

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

17CIV13/23

First/Second Semester B.E. Degree Examination, Jan./Feb. 2023 Elements of Civil Engineering and Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain briefly the scope of civil engineering in,
 - i) Structural Engineering
 - ii) Transportation Engineering
 - iii) Environmental Engineering
 - iv) Geotechnical Engineering
 - v) Water resources engineering. (10 Marks)
- b. State and explain the principle of :
 - i) Transmissibility of forces (05 Marks)
 - ii) Physical independence of forces. (05 Marks)
- c. Explain the role of civil engineer in infrastructural development. (05 Marks)

OR

- 2 a. Define couple and mention its characteristics. (06 Marks)
- b. Enumerate the different types of dams. State the functions of dams. (06 Marks)
- c. Determine the moment of 400N force about points A, B, C and D as shown in Fig.Q2(c).

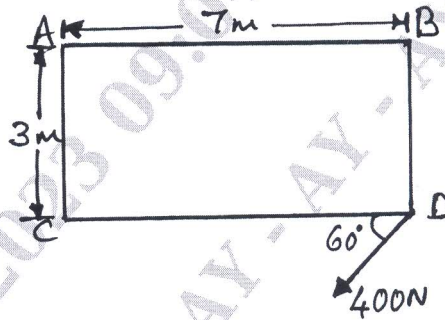


Fig.Q2(c) (08 Marks)

Module-2

- 3 a. State and prove Lami's theorem. Also write the significance of the law. (10 Marks)
- b. Find the resultant of coplanar concurrent forces shown in Fig.Q3(b).

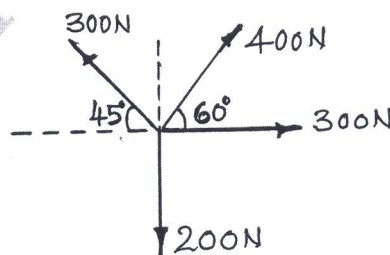


Fig.Q3(b)

(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

- 4 a. State the laws of static friction. (04 Marks)
 b. Define :
 i) Angle of friction
 ii) Coefficient of friction
 iii) Cone of friction. (06 Marks)
 c. Determine the force P just required to slide the block B in arrangement shown in Fig.Q4(c). Find also the tension in the string, take weight of block A = 500N, B = 1000N and $\mu = 0.2$ (for all contact surfaces).

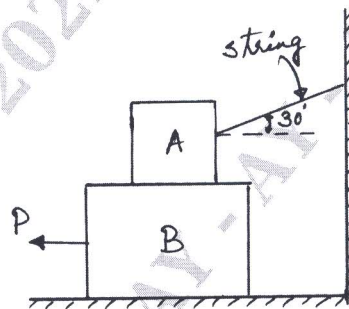


Fig.Q4(c)

(10 Marks)

Module-3

- 5 a. State and prove Varignon's theorem of moment. (10 Marks)
 b. Determine the reactions at the supports A and B for the beam as shown in Fig.Q5(b).

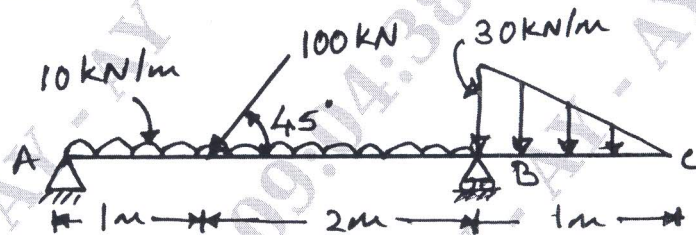


Fig.Q5(b)

(10 Marks)

OR

- 6 a. Explain with neat sketch :
 i) Types of loads
 ii) Types of support
 iii) Types of beams. (10 Marks)
 b. Determine the resultant of the system of forces acting on a lamina as shown in Fig.Q6(b) locate the distance of the resultant from point 'O'.

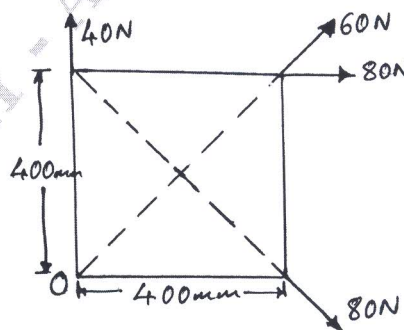


Fig.Q6(b)

(10 Marks)

Module-4

- 7 a. State and prove parallel axis theorem. (08 Marks)
 b. With reference to the co-ordinate axis x and y, locate the centroid of the shaded area as shown in Fig.Q7(b).

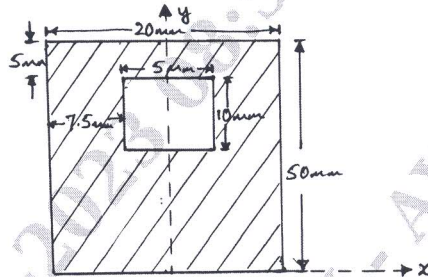


Fig.Q7(b)

(12 Marks)

OR

- 8 a. Determine the centroid of a triangular lamina about its base by method of integration. (08 Marks)
 b. Determine the moment of inertia of the section along the horizontal axis passing through the centroid of the section shown in Fig.Q8(b).

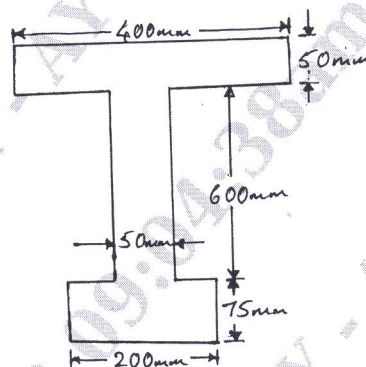


Fig.Q8(b)

(12 Marks)

Module-5

- 9 a. A stone is dropped into a well. After 4 seconds the sound of splash is heard. If the velocity of sound is 330 m/s. Find the depth of the well upto the water surface. (10 Marks)
 b. A projectile is launched from a gun. After 3.783 seconds, the velocity of the projectile is observed to make an angle of 30° with the horizontal and at 4.79 seconds it reaches its maximum height. Calculate the initial velocity and angle of projection. (10 Marks)

OR

- 10 a. What is a projectile? Define the following terms briefly :
 i) Angle of projection
 ii) Horizontal range
 iii) Vertical height
 iv) Time of flight. (10 Marks)
 b. The motion of a particle starting from rest is defined by $a = 10t - t^2$, where a is in m/s^2 and t is in seconds. Find the displacement before it starts in reverse direction of motion and velocity when acceleration changes its direction. (10 Marks)
