Code: ME1T6, AE1T6

I B. Tech - I Semester – Regular/Supplementary Examinations December 2016

ENGINEERING MECHANICS - I
(Common for ME, AE)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks
$$11 \times 2 = 22 \text{ M}$$

1.

a) What are different types of trusses?

b) List the applications of principle of virtual work.

c) What do you mean by angle of friction?

d) What do you mean by cone of friction?

e) What is Lami's theorem?

f) What do you mean by Varignon's theorem?

g) Define centroid.

h) Find the magnitude and direction of the resultant of two forces 15 N and 30 N acting at a point with an included angle of 30^0.

i) What are the assumptions in perfect truss?

j) What do you mean by virtual work?

k) Define moment of inertia.

Answer any *THREE* questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) Find the resultant of a set of coplanar forces acting on a lamina as shown in fig. Each square has side of 10mm.
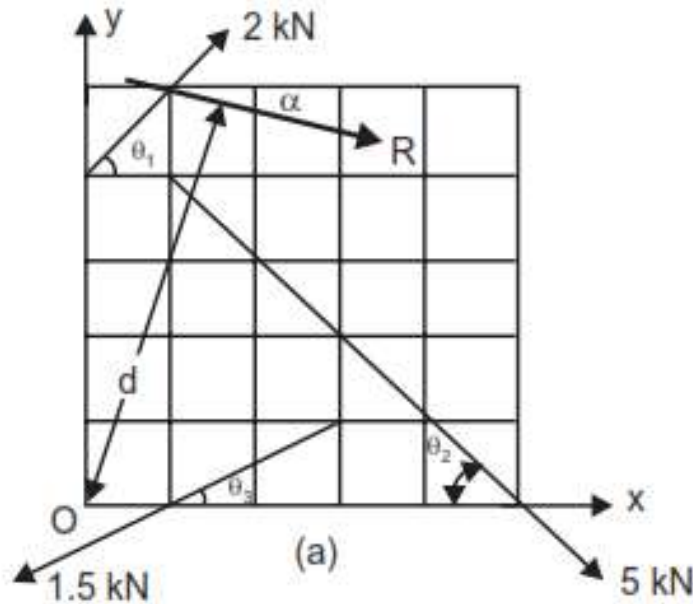
8 M

b) The wheel weighing 1000 N and of diameter 60 cm rests against a block of height 15 cm. Find the least pull through the centre of the wheel to just turn the wheel over the corner of the block. Find the reaction of 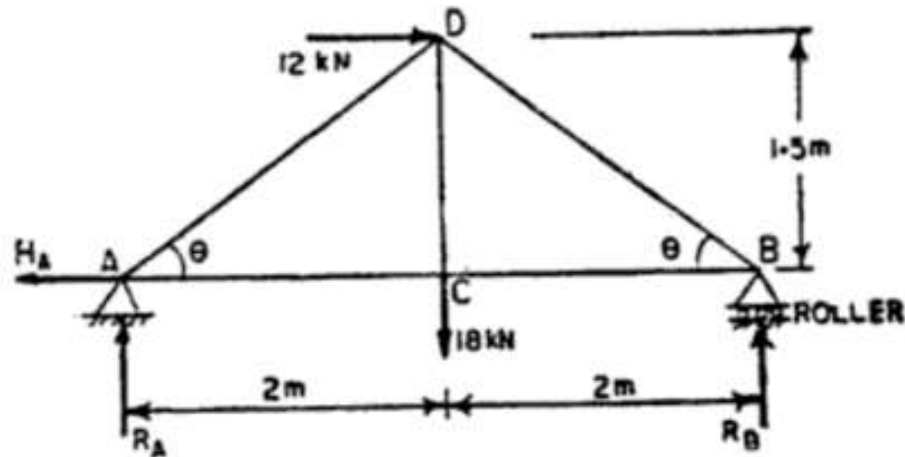the block. All surfaces are smooth.   8 M

3. A I section is made up of top flange, 80x20 mm, web 120x20 mm and bottom flange 100x20 mm. Find out I_{xx} and I_{yy} of the section.   16 M

4. Determine the forces in the truss shown in below figure which carries a horizontal load of 12 kN and vertical load of 18 kN.

16 M

5. a) A body resting on a rough horizontal plane required a pull of 82 N inclined at 30^0 to the plane just to move it. It was found that a push of 100 N inclined at 30^0 to the plane just moved the body. Determine the weight of the body and the coefficient of friction.

8 M

b) What is the value of P in the system shown in figure to cause the motion to impend? Assume the pulley is smooth and coefficient of friction between the other contact surfaces is 0.2.

8 M
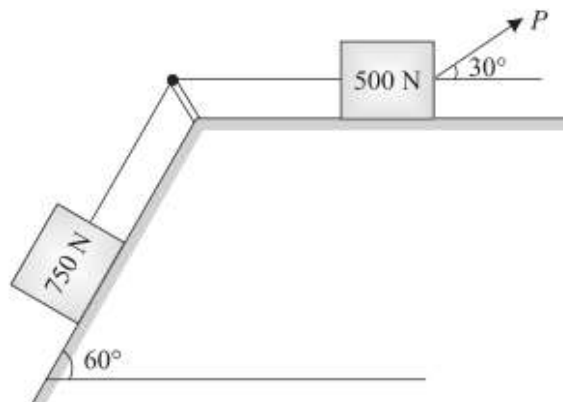
6. Two beams AC and CD of lengths 9 m and 10 m respectively are hinged at C. These are supported on rollers at the left and right ends (A and D). A hinged support is provided at B, 7 m from A. Using the principle of virtual of work, determine the reactions at the hinge C and the support B when a load of 700 N acts at a point 6 m from D.   16 M