PVP 19

Code: 19CE3301

II B.Tech - I Semester – Regular Examinations – MARCH 2021

ENGINEERING MECHANICS
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place

PART – A

1. a) Write a short note on Free Body Diagram with an example.
   b) State parallel axis theorem.
   c) State laws of dry friction
   d) State the assumptions made in the analysis of trusses.
   e) What is a Projectile? Define angle of projection and horizontal Range of projectile.

PART – B

UNIT – I

2. Find the magnitude and direction of the resultant R of four concurrent force systems shown in Fig.1. 12 M

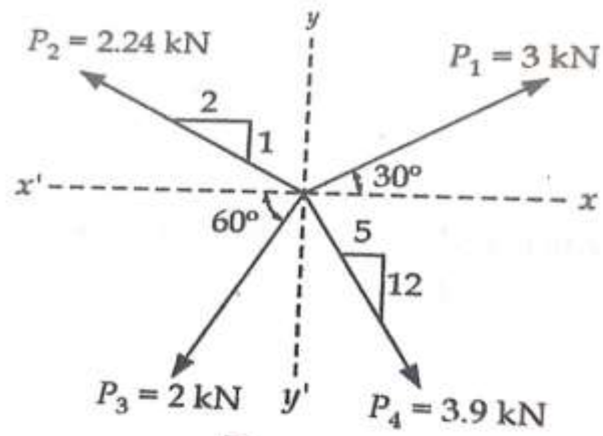

Fig.1.

OR

3. Two cylinders of diameters 100 mm and 50 mm, weighing 200 N and 50 N, respectively are placed in a trough as shown in Fig.2. Neglecting the friction, find the reactions at contact surfaces 1, 2, 3 and 4. 12 M

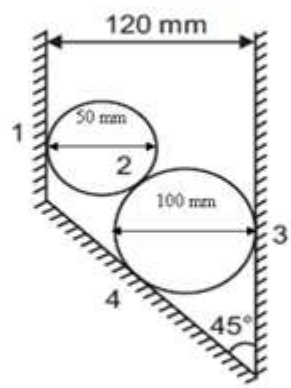

Fig.2

UNIT – II

4. Find the moment of inertia of a T section shown in Fig.3. about an axis passing through its centroid. 12 M

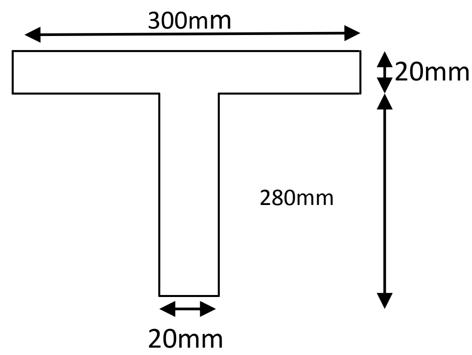

Fig.3.

OR

5. Determine the position of centroid of a plane figure shown in Fig.4. 12 M

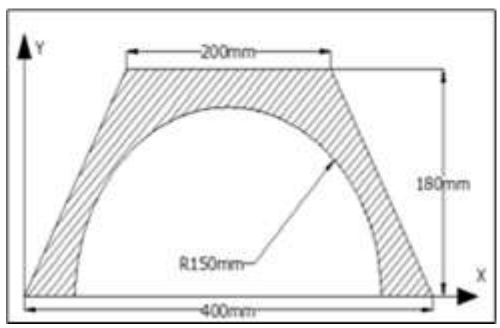

Fig.4.

UNIT-III

6. In Fig.5, W_1 weighs 200 N and W_2 weighs 120 N. They are tied together by a rope parallel to the plane. The coefficient of friction between W_1 and the plane is 0.25 and between W_2 and the plane is 0.5. Determine the value of the angle θ at which the sliding will occur. What is the tension in the rope? 12 M

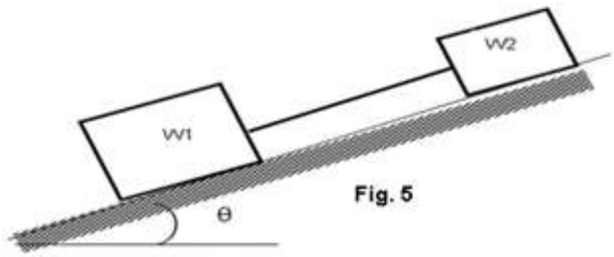

Fig.5.

