CBCS SCHEME

Fourth Semester B.E. Degree Examination, Aug./Sept. 2020
Structural Analysis

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing one full question from each module.*

Module-1

1 a. Define statically determinate and Indeterminate structure with example. **(04 Marks)**

    b. Analyse the truss shown in below Fig Q1(b) by the method of joints an indicate the member forces on a neat sketch of truss.
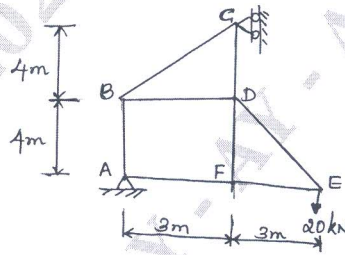

Fig Q1(b) **(12 Marks)**

OR

2 a. What are linear and non-linear systems? Explain. **(04 Marks)**

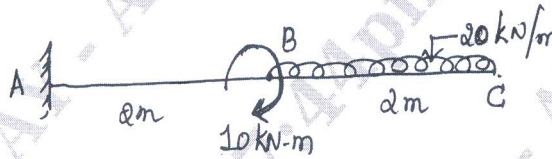   b. Calculate slope and deflection at free end by Moment Area method.

Fig Q2(b) **(12 Marks)**

Module-2

3 a. What is strain energy? Derive the expression for strain energy due to bending. **(08 Marks)**

    b. State the moment area theorems and derive the same. **(08 Marks)**

OR

4 a. Calculate the deflections at point C and D and maximum deflection and its location for the beam as shown in Fig Q4(a) by Machaulay's method. Take value of $EI = 17000$ kN-m^2.
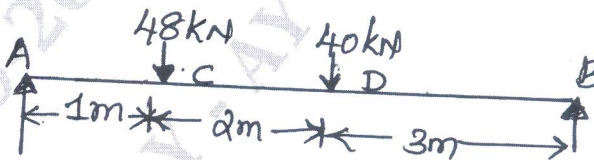

Fig Q4(a) **(12 Marks)**

    b. