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Code No. : 11023 S(A)

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (CBCS) I-Semester Supplementary (New/Old) Examinations, June/July-2019

Basic Engineering Mechanics
(Civil, EEE & Mech. Engg.)

Time: 3 hours

Max. Marks: 60

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. State the principle of Transmissibility.
2. Draw the sketch showing non-coplanar concurrent force system.
3. State Lami's theorem and explain with one example.
4. How do you represent a spatial force of magnitude $F = 200$ N between the points $A(-4,2,4)$ and $B(2,5,-3)$ in vector form.
5. What do you mean by a truss structure? Explain.
6. Differentiate between a perfect truss and a deficient truss.
7. Distinguish between coefficient of friction and angle of friction.
8. What is the importance of belt friction? Explain.
9. Define centroid. Write the expression for centroid of a semicircle of radius 'R'.
10. Determine radius of gyration of a right-angled triangle having base as 'b' and height as 'h'.

Part-B (5 × 8 = 40 Marks)

11. a) Find the values of P and F so that the four forces shown in the Fig.1 produce an upward resultant of 300N acting at 4m from left end of the bar. [3]

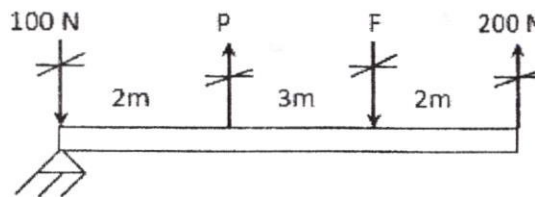


Fig.1

- b) The three forces shown in the Fig. 2 are required to cause a horizontal resultant acting through point A. If $T = 316$ N, determine the values of F and P. Consider the grid size to be 1 cm. [5]

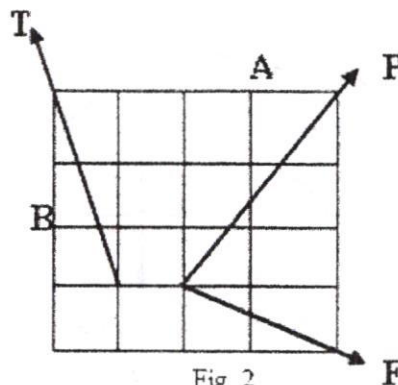


Fig. 2

12. a) A 12 m bar of negligible weight rests in a horizontal position on the smooth inclines as shown in the Fig.3. Compute the distance x at which the load $T=100\text{N}$ should be placed from right end to keep the bar horizontal. [3]

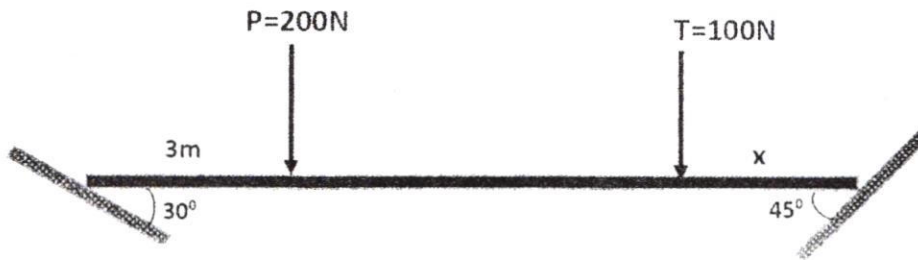


Fig.3

- b) In the Fig.4, a vertical boom AE is supported by guy wires from A to B, C and D. If tensile load in wire AD is 252N , find the forces in AC and AB so that the resultant force on A is vertical. [5]

