R-11 / R-13

Code: 1G511

B.Tech. I Year Supplementary Examinations October 2020
Engineering Mechanics
(Common to CE & ME)
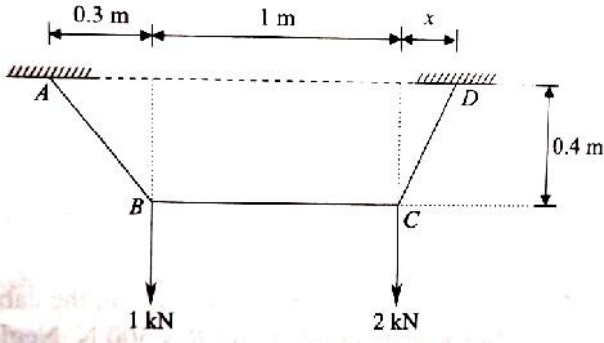
Max. Marks: 70   Time: 3 Hours
Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)
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1.   A cable ABCD supports two loads 1kN and 2kN at points B and C respectively. Determine the tension in each portion of the cable if the portion BC remains horizontal. Also, determine the distance 'x' for which equilibrium can be maintained. Refer fig.

   14M

2.   A beam AC hinged at A is held in a horizontal position by a cable attached at end C and passing over a smooth pulley as shown in fig. The free end of the cable is connected to a weight 2000N that rests on the beam. Determine the reaction at A and tension in the cable. Neglect the weight of the beam.
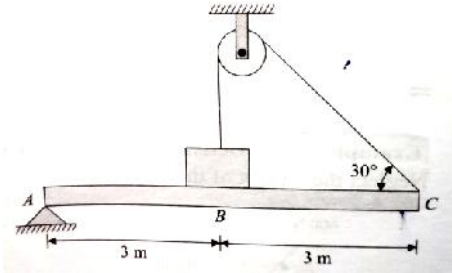
                                                                    14M

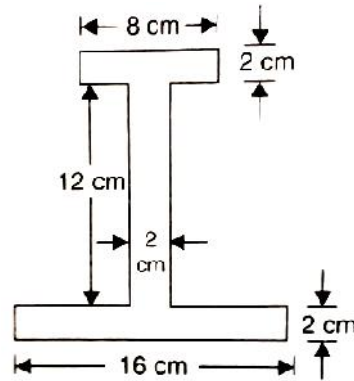3.   Compute the axial forces in the members of the plane truss as shown in fig.
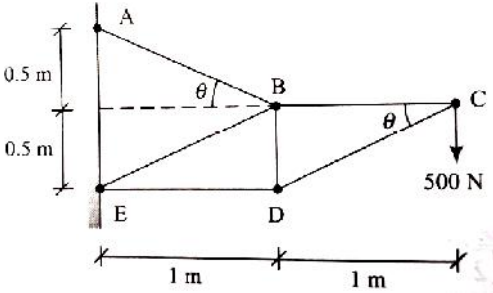
                                                                    14M

4. a) Define the following terms: 7M
        i). Angle of friction   ii). Angle of repose

    b) State the laws of solid friction.   7M

5.   Find the centroid of the I-section shown in fig.

6.   State and prove the parallel axis theorem.   14M

7.   A flywheel is rotating at 200rpm and after 10seconds it is rotating at 160rpm. If the retardation is uniform, determine the number of revolutions made by the flywheel before it comes to rest from the speed of 200rpm.   14M

8.   Two weights 800N and 200N are connected by a thread and they move along a rough horizontal plane under the action of a force of 400N applied to the 800N weight as shown in fig. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Using D'Alembert's principle determine the acceleration of the weight and tension in the thread.

                                                                                        14M

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Code: 1GC14

R-11 / R-13

B.Tech. I Year Supplementary Examinations October 2020

Mathematics-I

(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) Solve $x \log x \dfrac{dy}{dx} + y = \log x^2$.   7M

    b) If the temperature of the air is 30^0C, and the substance cools from 100^0C to 70^0C
        in 15 minutes, find when the temperature will be 40^0C?   7M

2.   Solve $\dfrac{d^2 y}{dx^2} + \dfrac{dy}{dx} + y = (1 - e^x)^2$ 14M

3. a) Verify Rolle's theorem for $f(x) = (x+2)^3 (x-3)^4 \ in \ (-2,3)$.   7M

    b) Verify Lagrange's mean value theorem for $f(x) = \log_e^x \ in \ [1,e]$.   7M

4. a) Trace the curve $y^2 (2a - x) = x^3$ 7M

    b) Trace the curve $x^3 + y^3 = 3axy$ 7M

5. a) Evaluate $\displaystyle\int_0^1 \int_0^x e^{\frac{x}{y}} dx dy$ 7M

    b) Evaluate $\displaystyle\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dx dy$ 7M

6. a) Find the Laplace transform of $e^{2t} + 4t^3 - 2\sin 3t + 3\cos 4t - 5\sinh t$ 7M

    b) Find the Laplace transform of $e^{-3t}(2\cos 5t - 3\sin 5t + 2t)$ 7M

7.   Solve $y^{11} - 3y^1 + 2y = e^{3t}$ when $y(0) = 1, y^1(0) = 0$.   14M

8.   Evaluate the line integral $\displaystyle\int_C (x^2 + xy)dx + (x^2 + y^2)dy$ where C is the square

        formed by the lines $x = \pm 1, y = \pm 1$.   14M

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