

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Briefly explain the scope of any Four fields of Civil Engineering. (10 Marks)
- b. Explain in detail the role of civil engineer in the infrastructural development. (10 Marks)

OR

- 2 a. Explain in brief about any four building materials for construction. (10 Marks)
- b. Explain in brief about smart materials in construction field. (10 Marks)

Module-2

- 3 a. State and prove Varignon's Principle of moments. (10 Marks)
- b. Determine the magnitude, direction of the resultant force for the force system shown in Fig.Q3(b) locate the resultant force with respect to the point D.

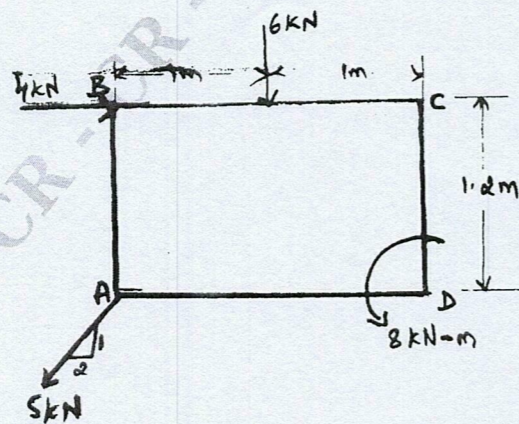


Fig.Q3(b)

(10 Marks)

OR

- 4 a. Determine the reactions at contact points for spheres A, B and C as shown in Fig.Q4(a). It is given that : $W_A = W_B = 4 \text{ kN}$, $W_C = 6 \text{ kN}$, $d_A = d_B = 500 \text{ mm}$, $d_C = 800 \text{ mm}$.

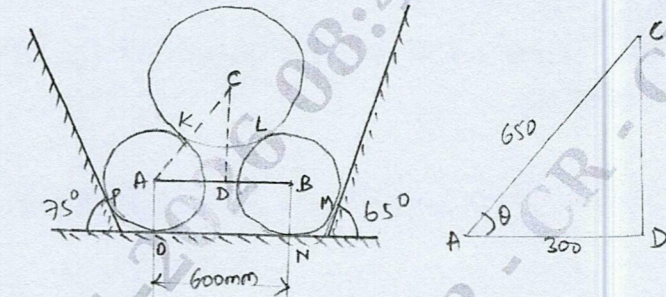


Fig. 2

(10 Marks)

- b. A small block of weight 1000 N as shown in Fig.Q4(b), is placed on a 30° inclined plane with $\mu = 0.25$. Determine the horizontal force to be applied for :
 - i) Impending motion down the plane
 - ii) Impending motion up the plane.

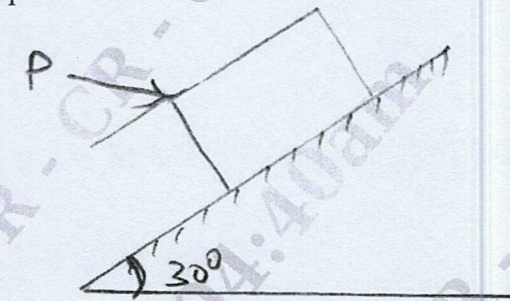


Fig.Q4(b)

(10 Marks)

Module-3

- 5 a. Determine the centroid for a rectangular lamina using method of integration. (10 Marks)
- b. Determine the centroid for the given composite geometrical section as shown in Fig.Q5(b).

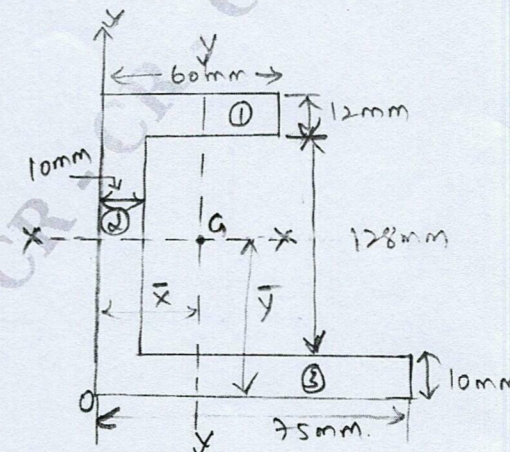


Fig.Q5(b)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Derive an expression for moment of inertia of a triangle with respect to horizontal centroidal axis. (10 Marks)
- b. Locate the centroid of the shaded area as shown in Fig.Q6(b).

