**B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering) /
BTCLEVI / BTMEVI / BTELVI / BTECVI / BTCSVI**

Term-End Examination

ᴏᴏ1ᴇ3   **June, 2018**

ET-202(A) : ENGINEERING MECHANICS

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any five questions. All questions carry equal marks. Use of non-programmable scientific calculator is permitted.*

1. (a)   A weight of 1000 N is supported by two chains as shown in Figure 1. Determine the tension in each chain.   7
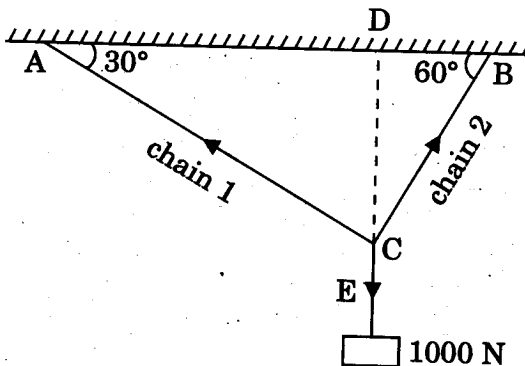

Figure 1

(b) Two forces P and Q are acting at a point O as shown in Figure 2. The resultant force is 400 N and angles β and γ are 35° and 25° respectively. Find the two forces P and Q.　　7
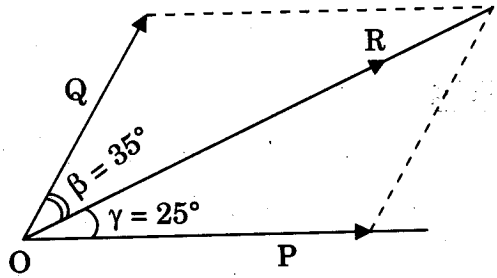

Figure 2

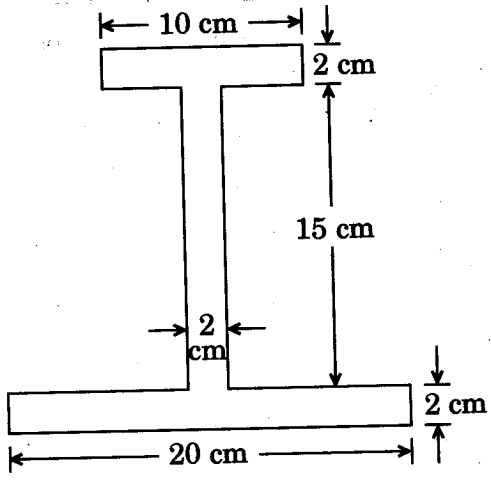2. (a) Find the centre of gravity of the I-section shown in Figure 3.　　7

Figure 3

(b) Figure 4 shows a T-section of dimensions 10 × 10 × 2 cm. Determine the moment of inertia of the section about the horizontal and vertical axes, passing through the centre of gravity of the section.　7
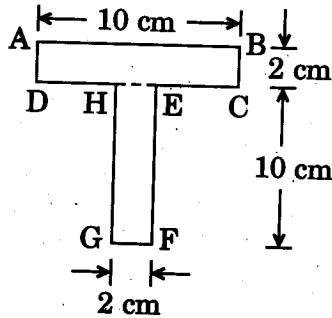

Figure 4

3. (a) A body is moving with uniform acceleration and covers 15 m in the fifth second and 25 m in the tenth second. Determine　7

(i) The initial velocity of the body

(ii) The acceleration of the body

(b) A tower is 90 m in height. A body is dropped from the top of the tower and at the same time another body is projected upward from the foot of the tower. Both the bodies meet at a height of 30 m. Find the velocity with which the second body is projected upward.　7

4. **(a)** A body is projected at an angle of 60° with the horizontal. The horizontal range of the body is 5 kilometres. Find :   7

    (i) The velocity of the projection

    (ii) The maximum height attained by the projectile

  (b) A body of weight 500 N is pulled up on an inclined plane, by a force of 350 N. The inclination of the plane is 30° to the horizontal and the force is applied parallel to the plane. Determine the coefficient of friction.   7

5. **(a)** A truss is loaded and supported as shown in Figure 5. Determine the axial forces in the members CE, CG, and FG.   7
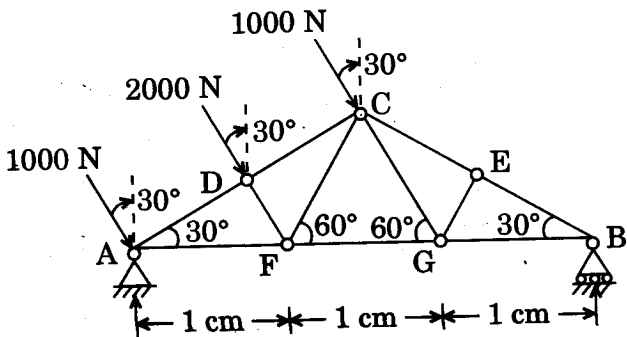

Figure 5

(b) A simply supported beam of length 5 m carries a uniformly increasing load of 800 N/m at one end to 1600 N/m at the other end. Calculate the reactions at both ends. 7

6. (a) A vehicle of mass 600 kg, moving with a velocity of 12 m/s strikes another vehicle of mass 400 kg moving at 9 m/s in the same direction. Both the vehicles get coupled together due to the impact. Find the common velocity with which the two vehicles will move. Also find the loss of kinetic energy due to impact. 7

(b) A truck of weight 20 kN is travelling at 45 km/hr on a plane road. It is brought to rest in 20 meters. Determine the average force of resistance acting on the truck. 7

7. (a) State triangle law of forces and Lami's theorem. 7

(b) What are the different methods of analysing a perfect frame ? Give the applications of these methods with proper justification. 7

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