontal. 16 M



6. Two beams AE and BD are supported and loaded as shown in figure. Determine the reactions at the points B and D using principle of virtual work. 16 M