

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

CLASS: B. ARCH
BRANCH: ARCHITECTURE

SEMESTER : II
SESSION : SP/22

SUBJECT: AR153 - STATICS AND STRENGTH OF MATERIALS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

- Q.1(a) State and explain Varignon's theorem of moment with a suitable example. [5]
 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. [5]

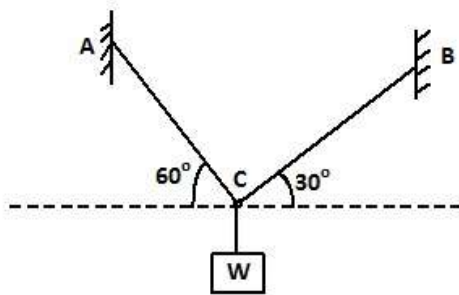


Figure 1

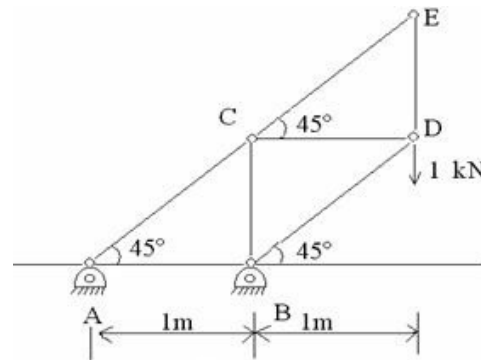


Figure 2

- Q.2(a) Explain with a suitable example about Method of Joints used to analyse truss problems. [5]
 Q.2(b) A simple truss ABCDE is subjected to a vertical load 1 kN at joint D as shown in Figure 2. Determine the axial force acting through the members AC and AB. The truss is hinged at A and B. [5]
- Q.3(a) What is parallel axis theorem of Moment of Inertia? Explain with an example. [5]
 Q.3(b) Determine the distance y_c from the base BC of a triangle ABC to the centroid G of its area as shown in Figure 3. The triangle has base length b and height h. [5]

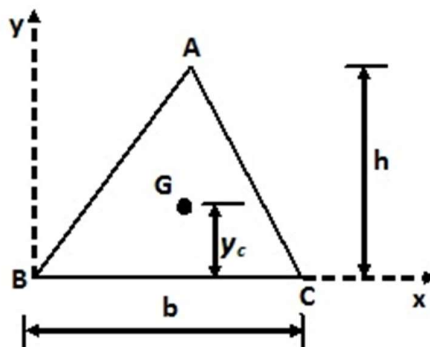


Figure 3

- Q.4(b) Draw the stress-strain diagram obtained from the tensile test of a typical ductile material and explain the important points. [5]
 Q.4(c) A bar of 30 mm diameter is subjected to an axial pull of 60 kN. The measured extension on gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Calculate:- [5]
 (i) Young's modulus of the material of the bar and (ii) Poisson's ratio.

Q.5(a) What are the different types of beams used in structural engineering? Briefly describe them. [5]

Q.5(b) A simply supported beam AB carrying two concentrated loads of P at points C and D as shown in Figure 4. Draw the shear force and bending moment diagram of the beam. The beam has length L . [5]

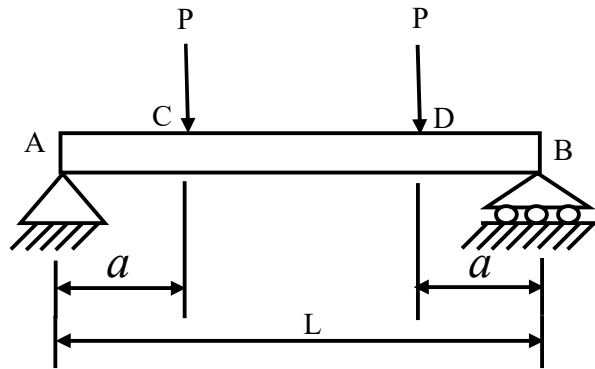


Figure 4

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