Hall Ticket Number:

Code No.: 1116 OS

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. I Year I-Semester (Old) Examinations, May/June-2016

Engineering Mechanics-I

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. Two forces 100N and 200N are acting at an angle of **θ** yielding a resultant force of 150N. Compute the angle the resultant makes with 100N force.
2. A 100N force acts at point A(2,3) and joins the point B(4,5). Calculate the moment of this force about a point C(2,1).
3. State Varignon's theorem.
4. Give the equilibrium equations in case of parallel forces acting in space.
5. Write the relationship between the number of members (m) in a statically determinate planar truss having 'n' pin joints and 'R' being number of support reactions.
6. List the assumptions made in the analysis of trusses with respect loads and joints.
7. State laws of friction.
8. Explain the cone of friction.
9. Differentiate centroid from centre of gravity.
10. Compute the radius of gyration of a square section about an axis passing through its centroid.

Part-B (5 X 10=50 Marks)

11. a) Calculate the resultant of the following concurrent forces. [5]
    i. 50N, acting 135^0 with positive X direction.
    ii. 200N, acting 45^0 with positive X direction.
    iii. 150N, acting along Y axis.

    b) The moment of a certain force F is 180Nm clockwise about O and 90 Nm counter clockwise about B. If the moment about A shown in fig:1 is zero, determine the force F. [5]

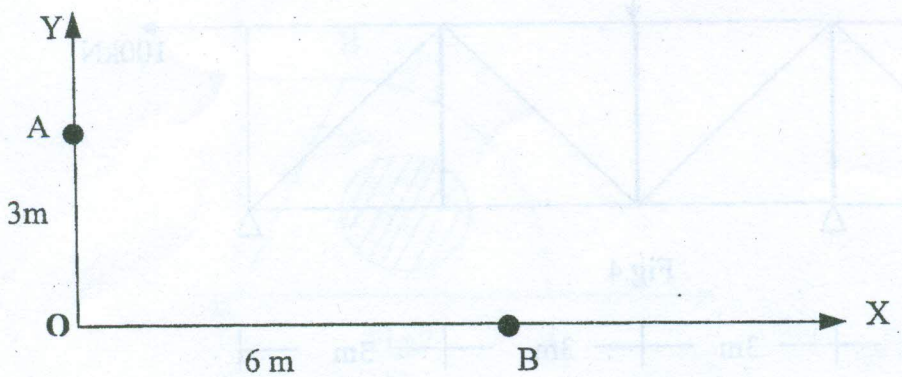

Fig:1

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12. Calculate the forces in the members of the tripod shown in Fig.2, OA, AB and AC due to a 100kN force acting at A parallel to X-axis. A(3,5,0); B(5,0,4); C(6,-1,-1). [10]

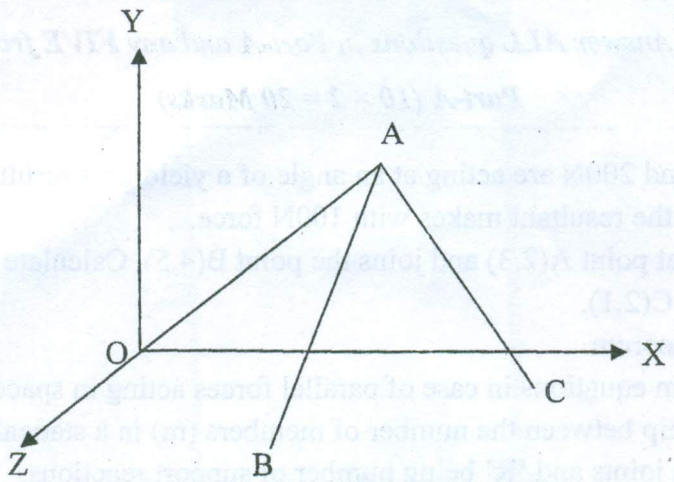

Fig.2

13. Three bars, pinned together at B and C and supported by hinges at A and D as shown in fig:3, form a four link mechanism. Determine the value of P that will prevent motion.[10]

