CLASS: BTECH   SEMESTER : III
BRANCH: MECHANICAL / PRODUCTION   SESSION : MO/2022

SUBJECT: ME205 STRENGTH OF MATERIALS

TIME: 3:00 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. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q1.   The strain components at a given point are $\epsilon_x = -533 \times 10^{-6}$, $\epsilon_y = 67 \times 10^{-6}$, and $\gamma_{xy} = -626 \times 10^{-6}$. If   [10]
      E=200 GPa and v=0.30, find the stress components whose normal is at 45° from x axis.

Q2.   An I - section girder, 200 mm wide by 300 mm depth flange and web of thickness is 20 mm is   [10]
      used as simply supported beam for a span of 7 m. The girder carries a distributed load of 5 kN
      /m and a concentrated load of 20 kN at mid-span.
      Determine the
              (i). The second moment of area of the cross-section of the girder
              (ii). The maximum stress set up.

Q3.   A concentrated load of 300 N is applied to the simply supported beam as shown in Fig. 2.   [10]
      Determine the equations of the elastic curve between each change of load point and the
      maximum deflection in the beam.

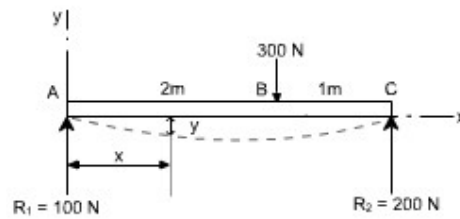
Fig. 2

      a. Derive the complete torsion equation for circular shaft.   [10]
      b. The solid shaft is fixed to the support at C and subjected to the torsional loadings shown.
      Determine the shear stress at points A and B and sketch the shear stress on volume elements
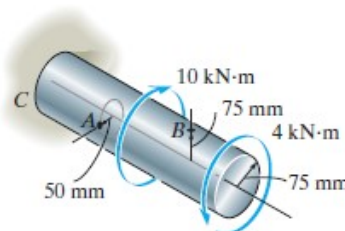   located at these points.

Fig. 3

Q5.   Calculate the minimum wall thickness for a thin-walled cylindrical pressure vessel that is to carry   [10]
      a gas at pressure of 10 MPa. The diameter of the vessel is 0.6 m, and the stress is limited to 85
      MPa.