Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Marine Engg.) (2013 Onwards)/
B.Tech.(ME) (2011 Onwards)
(Sem.–3)

STRENGTH OF MATERIALS – I

Subject Code : BTME-301
Paper ID : [A1138]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION–A

1. Answer briefly :

a) State and explain Hook's law.

b) Define principal stresses.

c) What do you mean by point of contrafiexure? Briefly explain with a sketch.

d) Write the relation between rate of loading, shear force and bending moment.

e) What are flitched beams? Write their applications.

f) What is meant by bending of circular shafts? Discuss with a suitable sketch.

g) Distinguish between column and strut.

h) Define slenderness ratio.

i) Define slope and deflection of a beam.

j) Name various methods used to find slope and deflection.

SECTION-B

2. Explain stress-strain diagram for ductile materials.

3. The principal stresses at a point across two perpendicular planes are 75MN/m^2 (tensile) and 35 MN/m^2 (tensile). Find the normal, tangential stresses and the resultant stress and its obliquity on a plane at 20° with the major principal stress.

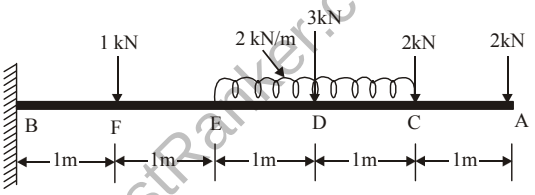
4. Write the assumptions in the simple bending theory, and derive bending formula.

5. Derive Euler's formula for column with both ends hinged.

6. A concentrated load W is acting at free end of a cantilever. The length of the cantilever is L. Derive the formulae to find maximum slope and deflection at free end by double integration method.

SECTION-C

7. Draw the shear force and bending moment diagrams for a cantilever loaded as shown below.



8. A hollow circular shaft 20 mm thick transmits 294 kW at 200 rpm. Determine the diameter of the shaft if shear strain due to torsion is not to exceed 8.6×10^{-4}.Take, modulus of rigidity as 80 GN/m^2.

9. Write short notes on :

   a) Ellipse of stress and its applications.

   b) Macaulay's method to find slope and deflection.