Hall Ticket Number:

Code No. : 11016 O

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. (CBCS) I-Semester Backlog Examinations, December-2017

Basic Engineering Mechanics
(For Civil, EEE & 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. What is couple? State characteristics of a couple.
2. State parallelogram law of forces.
3. State Lami's theorem and explain with an example.
4. Explain the importance of Free Body Diagram.
5. Enumerate types of friction with examples.
6. Explain belt friction with suitable example.
7. What is the significance of centroid in engineering mechanics?
8. State perpendicular axis theorem for MI with suitable example.
9. What are the assumptions made in the analysis of trusses.
10. What is truss and state its applications.

Part-B (5 × 10 = 50 Marks)

11. a) Determine the resultant of the forces acting on the eye bolt shown in Fig.1. [4]

    b) Three bars pinned together at B and C and supported by hinges at A and D form a four-link mechanism as shown Fig.2. Determine the value of 'P' that will prevent motion. [6]

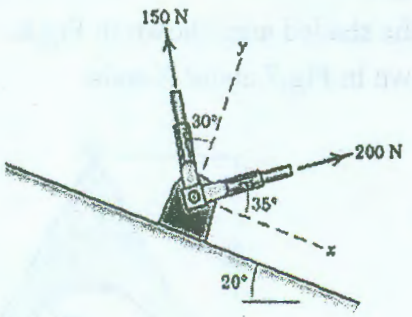

Fig. 1

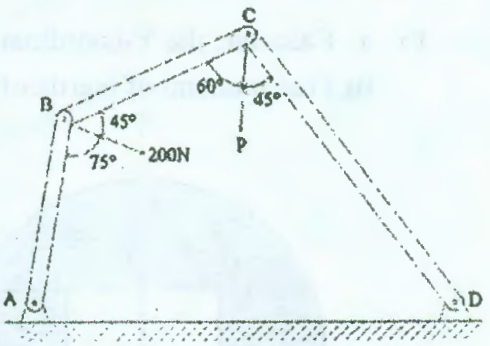

Fig. 2

12. a) Explain various supports and support reactions. [4]

    b) If the force multiplier of a force P acting from A to E is P_m= 10N/m, and that of F acting from B to D is F_m=30N/m referring Fig.3. Find out the following: [6]

    i) Component of each force along AC ii) Moment of P about the axis CD.

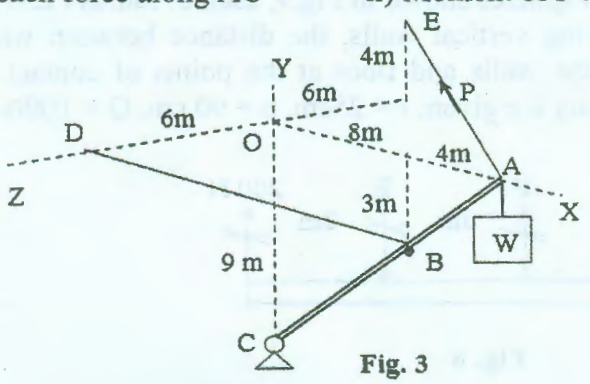

Fig. 3

Contd... 2

13. a) What are the advantages of method of sections over method of joints? How will you use method of section in finding forces in the members of a truss?

b) A cantilever truss is loaded as shown in fig.4. Find the member forces.

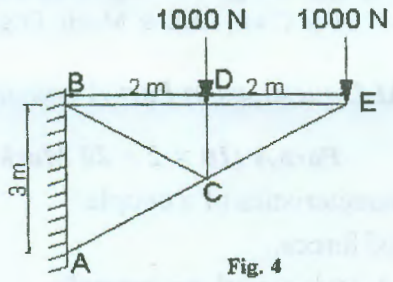

Fig. 4

14. a) Two equal bodies A and B of weight 'W' each are placed on a rough inclined plane. The bodies are connected by a light string. If $\mu_A = 1/2$ and $\mu_B = 1/3$, show that the bodies will be both on the point of motion when the plane is inclined at $\tan^{-1}(5/12)$. [5]

b) A block overlying a 10° wedge on a horizontal floor and leaning against a vertical wall and weighing 1500N is to be raised by applying a horizontal force to the wedge as shown in Fig.5. Assuming the coefficient of friction to be 0.3, determine the minimum horizontal force to be applied to raise the block. [5]

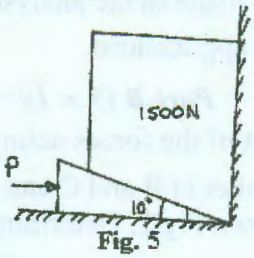

Fig. 5

15. a) Calculate the Y-coordinate of centroid of the shaded area shown in Fig.6. [4]

b) Find moment of inertia of shaded area shown in Fig.7 about X-axis. [6]

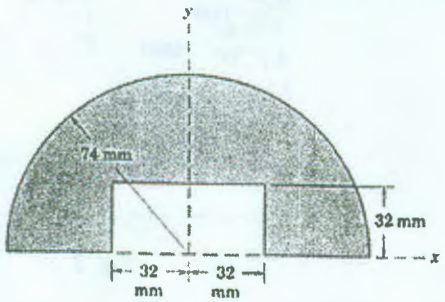

Fig. 6

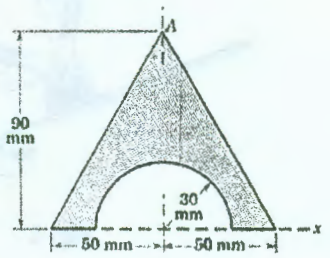

Fig. 7

16. a) Find the values of P and F so that the four forces shown in the Fig.8 produce an upward resultant of 300N acting at 4m from left end of the bar. [4]

b) Two smooth spheres shown in Fig.9, each of radius r and weight Q, rest in a horizontal channel having vertical walls, the distance between which is b. Find the pressures exerted on the walls and floor at the points of contact A, B and D. The following numerical data are given: r = 25cm, b = 90 cm, Q = 100N. [6]

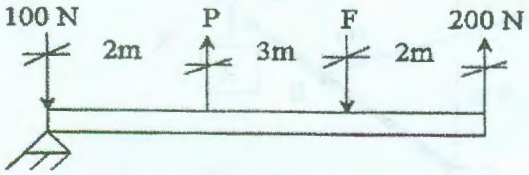

Fig. 8

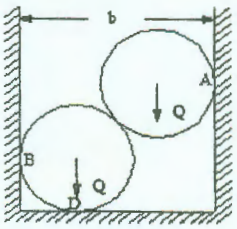

Fig. 9

Contd... 3