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**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. I Year I-Semester (Old) Examinations, December-2016**

**Engineering Mechanics – I**

Time: 3 hours

Max. Marks: 50

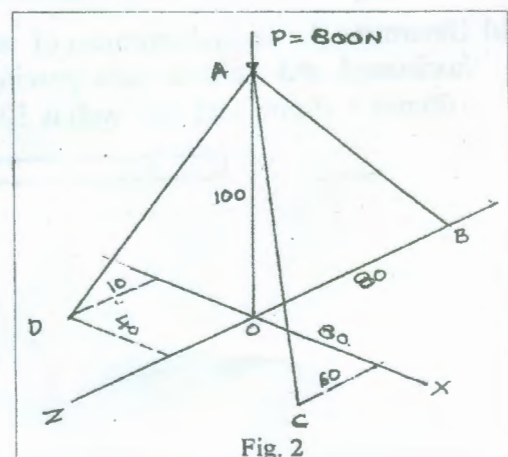
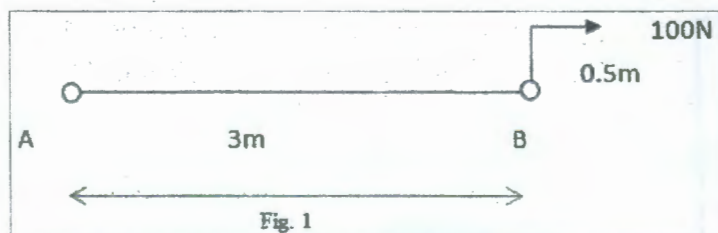
*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (15 Marks)**

1. State parallelogram law of forces. [1]
2. Two forces 20 N and 40 N act to produce a resultant force of 35 N. What is the included angle between the forces? [2]
3. A force of 40 N act at A (1, 2, 4) and directed towards B (4, 0, 6). Develop the force vector. [2]
4. Give the equilibrium equations in case of Parallel forces acting in space. [1]
5. A mass of 100kg is pulled along a horizontal surface by an effort of 200N, acting at an angle of  $20^\circ$  with horizontal. Determine the co-efficient of friction. [1]
6. Give the equilibrium equations in case of concurrent forces acting in a plane. [1]
7. What is cone of friction? [2]
8. A block of 100 N is just held by a rope wound around a rough cylinder by three turns carrying 40 N force at its end. What is the coefficient of friction between the rope and the cylindrical drum? [2]
9. A uniform wire is bent in the form of a right angled isosceles triangle of height 400 mm. Mention where the centroid of the bent portion from base (400mm) of the triangle is located. [2]
10. What is the radius of gyration of a Circular section about an axis passing through its base? [1]

**Part-B (5 × 7 = 35 Marks)**

11. a) The following forces are acting at A (2,4,0). Determine the resultant forces. [4]
  - i) 40N towards B (-2, -4, 0)
  - ii) 60N towards C (5, 7, 0)
  - iii) 100N towards D (5, 0, 0)
- b) Resolve a 450N force into two components along two axes OX and OY. The included angle between the axes is  $135^\circ$ . [3]
12. a) Determine the reactions at the supports of simply supported beam shown in Fig.1. The end A is hinged and B is a roller support. [3]
- b) A vertical load  $P = 800$  N is applied to the tripod shown in Fig. 2. Find the force in each bar. All dimensions are in cm. [4]



13. a) Determine forces in members 1, 2 and 3 of the truss shown in Fig. 3. Use method of sections. [3]

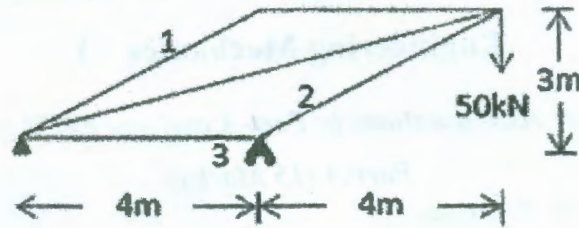


Fig. 3

- b) Determine the forces in the members of the truss shown in Fig. 4. ABC is an equilateral triangle. Support A is hinged and the support B is a roller support. [4]

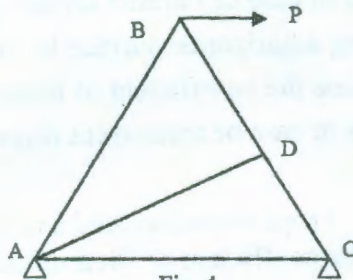


Fig. 4

14. a) Two blocks of same weight 100N each, are connected by a bar AB are impend to slide along the inclined plane shown in Fig. 5. Friction between lower block and the inclined plane is 0.35 and friction between the upper block and contact surface is 0.45, determine inclination of plane and the force in the connecting bar. [4]

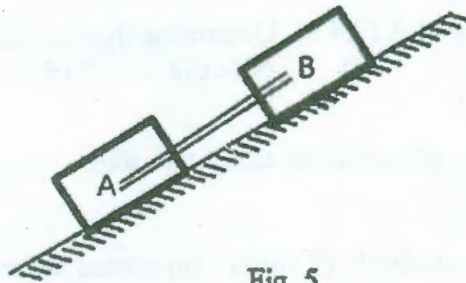


Fig. 5

- b) Derive an expression for belt friction. [3]
15. a) State and Prove Parallel axis theorem. [3]
- b) Determine the second moment of area of the lamina shown in Fig. 6 with respect to horizontal and vertical axis passing through the centroid of the section. Flange is 100mm × 10mm each and web is 300mm × 8mm. [4]

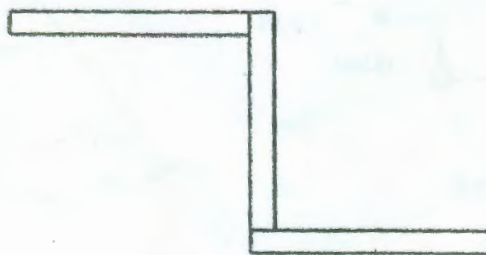


Fig. 6