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

Term-End Examination

□□8己3   **December, 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) Determine the magnitude, direction and
position of a single equivalent force P, which
keeps in equilibrium the system of forces
acting at the corners of a rectangular block
as shown in Figure 1.   7
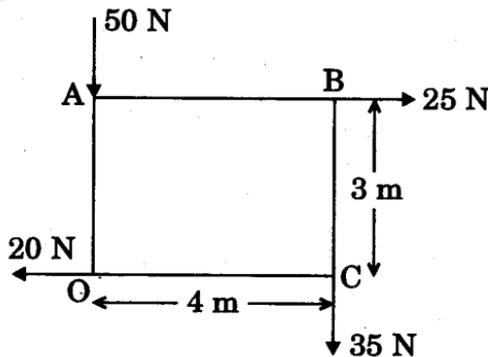
Figure 1

(b) A weight of 900 N is supported by two chains of lengths 4 m and 3 m as shown in Figure 2. Determine the tension in each chain. 7
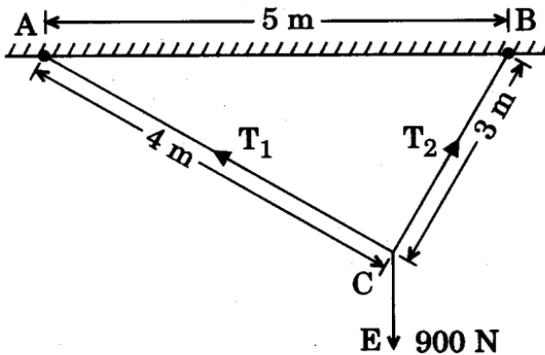

Figure 2

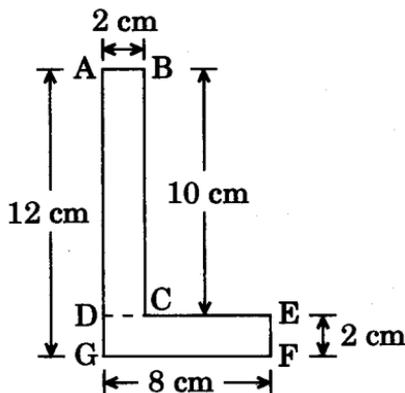2. (a) Find the centre of gravity of the L-section shown in Figure 3. 7

Figure 3

(b) Find the moment of inertia of the area shown shaded in Figure 4, about edge AB. 7
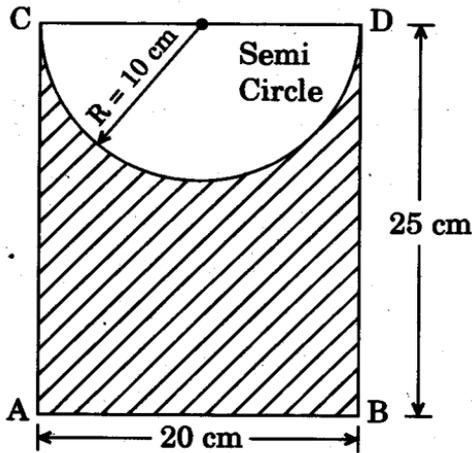

Figure 4

3. (a) A stone is thrown vertically upwards with a velocity of 19·6 m/s from the top of a tower 24·5 m high. Calculate *3+1+3*

(i) Time required for the stone to reach the ground.

(ii) Velocity of the stone in its downward travel at the point in the same level as the point of projection.

(iii) The maximum height to which the stone will rise in its flight.

(b) Body A is thrown with a velocity of 10 m/s at an angle of 60° to the horizontal. If another body B is thrown at an angle of 45° to the horizontal, find its velocity if it has the same   *2+3+2*

(i)   horizontal range,

(ii) maximum height, and

(iii) time of flight, as the body A.

4. (a) A 7·0 m long ladder rests against a vertical wall, with which it makes an angle of 45° with the floor. If a man, whose height is one half of that of the ladder, climbs it, at what distance along the ladder will he be, when the ladder will start slipping ? The coefficient of friction between the ladder and the wall is 1/3 and that between the ladder and floor is 1/2. (Assume mass of the man is 60 kg)   7

(b) A stone dropped into a well is heard to strike the water 4 seconds after drop. Find the depth of the well, if the velocity of sound is 350 m/s.   7

5. (a) A car of weight 9810 N accelerates from rest to a speed of 45 km/hr in a distance of 50 m against a resistance of 100 N. Find the average driving force acting on the car. Using the average force, determine the power developed by the car engine.   7

(b) A ball of mass 100 gm with velocity u, strikes directly another ball of same mass, which is at rest. The first ball is brought to rest by the impact. Find the loss of kinetic energy if the coefficient of restitution is $1/\sqrt{2}$. 7

6. (a) Find the force in the member CF of the truss loaded and supported as shown in Figure 5. 7
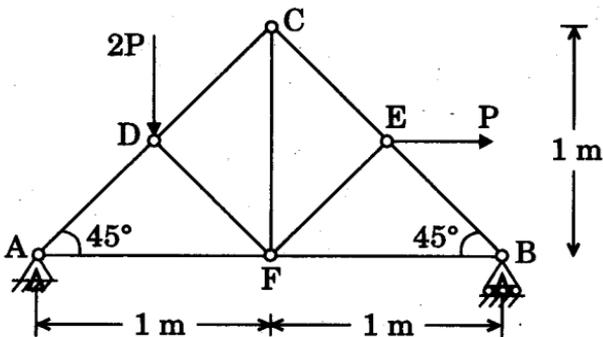

Figure 5

(b) A simply supported beam of span 9 m carries a uniformly varying load from zero at one end A to 900 N/m at end B. Calculate the reactions at the two ends of the support. 7

7. (a) If three concurrent forces are acting on a body which is in equilibrium, then the resultant of the two forces should be equal and opposite to the third force. Prove this statement. 7

(b) Explain the principle of conservation of energy, with the help of an example. 7

———