CBCS SCHEME

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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)**

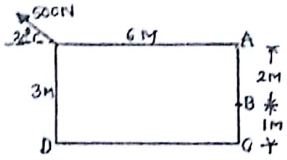


Fig.Q1(c)

OR

2 a. State and explain basic idealization in mechanics. **(08 Marks)**

b. Explain the following bridges with neat sketches :
i) Suspension bridge ii) Arch bridge. **(06 Marks)**

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)**

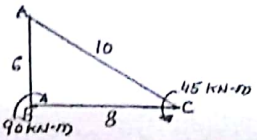


Fig.Q2(c)

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)**

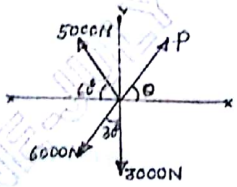


Fig.Q3(b)

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 $W_A = W_B = 4kN$, $W_C = 6kN$, $d_A = d_B = 500mm$, $d_C = 800mm$. **(10 Marks)**

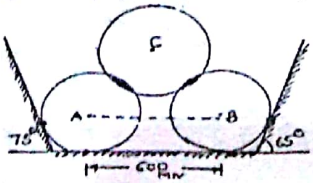


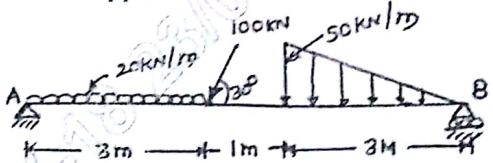
Fig.Q4(c)

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)



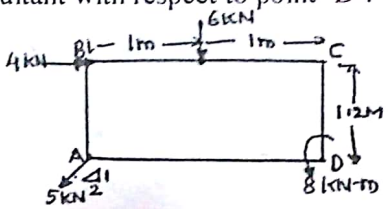
OR

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)

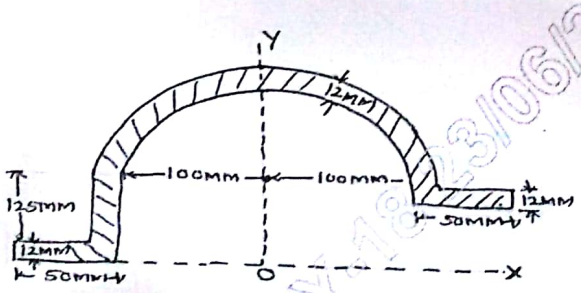


Module-4

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)

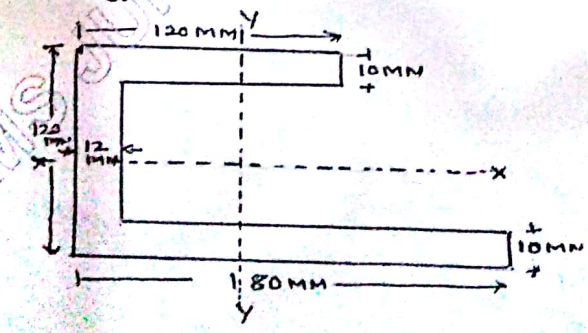


OR

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)



17CIV13/23

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 $2m/sec^2$. 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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