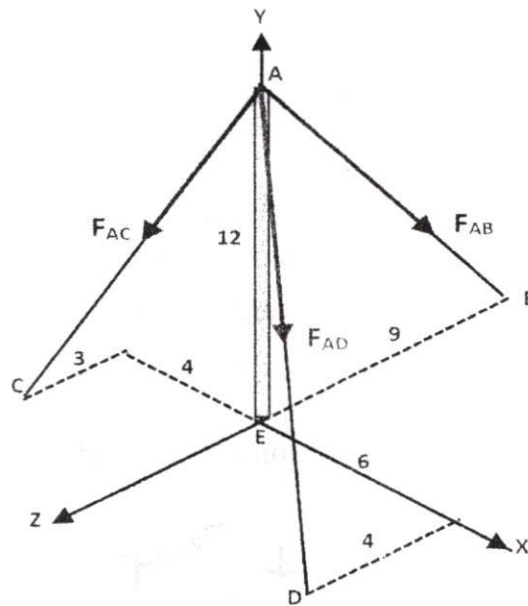


Fig.4

13. a) Explain step-by-step procedure of performing analysis of a truss using method of sections. [3]
 b) Determine the force in members DF, DG, and EG of the Howe truss, shown in Fig.5. [5]

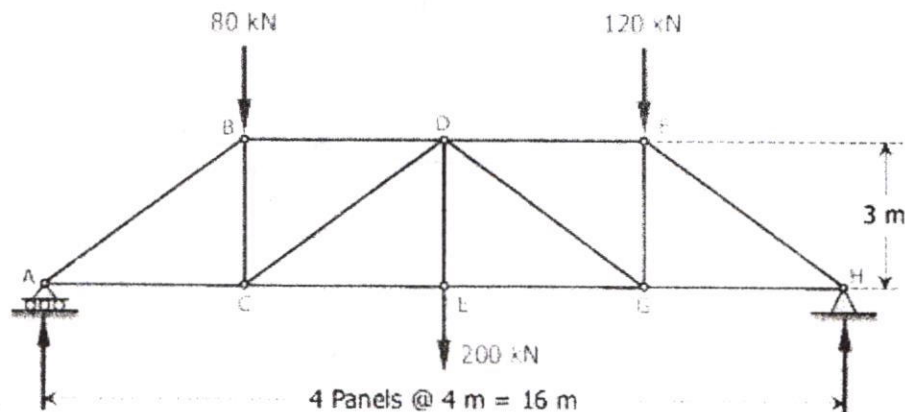


Fig. 5

14. a) For the block shown in Fig.6 compute the frictional force exerted by the horizontal surface. [3]

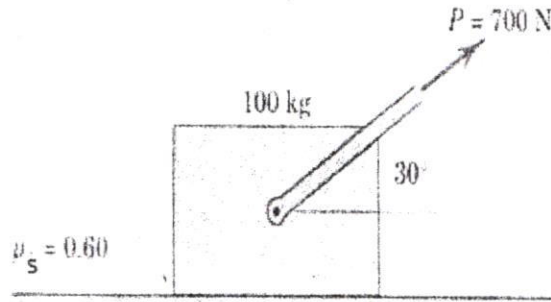


Fig.6

- b) A uniform ladder 3m long weighs 600N. It is placed against a vertical wall at an angle of 60° with the ground as shown in Fig.7. How far along the ladder can a 750N man climb before the ladder is on the verge of slipping? Assume Coefficient of friction at all contact surfaces as 0.25. [5]

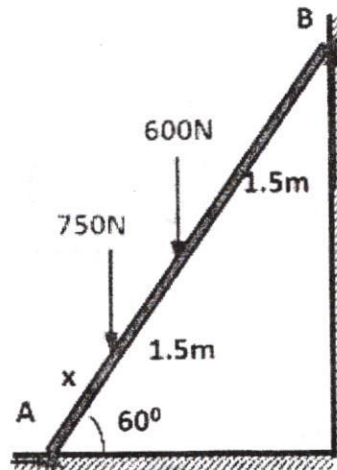


Fig.7

15. a) Determine the distance of centroid of a right-angled triangle of base 'b' and height 'h'. [3]
 b) Calculate moment of inertia of the I-section shown in Fig.8 about its base. [5]