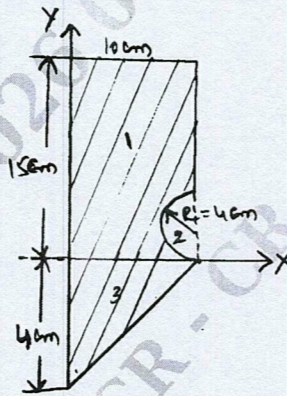


Fig.Q6(b)

(10 Marks)

Module-4

- 7 a. Explain types of supports with neat sketch. (10 Marks)
- b. A simply supported beam of span 6 m is subjected to loading as shown in Fig.Q7(b) determine the reactions at A and B.

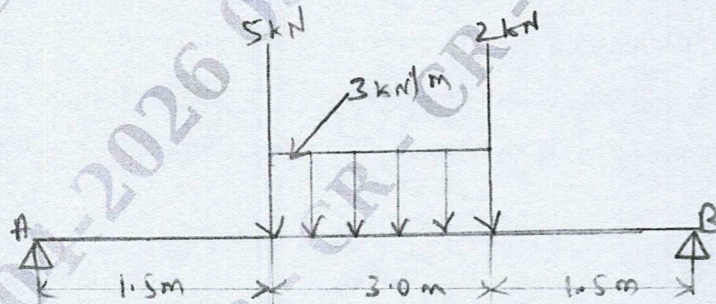


Fig.Q7(b)

(10 Marks)

OR

- 8 a. Define Trusses. What are the different types of Trusses and assumptions made in the analysis of statically determinate Trusses? (10 Marks)
- b. Explain in brief the analysis of Statically Determinate Trusses by method of joints and method of sections. (10 Marks)

Module-5

- 9 a. Explain : (10 Marks)
- i) Displacement
 - ii) Velocity
 - iii) Speed
 - iv) Acceleration
 - v) Deceleration.

- b. A car and truck are both travelling at a constant speed of 45 km/h. Car is 10 m behind the truck. The truck driver suddenly applies his brakes, causing the truck to decelerate at a constant rate at 2 m/s^2 . Two seconds later the driver of car applied his brakes and just manages to avoid rear end collision. Determine the constant rate at which the car decelerated. (10 Marks)

OR

- 10 a. Explain the terms : (10 Marks)
- i) Velocity of projection
 - ii) Angle of projection
 - iii) Time of flight
 - iv) Horizontal range
 - v) Vertical height.

- b. Find the least initial velocity with which a projectile is to be projected so that it clears a wall 4m height located at a distance of 5 m and strikes the ground at a distance 4 m beyond the wall as shown in Fig.Q10(b). The point of projection is at the same level as the foot of the wall.

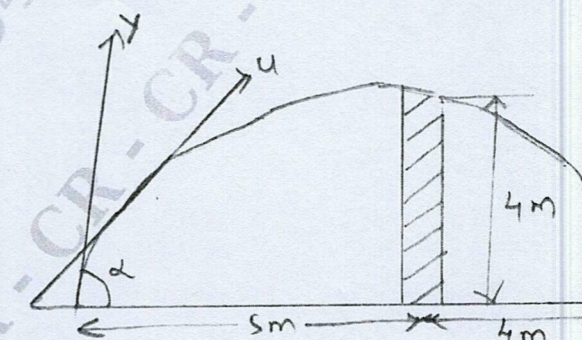


Fig.Q10(b)

(10 Marks)