U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

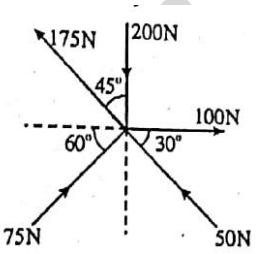
September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 21CV1ESECM / 21CV2ESECM **Max Marks: 100**
Course: Elements of Civil Engineering and Engineering Mechanics

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

MODULE - I

1 a) Find the resultant and its direction for the system of forces shown in FigQ1(a) **10**



FigQ1(a)

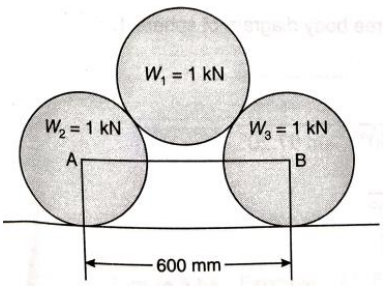
b) Explain i) Principle of Superposition of forces ii) Principle of transmissibility of a force **05**

c) State and Prove Varignon's principle. of moments. **05**

OR

2 a) Explain Free body diagram with example. **05**

b) Determine the reactions at the surfaces of contact and the tension in the string AB shown in FigQ2 (b). The radii of spheres are $R_1 = R_2 = R_3 = 200$ mm. Assume all contact surfaces to be smooth. **10**

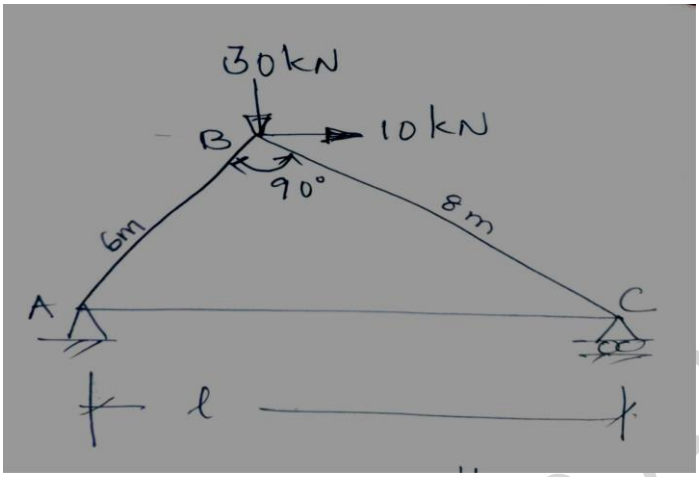


FigQ2(b)

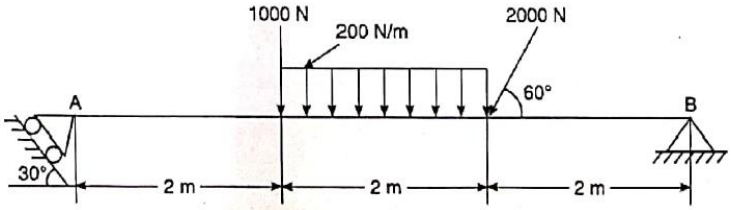
c) State and prove Lami's theorem. **05**

MODULE - II

3 a) Analyze pin jointed plane truss shown in Fig Q 3 (\a) and tabulate the results **10**



b) A horizontal beam 6m long is subjected to loads as shown in FigQ3 (b). find the reactions at the supports. **10**

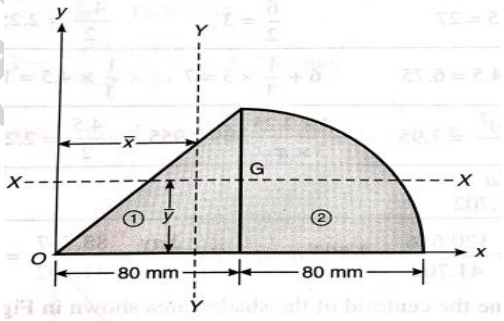


FigQ3 (b).

MODULE - III

4 a) Obtain the centroid of a semi-circle by method of integration. **8**

b) Locate the centroid of the shaded area shown in FigQ4 (b). . **12**



FigQ4 (b).

OR

5 a) Determine the radius of gyration of the shaded area shown in FigQ5 (a) about the y-axis indicated. **10**

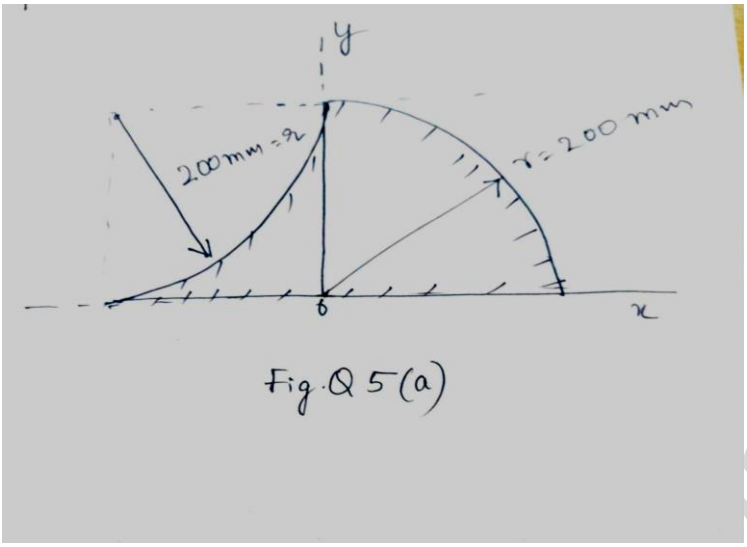
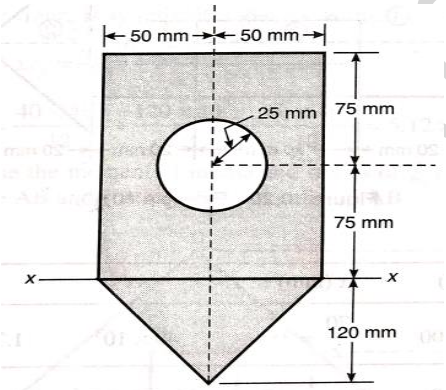


Fig.Q 5(a)

b) Determine the moment of inertia of the plane lamina shown in FigQ5 (b). about the x axis indicated. **10**



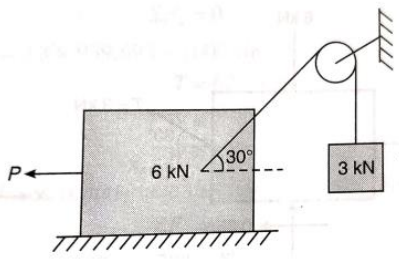
FigQ5 (b).

MODULE - IV

6 a) Explain with sketches the theory of dry sliding friction **08**

b) A block weighing 6kN is attached to a string, which passes over a frictionless pulley and supports a weight of 3kN, when the coefficient of friction between the block and the floor is 0.35. Refer FigQ6 (b). Determine the value of P when the **12**

(i) motion is impending towards right.
(ii) motion is impending towards left.



FigQ6 (b)

MODULE - V

7 Describe briefly (i) Structural engineering (ii) Geotechnical Engineering (iii) Hydraulics and water resources engineering (iv) Transportation Engineering **20**

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