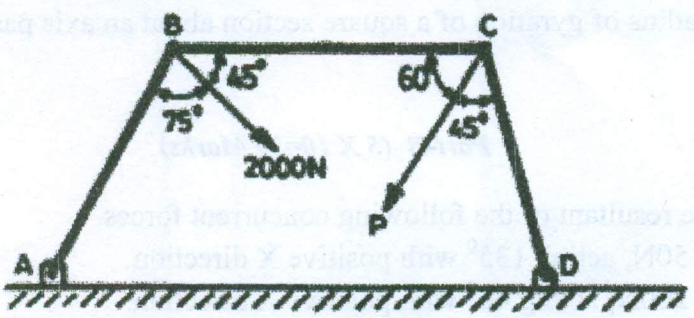

Fig:3

14. Compute the forces in the vertical and inclined members of the truss shown in Fig.4. Height of the truss in 3m. [10]

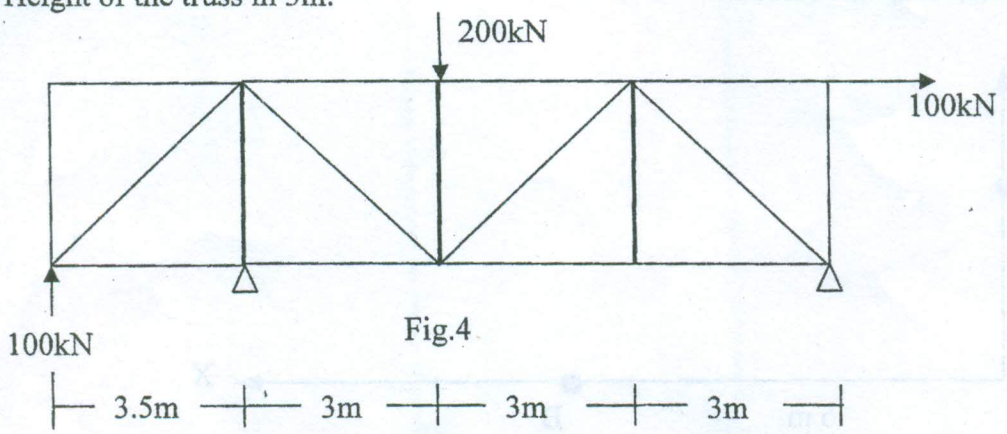

Fig.4

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15. Determine the force P required to start the wedge shown in fig:5. The angle of friction for all contact surfaces is 15^0. [10]

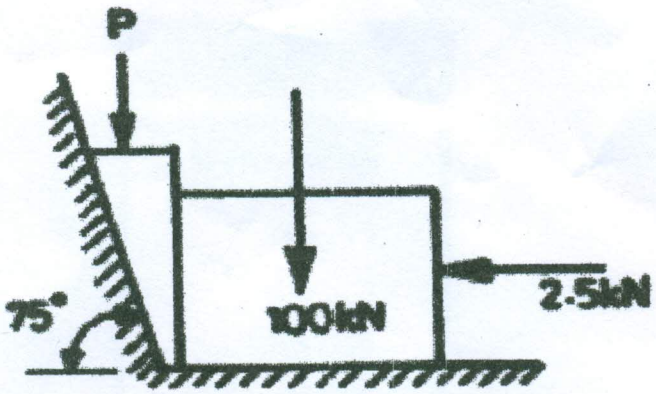

Fig:5

16. Two blocks of Weight W_1= 150N and W_2 = 100N rest on rough inclined plane and are connected by a flexible string as shown in Fig.6. If the coefficient friction between the W_1 and incline is 0.3 and the same between W_2 and incline is 0.5. Compute the angle defined by the incline with horizontal for sliding to impend. [10]

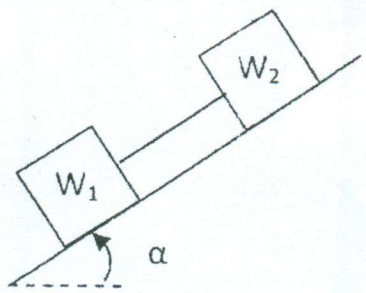

Fig.6

17. a) Calculate the coordinates of the centre of the circular portion cut from plate OABC as shown in Fig.7, such that the centroid of the remaining portion of the lamina coincides with the centre of the circular portion. OA=OB=500mm;. Diameter of the circle is 100mm. Angle AOB = 75^0. [7]

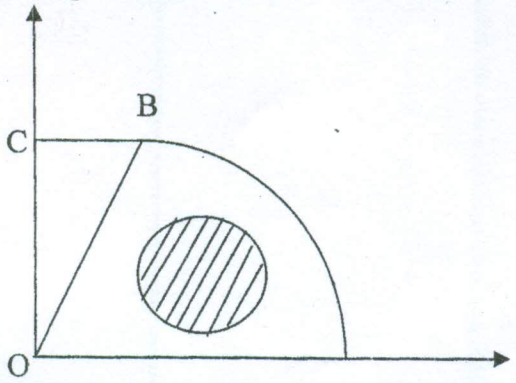

Fig.7

b) State Parallel axis theorem and hence evaluate the second moment area of a semicircular lamina about an axis passing through the centroid and parallel to the base diameter. [3]

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