Hall Ticket Number:

Code No.: 1126

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (CBCS) I-Semester (Main) Examinations, December-2016

Basic Engineering Mechanics

(Civil, E.E.E. & Mech. Engg.)

Time: 3 hours Max. Marks: 70

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

Part-A (10 × 2 = 20 Marks)

1. Explain various supports and support reactions.
2. State the Lami's theorem and explain its limitations.
3. Explain the free body diagram with suitable examples.
4. Write the equilibrium equations for a concurrent force system in space.
5. Define and explain the terms: perfect frame and deficient frame.
6. What are the steps involved in the analysis of a truss.
7. Define belt friction and discuss the sense of frictional forces acting at the contact points.
8. With suitable examples explain the types of friction.
9. State and prove perpendicular axis theorem.
10. With suitable example explain various steps to be followed to determine Moment of inertia (MI) of composite area.

Part-B (5 × 10 = 50 Marks)

11. a) Find the support reactions for a simply supported beam AB loaded as shown in Figure: 1, where A is hinge support. [5]

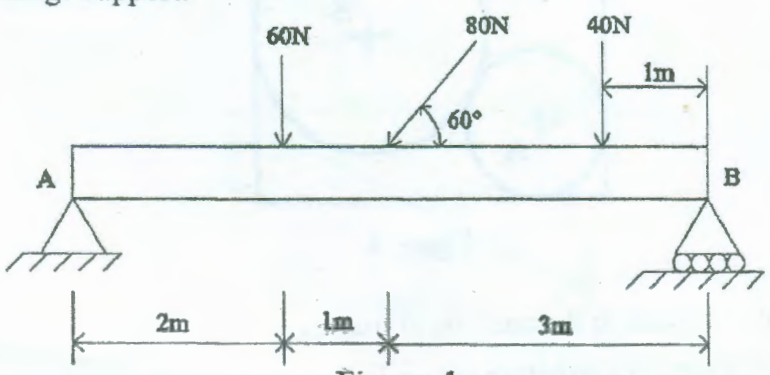

Figure: 1

b) The moment of a certain force F is 180Nm clockwise about O and 90 Nm counter clockwise about B as shown in Figure: 2. If the moment about A is zero, determine the force F. [5]

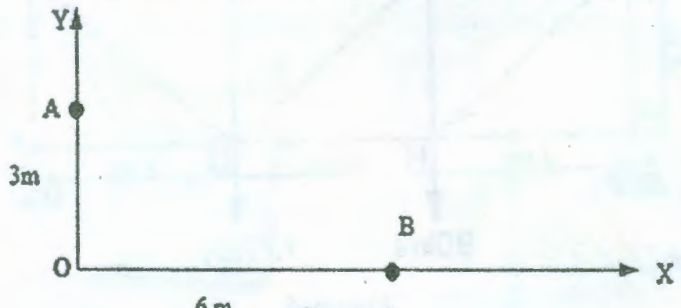

Figure: 2

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12. a) If the force multiplier of a force F acting from B to D is F_m= 20 N/m as shown in the Figure: 3, find out the following : a) Component of F along AC. b) Moment of F about E. [5]

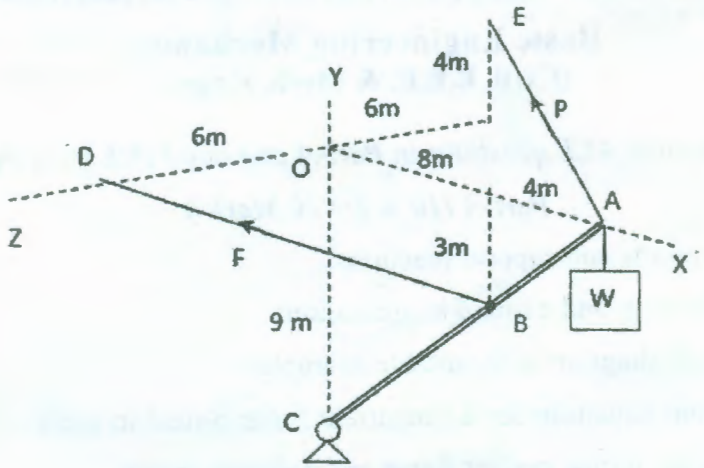

Figure: 3

b) Three Cylinders are piled in a rectangular ditch of width 0.18 m as shown in Figure: 4. Neglecting friction, determine the reaction between cylinder A and the Vertical Wall. Take W_A = 150 N, W_B = 400 N, W_C = 200 N, R_A = 40 mm, R_B = 60 mm, R_C = 50 mm. [5]

