Code No. 3395 / S

FACULTY OF ENGINEERING

B.E. I-Semester (Suppl.) Examination, June / July 2017

Subject : Engineering Mechanics-I

Time : 3 hours **Max. Marks : 70**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (20 Marks)

1 Define a couple and write any two characteristics. 2

2 Express the force vector of a 100 kN force, passing from point A(2, 4, 1) to point B(6, 7, 8) and also write its unit vector. 2

3 Show how a non-concurrent force acting on a body can be replaced by an equivalent force couple. 2

4 Write the static equilibrium equations for non-concurrent co-planar force system. 2

5 Write the basic assumptions for using method of joints of analysis of pin jointed trusses. 2

6 Find out the forces in the members AC & BC of the truss shown in Fig.1 2

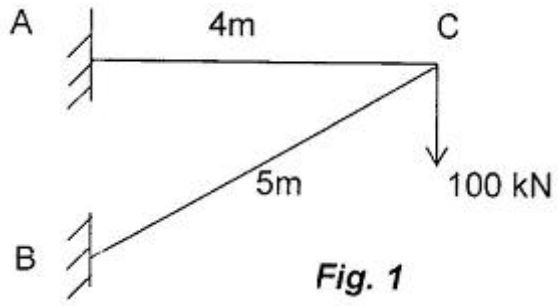

Fig. 1

7 Define cone of friction. 2

8 Differentiate dynamic friction from static friction. 2

9 Determine the centroid of the triangle (b x h) about the base from basic principles. 2

10 Define polar moment of inertia. 2

PART – B (50 Marks)

11 A force F passing though C produces a clockwise moment of 600 N.cm about A and a counter clockwise moment of 300 N.cm about B as in Fig.2 shown below. Determine the moment F about O. 10

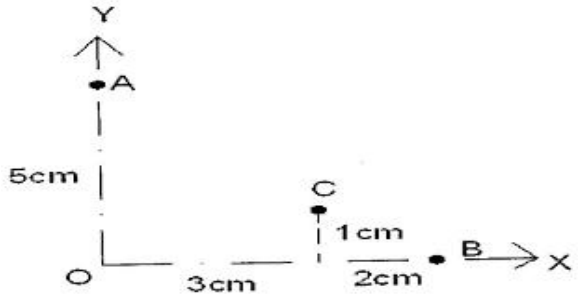

Fig. 2

..2

12 In the force system shown in Fig.3, it is found that the force multiplier of force F acting from B to D is f_m = 150 N/m. Find the following : 5+5

a) Component of F along AC and

b) Moment of F about an axis directed from A to E.

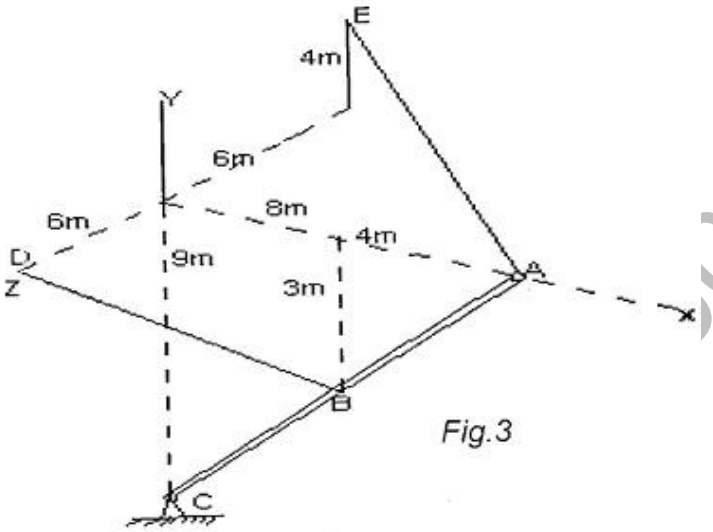

Fig.3

13 Find out the forces in all the members of the truss shown in Fig.4 and make a tabular form mentioning nature of the force in each member. 10

