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

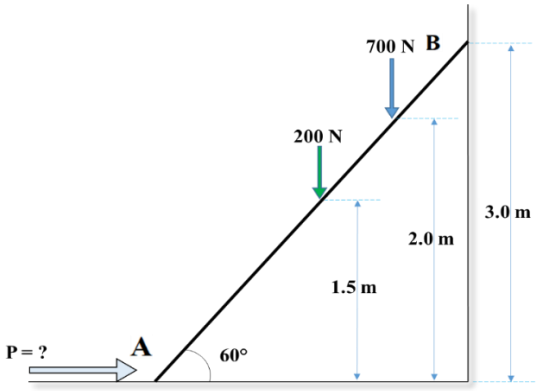
**Autonomous Institute Affiliated to VTU**

## December 2023 Supplementary Examinations

**Programme: B.E.** **Semester: I / II**
**Branch: Common to all Branches** **Duration: 3 hrs.**
**Course Code: 22CV1ESICV / 22CV2ESICV** **Max Marks: 100**
**Course: Introduction to Civil Engineering**

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

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | UNIT - I | CO | PO | Marks |
|---|---|---|---|---|---|
| 1 | a) | Elucidate the scope of transportation engineering. | CO1 | PO6 | **6** |
| | b) | Compare and contrast the distinctions among plain, reinforced, and pre-stressed concrete. | CO1 | PO6 | **8** |
| | c) | Classify various categories of masonry walls employed in building construction. | CO1 | PO6 | **6** |
| | | **UNIT - II** | | | |
| 2 | a) | Explain the rationale for implementation of 'Automation systems' in buildings. | CO2 | PO7 | **6** |
| | b) | Analyze the challenges linked to urban flooding and evaluate the functions of urban flood control systems. | CO2 | PO7 | **8** |
| | c) | Summarize key points related to sustainable development goals. | CO2 | PO7 | **6** |
| | | **UNIT - III** | | | |
| 3 | a) | State the following principles. i. Principle of superposition of forces; ii. Principle of transmissibility of forces. | CO3 | PO1, PO2 | **4** |
| | b) | A ladder weighing 200 N to be kept in position as shown in Fig. 1, is resting on a smooth floor and leaning against a smooth wall. Determine the horizontal force 'P' required to prevent it from slipping when a man weighing 700 N is at a height 2m above the floor level.   Fig. 1 | CO3 | PO1, PO2 | **8** |

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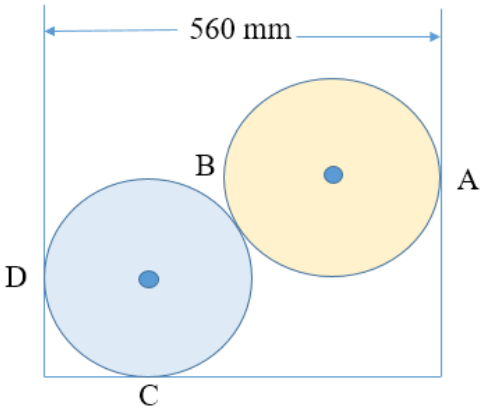
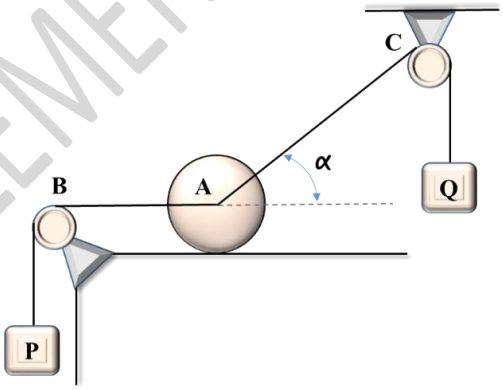
| | | c) | Two smooth spheres each of radius 150 mm and weight 250 N rest in a horizontal channel having vertical walls, the distance between which is 560mm. Find the reaction at the points of contacts A, B, C, D as shown in figure below. Refer Fig. 2.<br>  <br><br>Fig. 2 | *CO3* | *PO1, PO2* | **8** |
| | | | **OR** | | | |
| | 4 | a) | Explain the basic idealizations in mechanics. | *CO3* | *PO1, PO2* | **4** |
| | | b) | A ball weighing 400 N rests upon a smooth horizontal plane and has attached to its center two strings AB and AC which pass over frictionless pulleys at B and C and carry loads P and Q, respectively, as shown in Fig. 3. If the string AB is horizontal, find the angle α that the string AC makes with the horizontal when the ball is in a position of equilibrium. Also find the reaction R between the ball and the plane.<br>  <br><br>Fig. 3 | *CO3* | *PO1, PO2* | **8** |
| | | c) | There are four forces acting on the eye bolt, three of which are indicated as shown in Fig. 4. The resultant of these four forces is R = 3.7 kN. Determine the fourth force. | *CO3* | *PO1, PO2* | **8** |