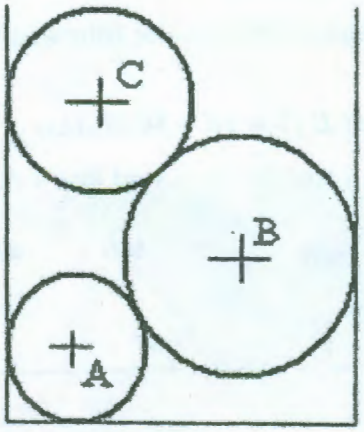

Figure: 4

13. a) List the assumptions made in the analysis of trusses. [2]

b) Find the member forces in a structure shown in Figure: 5 below. [8]

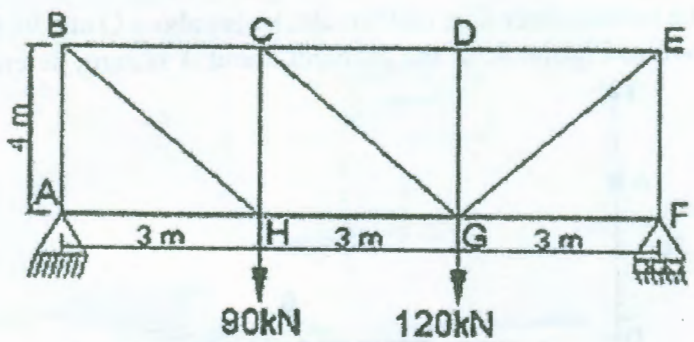

Figure: 5

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16. a) Find the tensile force in cables AB & CB for the system shown in Figure: 9. The remaining cables ride over frictionless pulleys E & F. [5]

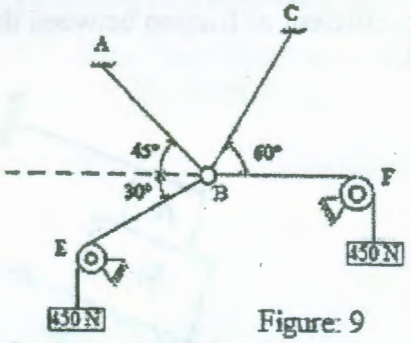

Figure: 9

b) A boom AB is supported in a horizontal position by a hinge A and a cable which runs from C over a small pulley at D as shown in Figure: 10. Compute the tension T in the cable and the horizontal and vertical components of the reaction at A. Neglect the weight of the boom and the size of the pulley at D. [5]

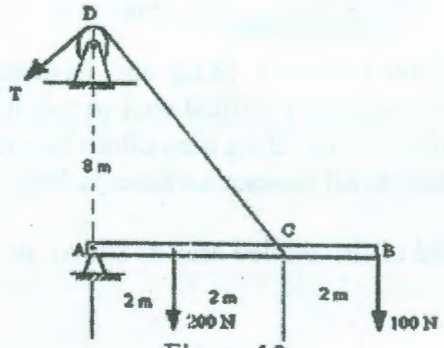

Figure: 10

17. Answer any ***two*** of the following:

a) Analyse the truss shown in Figure: 11. [5]

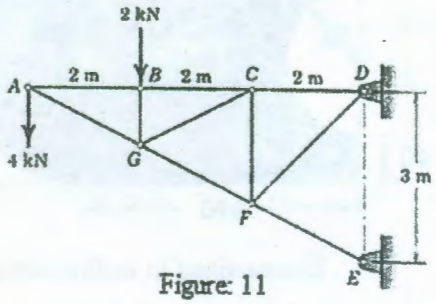

Figure: 11

b) A block overlying a 14^0 wedge on a horizontal floor and leaning against a vertical wall and weighing 2 kN as shown in Figure: 12 is to be raised by applying a horizontal force to the wedge. Assuming the coefficient of friction to be 0.3, determine the minimum horizontal force to be applied to raise the block. [5]

c) Locate the centroid of given parabola $y^2 = kx$ bounded by x-axis the line x = a shown in Figure: 13. [5]