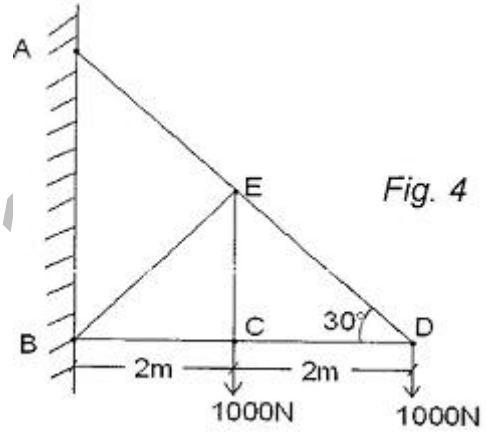

Fig. 4

14 A uniform bar AB, 10m long and weighing 280 N, is hinged at B and rests upon a 400 N block at A as shown in Fig.5 if the coefficient of friction is 0.40 at all contact surfaces, find the horizontal force P required to start moving the 400N block? 10

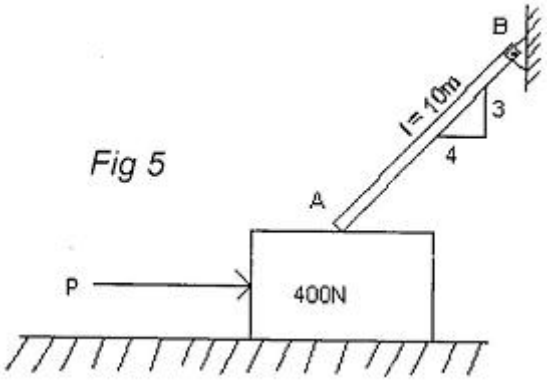

Fig 5

15 Locate the centroid of the shaded area ABCO from xy axes as shown in Fig.6 below. 10

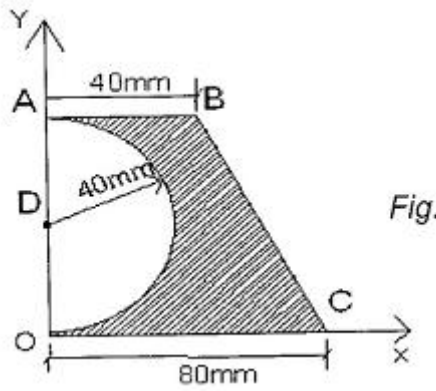

Fig.6

16 Find the moment of inertia of the culvert (shaded portion as shown in Fig.7) about the indicated xx axis and its centroidal axis. Take culvert height as 300 mm. 10

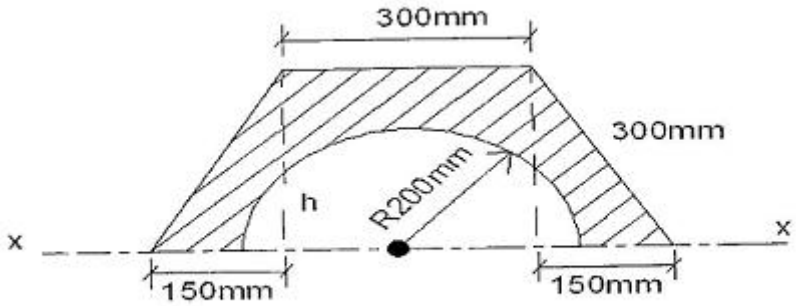

Fig. 7

17 Bar AB of negligible weight is subjected to a vertical force of 3 kN and a horizontal force of 1.5 kN applied as shown in Fig.8. Find the angle 'θ' at which equilibrium exists. Assume both the supporting surfaces as smooth surfaces. 10

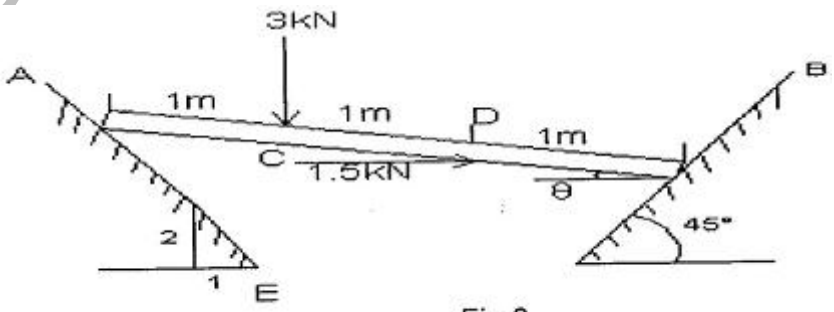

Fig.8

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