

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
(MID SEMESTER EXAMINATION SP2023)

CLASS: B. ARCH  
BRANCH: ARCHITECTURE

SEMESTER : II  
SESSION : SP/2023

SUBJECT: AR153 STATICS AND STRENGTH OF MATERIALS

TIME: 02 Hours

FULL MARKS: 25

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- |  |     | CO | BL |
|--|-----|----|----|
| Q.1(a) Explain the conditions of equilibrium of a body subjected to co-planar and concurrent system of forces?   | [2] | 1  | 2  |
| Q.1(b) A weight $W = 100\text{ N}$ is suspended at point C with the help of two strings AC and BC as shown in Figure 1. Determine the forces acting through the strings AC and BC when the weight $W$ is in equilibrium. | [3] | 1  | 3  |

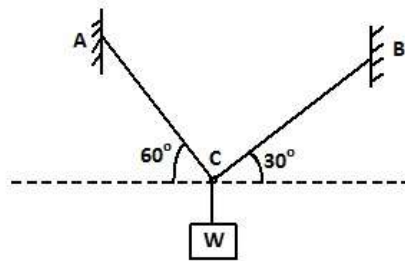


Figure 1

- |  |     |   |   |
|--|-----|---|---|
| Q.2(a) Explain resultant of a system of forces with example.   | [2] | 1 | 2 |
| Q.2(b) A ball of weight $Q = 53.4\text{ N}$ rest in a right angled trough as shown in Figure 2. Determine the forces exerted on the sides of the trough at D and E if all the surfaces are perfectly smooth. | [3] | 1 | 3 |

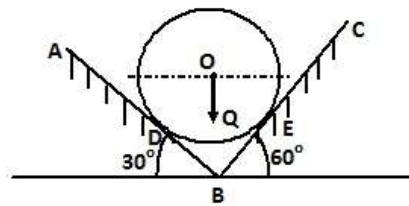


Figure 2

- |   |     |   |   |
|---|-----|---|---|
| Q.3(a) Illustrate the assumptions followed to analyze a plane truss problem.  | [2] | 2 | 3 |
| Q.3(b) Calculate the force acting through the members AB and BC of the truss shown in Figure 3. Use method of joints. | [3] | 2 | 3 |

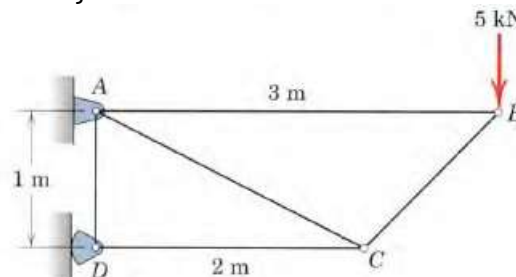


Figure 3

- Q.4(a) Explain the terms: Plane truss and Simple truss. [2] 2 2  
 Q.4(b) Calculate the forces in members BC, BE, and EF of the truss shown in Figure 4. Use [3] 2 3  
 method of sections.

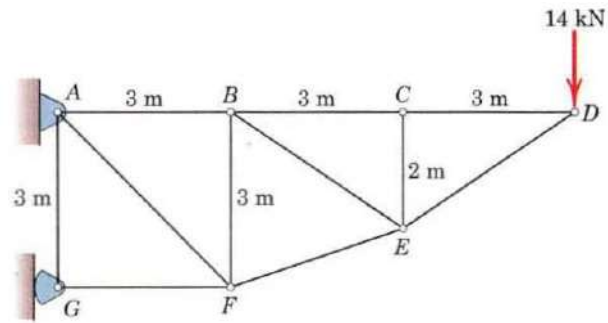


Figure 4

- Q.5(a) Explain the terms: Center of Gravity and Centroid. [2] 3 2  
 Q.5(b) Derive the formula to determine the center of Gravity of a body of weight  $W$ . [3] 3 6

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