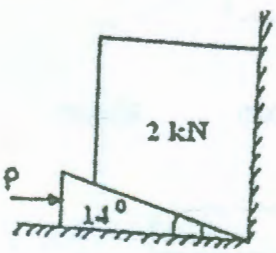

Figure: 12

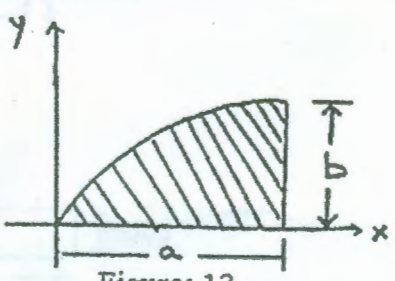

Figure: 13

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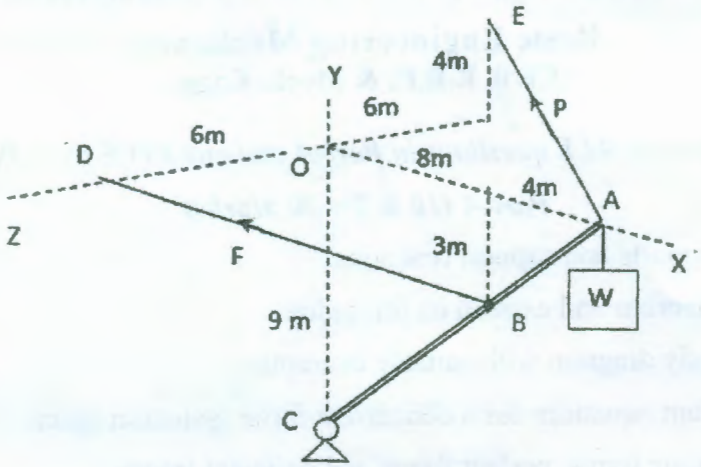

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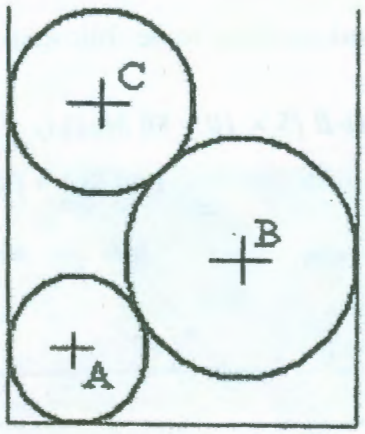

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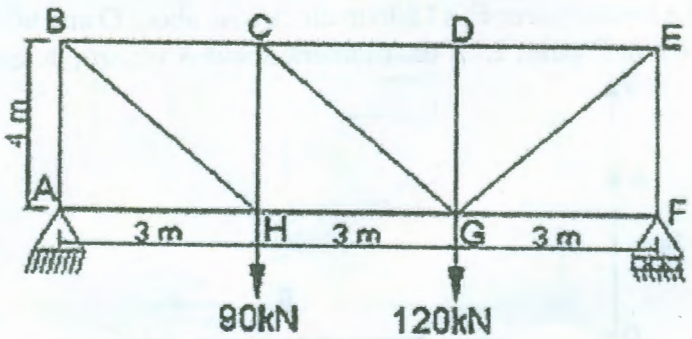

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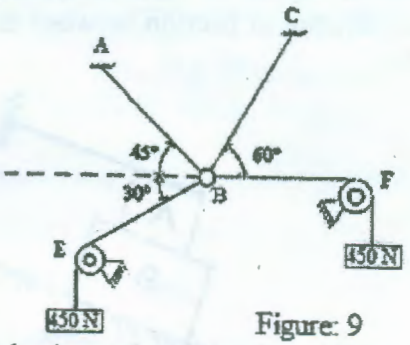

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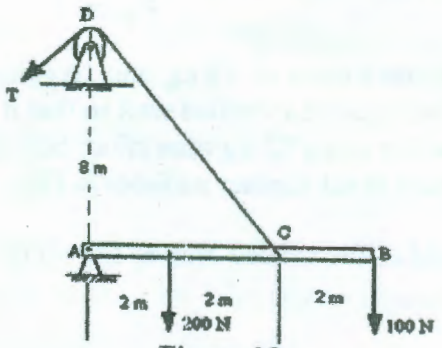

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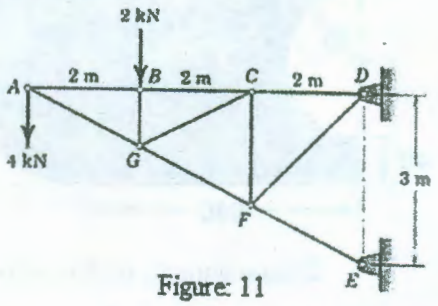

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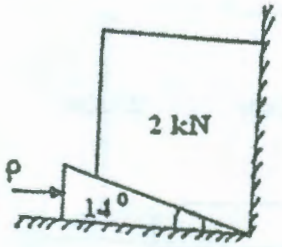

Figure: 12

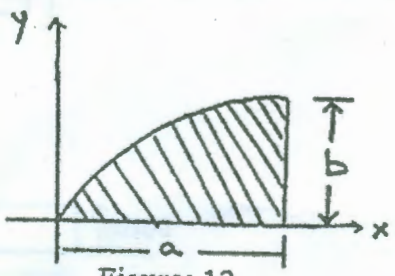

Figure: 13