OR

7. a) A pull of 250 N inclined at 30° to the horizontal plane is required just to move a body kept on a rough horizontal plane. But the push required just to move the body is 300N. If the push is inclined at 30° to the horizontal, find the weight of the body and the coefficient of friction. 6 M

b) A block weighing 1000N is to be raised by means of a 15^0 wedge B 500N, as shown in Fig.6. Assuming the coefficient of dry friction between all contact surfaces to be 0.2, determine what minimum horizontal force P should be applied to raise the block 6 M

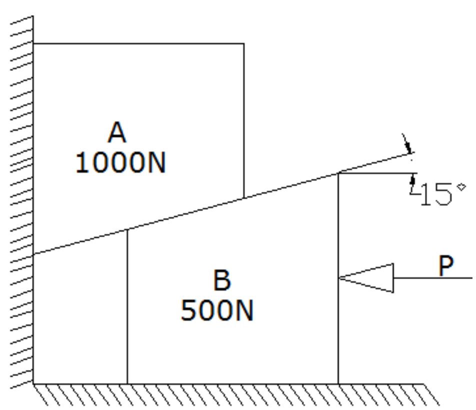

Fig.6.

UNIT – IV

8. Determine the forces induced in all the members of the pin-jointed truss shown in Fig.7. Mention clearly the nature of the forces (tension or compression) in each member. 12 M

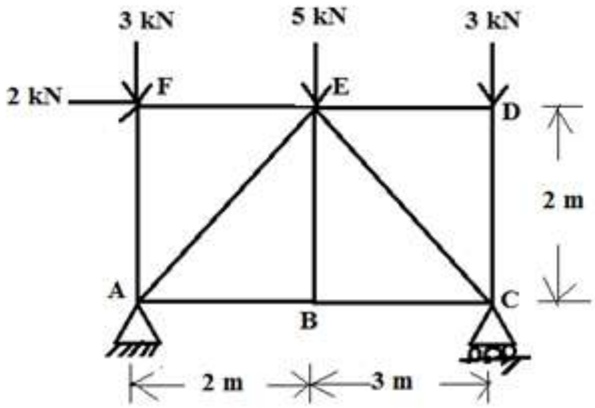

Fig.7.

OR

9. Determine the forces in the members of the truss as shown in Fig.8. 12 M

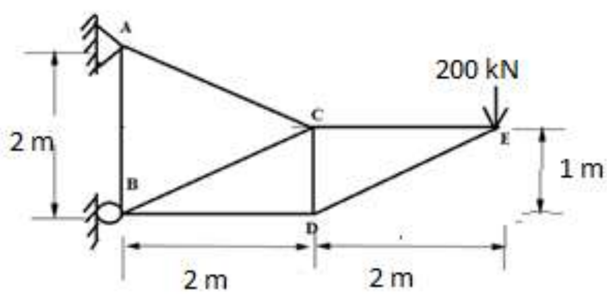

Fig.8.

UNIT – V

10. a) The motion of a particle is described by the following equations**:** 6 M

$x = t^2 + 8t + 4$ and $y = t^3 + 3t^2 + 8t + 4$

Determine (i) initial velocity of the particle, (ii) velocity of the particle at $t = 2s$ and (iii) acceleration of the particle at $t = 2s$

b) A stone is dropped into a well and the sound of splash is heard after 4 seconds. Assuming the velocity of sound to be 350 m/s. Find the depth of the well. 6 M

OR

11. a) The acceleration of a particle is defined by the relation $a = - 4V$, where a is in m/s^2 and V is in m/s. the particle starts from origin when $t=0$ and $V=30$ m/s. Find the distance travelled by the particle when it comes to rest. 6 M

b) In a rectilinear motion of a particle, the acceleration is governed by $a=12t-6t^2$. It starts from rest when $t=0$. Determine its velocity when it returns to its starting position. 6 M