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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. I Year I-Semester (Old) Examinations, December- 2015

Engineering Mechanics-I

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

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

Part-A (10 X 2=20 Marks)

1. Sketch the free body diagram of a smooth spherical roller of radius R, resting in a V – groove.
2. Give the force vector of a force of 100KN acting at A(2,3,4) and passing through origin. The force is directed towards the origin.
3. State and explain law of transmissibility.
4. Write the equilibrium equation in case of concurrent forces acting in space.
5. State the assumptions made in analyzing the forces in the members of a truss.
6. State the nature of forces in the top chord members of Warren truss subjected to gravity loads.
7. Differentiate rolling friction from sliding friction with a suitable example.
8. State laws of friction.
9. Differentiate centroid from center of gravity.
10. Compute the radius of gyration of a circular section about an axis passing through its centroid.

Part-B (5 X 10=50 Marks)
(All bits carry equal marks)

11. Calculate the resultant of the following concurrent forces.
    i. 50N, acting 135^0 with positive X direction and 45^0 with positive Y direction.
    ii. 200N, acting 45^0 with positive X direction and 45^0 with negative Y direction.
    iii. 150N, acting along Y axis.
    iv. 100N, acting along positive X direction.

12. A horizontal bar 10 m long and of negligible weight rests on rough inclined plane as shown in the Fig:1. If the angle of friction is 15^0, how close to B may the 300N force be applied before motion impends.

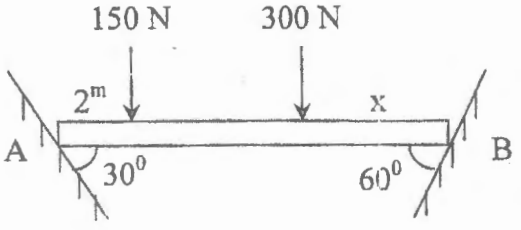

Fig:1

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13. Compute 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).

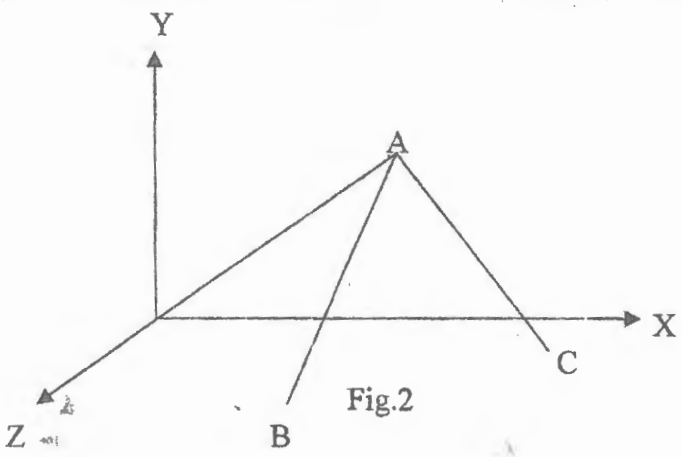

Fig.2

14. Calculate the forces in the members of the truss shown in Fig.3. P = 10kN. The members on all four sides are of same length.

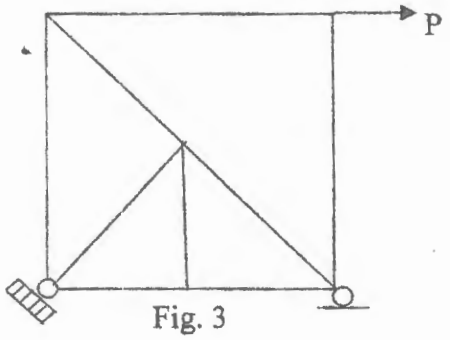

Fig. 3

15. Referring to Fig.4, compute the coordinates of the center of the circular portion cut from plate OABC such that the centroid of the remaining portion of the lamina coincides with the center of the circular portion. BC=OC=200mm; OA=500mm. diameter of the circle is 100mm.

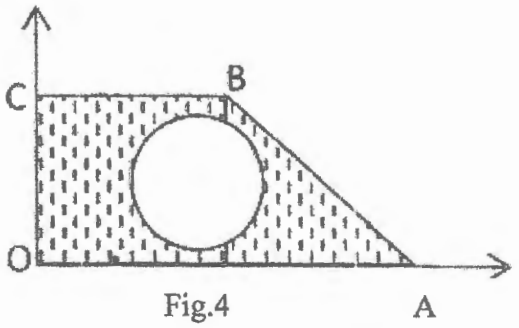

Fig.4

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16. Compute the distance s shown in fig: 5 to which the 90 kg painter can climb without causing 4 m. ladder to slip at its lower end A. The top of the 15 kg ladder has a small roller and at the ground, the coefficient of friction is 0.25. The mass centre of painter is directly above her feet.

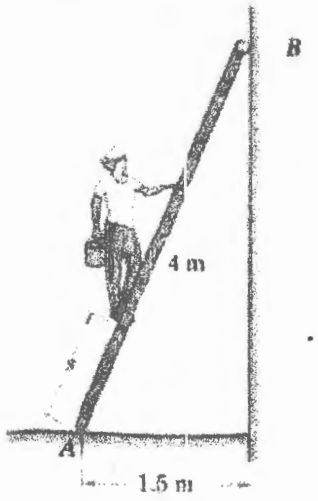

Fig.5

17. Calculate the moments of inertia of the lamina shown in Fig.6, with respect OX and OY axes. Height = 100mm, breadth = 80mm and thickness is 12mm.

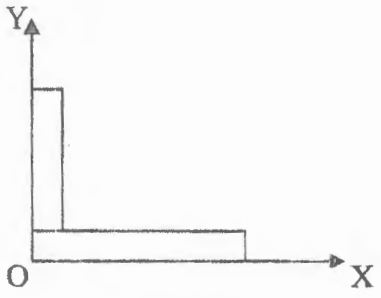

Fig. 6

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