

# CBCS SCHEME



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17CIV13/23

## First/Second Semester B.E. Degree Examination, June/July 2018 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. Briefly explain the role of civil engineer in the infrastructural development. (08 Marks)
- b. Define Couple and Mention its characteristics. (06 Marks)
- c. Find the moment of 500N force about point A, B, C and D as shown in fig. Q1(c). (06 Marks)

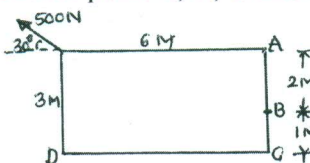


Fig.Q1(c)

OR

- 2 a. State and explain basic idealization in mechanics. (08 Marks)
- b. Explain the following bridges with neat sketches : (06 Marks)  
       i) Suspension bridge   ii) Arch bridge.
- c. In the triangle ABC, a force at 'A' produces a clockwise moment of 90kN-m at B and an anticlockwise moment of 45kN-m at C. Find the magnitude and direction of the force as shown in fig.Q2(c). (06 Marks)

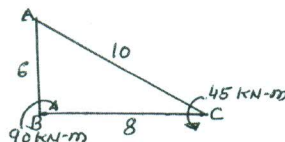


Fig.Q2(c)

### Module-2

- 3 a. State and prove Lami's theorem. Also write the significance of the law. (10 Marks)
- b. Four forces acting on the gusset plate of a joint in a bridge truss are shown in fig. Q3(b). Determine the value of 'P' and 'θ' to maintain the equilibrium of the joint. (10 Marks)

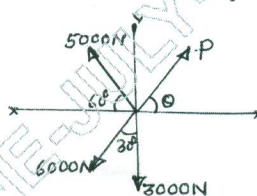


Fig.Q3(b)

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 reactions at contact points for spheres A, B and C as shown in fig.Q4(c). It is given that  $W_A = W_B = 4\text{kN}$ ,  $W_C = 6\text{kN}$ ,  $d_A = d_B = 500\text{mm}$ ,  $d_C = 800\text{mm}$ . (10 Marks)

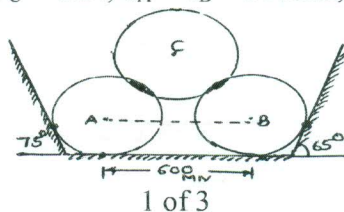


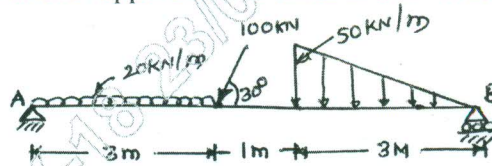
Fig.Q4(c)

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.

**Module-3**

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

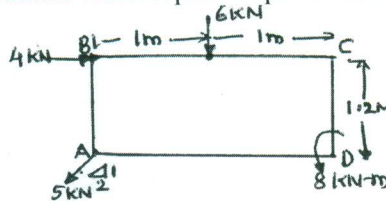
Fig.Q5(b)



OR

- 6 a. Explain briefly with neat sketch : (10 Marks)  
 i) Types of load ii) Types of support iii) Types of beams.  
 b. Determine the resultant of the force system acting on a body as shown in fig. Q6(b). Also locate the position of the resultant with respect to point 'D'. (10 Marks)

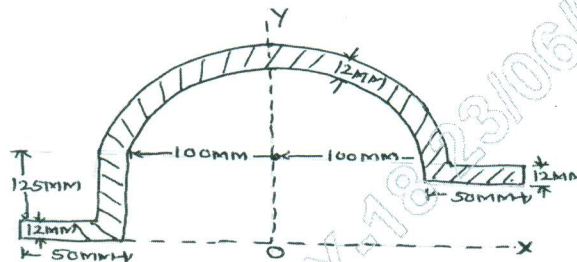
Fig.Q6(b)



**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 an area as shown in fig. Q7(b). (12 Marks)

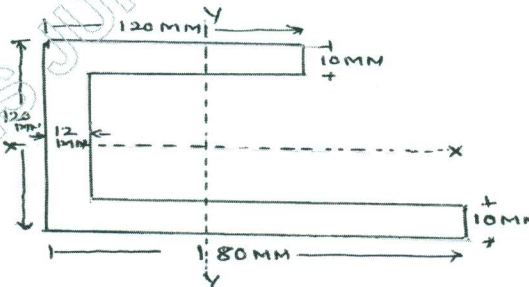
Fig.Q7(b)



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 shown in fig. Q8(b) about its centroidal axis. Calculate the least radius of gyration for the section. (12 Marks)

Fig.Q8(b)





**Module-5**

- 9 a. Determine the position at which the ball is thrown up the plane will strike the inclined plane as shown in fig. Q9(a). The initial velocity is 30m/sec and the angle of projection is  $\tan^{-1}\left(\frac{4}{3}\right)$ .

(10 Marks)

Fig.Q9(a)



- b. A Burglar's car starts at an acceleration of  $2\text{m/sec}^2$ . A police vigilant party came after 5 seconds and continued to chase the Burglar's car with a uniform velocity of 20m/sec. Find the time taken in which the police van will overtake the car. (10 Marks)

**OR**

- 10 a. What is a Projectile? Define the following terms briefly : (10 Marks)  
i) Angle of projection ii) Horizontal range iii) Vertical height iv) Time of flight.  
b. A stone is dropped from the top of the tower 50m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25m/sec. At what distance from the top and after how much time the stones cross each other. (10 Marks)

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