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17CIV13/23

## First/Second Semester B.E. Degree Examination, Jan./Feb. 2021 Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Discuss briefly the impact of Civil Engineering infrastructural development on the National Economy. (05 Marks)
- b. Explain the following with examples : i) Rigid body and Elastic body  
ii) Equilibrium and Equilibrant      iii) Scalar and Vector. (09 Marks)
- c. Explain briefly the scope of the following Civil Engineering fields :  
i) Structural Engineering      ii) Hydraulic Engineering. (06 Marks)

**OR**

- 2 a. Distinguish between Rigid Pavement and Flexible Pavement. (06 Marks)
- b. List the System of forces. (04 Marks)
- c. Find the magnitude and direction of the resultant force acting at a point.  
i) 80N towards North      ii) 20N towards North East      iii) 40N towards East  
iv) 60N in a direction inclined  $30^\circ$  East of South.  
v) 70N in a direction inclined  $60^\circ$  South of West. (10 Marks)

### Module-2

- 3 a. State and prove Lami's theorem. (06 Marks)
- b. Explain briefly dynamic friction. (04 Marks)
- c. A body of weight 100N is suspended by which two strings 5m and 4m length attached at same horizontal line 6m apart. Find tension in the strings. (10 Marks)

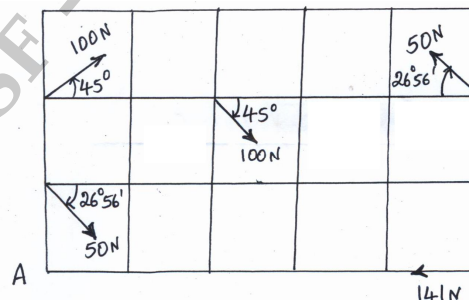
**OR**

- 4 a. Explain briefly the Laws of Static friction. (06 Marks)
- b. Explain : i) Angle of friction      ii) Limiting friction. (04 Marks)
- c. An effort of 200N is required just to move a certain body up an inclined plane of angle  $15^\circ$  the force acting parallel to the plane. If the angle of inclination of the plane is made  $20^\circ$ . The effort required again applied parallel to the plane is found to be 230N. Find the weight of the body and coefficient of friction. (10 Marks)

### Module-3

- 5 a. Mention the different types of supports, with neat sketch. (06 Marks)
- b. Determine completely one resultant of the free force shown in sketches. The forces are in Newton and squares are  $100\text{mm} \times 100\text{mm}$  and also find moment about A. (06 Marks)

Fig.Q5(b)



(14 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. State and prove Varignon's theorem. (08 Marks)  
 b. Determine the reactions @ the supports of the beam shown in fig. Q6(b) below. (12 Marks)

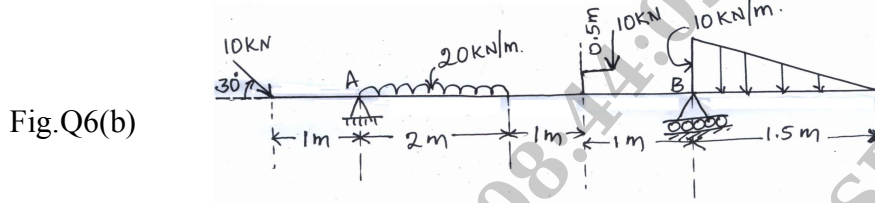


Fig.Q6(b)

**Module-4**

- 7 a. State and prove Parallel Axis theorem. (06 Marks)  
 b. Determine the coordinates of the centroid of the plane area shown in fig. Q7(b), with respect to 'O'.

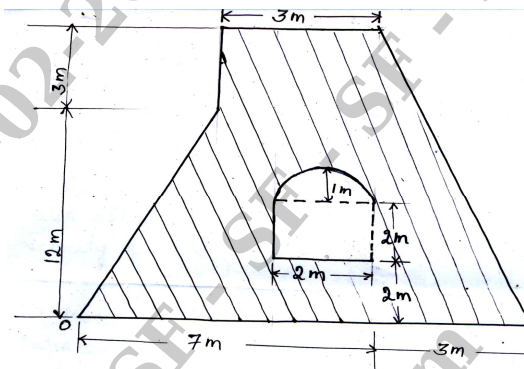


Fig.Q7(b)

OR

- 8 a. Explain : i) Centre of Gravity ii) Axis of Reference iii) Axis of Symmetry. (06 Marks)  
 b. Find the Polar moment of Inertia for the shaded area.

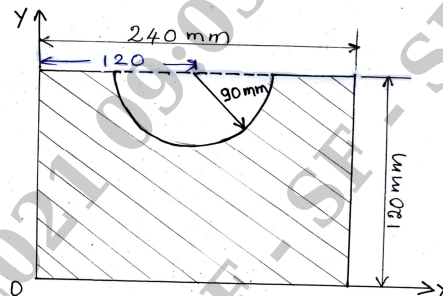


Fig.Q8(b)

**Module-5**

- 9 a. A motor car takes 10 secs to cover 20m and 15 secs to cover 40m. Find the uniform acceleration of the car and velocity at the end of 15 secs. (10 Marks)  
 b. A stone dropped into a well is heard to strike the water after 4 secs. Find the depth of the well. If the velocity of sound is 350 m/sec. (10 Marks)

OR

- 10 a. Prove that the path traced by the projectile is parabola. (06 Marks)  
 b. Explain the terms used with projectiles. (04 Marks)  
 c. A cricket ball thrown by a fielder from a height of 2m at an angle of  $30^\circ$  to the horizontal with an initial velocity of 20m/sec. hits the wickets at a height of 0.5m from the ground. How far was the fielder from the wickets? (10 Marks)

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