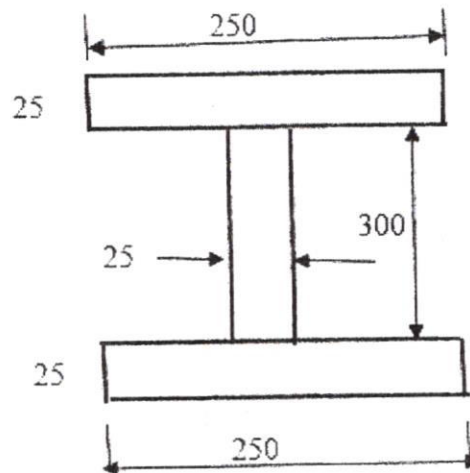


Fig.8

16. a) The moment of a certain force F is 180Nm clockwise about O and 90 Nm counter clockwise about B . If the moment about A is zero, determine the force F . Refer Fig.9. [3]
- b) A homogeneous smooth sphere rests on two inclines as shown in Fig.10. Determine the contact forces at A and B . [5]

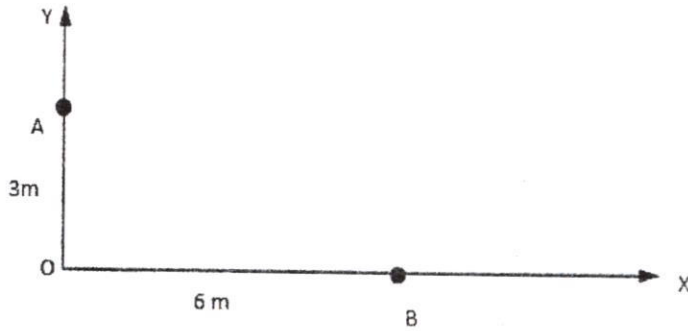


Fig.9

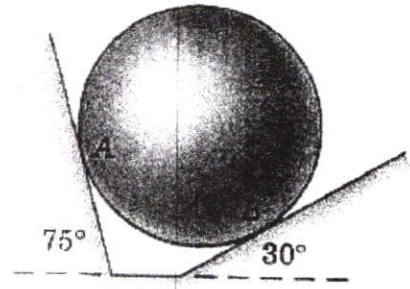


Fig.10

17. Answer any *two* of the following:

- a) Perform analysis of the truss shown in Fig.11. [4]

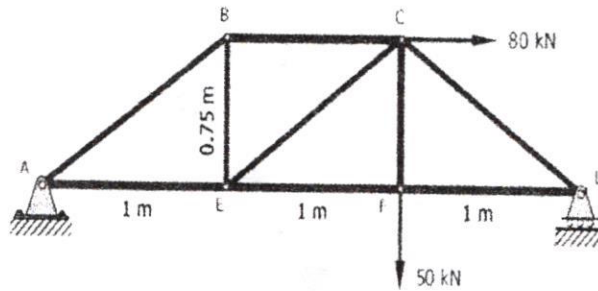


Fig.11

- b) Compute the force P required to start the wedge of 400N moving to the right. The angle of friction is 20° for all contact surfaces. Refer Fig.12. [4]
- c) Calculate the centroid of the shaded area shown in Fig.13.

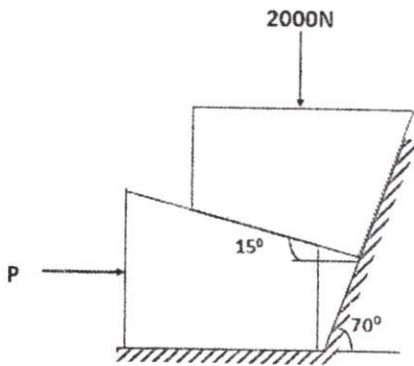


Fig.12

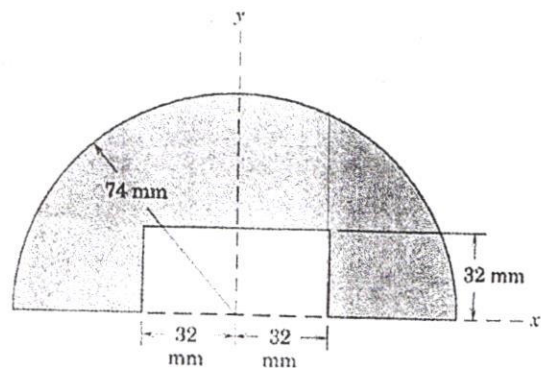


Fig.13