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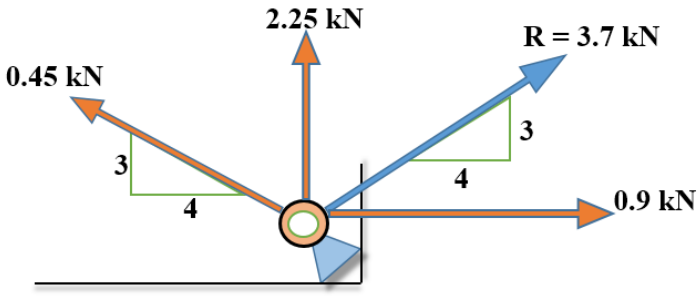


Fig. 4

| | | | | | | |
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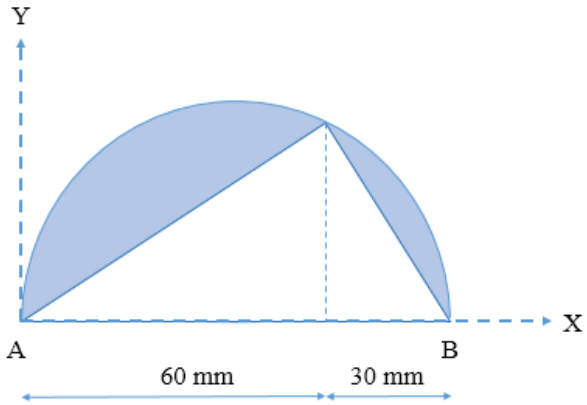
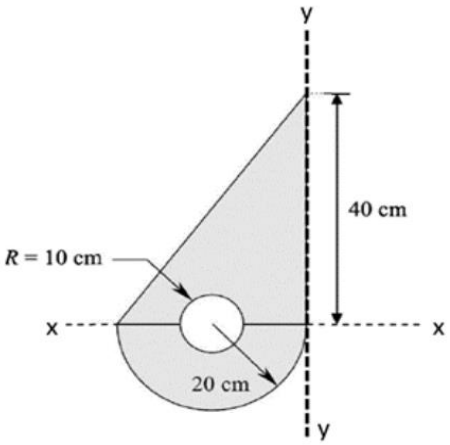
| | | | **UNIT - IV** | | | |
| 5 | a) | Derive an expression for centroid of a semi-circle. | *CO4* | *PO1, PO2* | **6** |
| | b) | Locate the centroid of shaded portion of a lamina shown in Fig. 5, if AB = 90 mm is diameter of semicircle.   Fig. 5 | *CO4* | *PO1, PO2* | **8** |
| | c) | List the differences between centroid and center of gravity. | *CO4* | *PO1, PO2* | **6** |
| | | **UNIT - V** | | | |
| 6 | a) | State the following:-<br>i. Parallel axis theorem<br>ii. Radius of gyration | *CO4* | *PO1, PO2* | **6** |
| | b) | Determine the moment of inertia of the composite area shown in Fig. 6 about the x and y axes indicated.   Fig. 6 | *CO4* | *PO1, PO2* | **14** |

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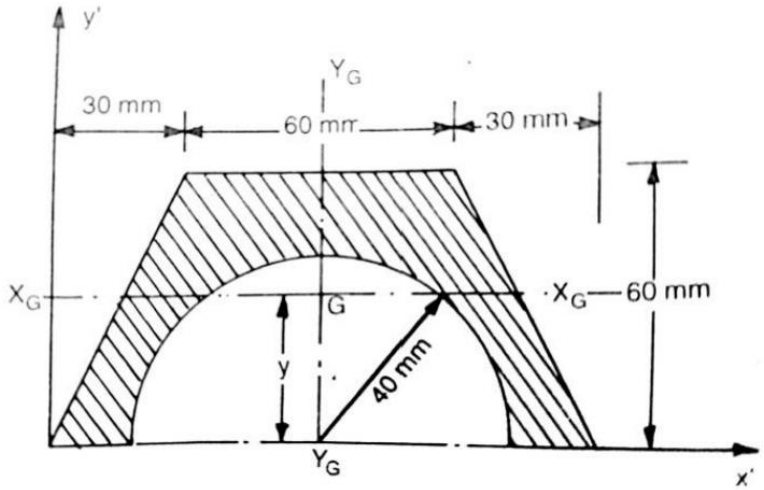
| | | | **OR** | | | |
| | 7 | a) | Derive the expression for moment of inertia of a triangle about its base. | *CO4* | *PO1, PO2* | **6** |
| | | b) | Compute the radius of gyration of the composite section shown in Fig. 7 about the horizontal centroidal axis($X_G$-$Y_G$)   Fig. 7 | *CO4* | *PO1, PO2* | **14** |

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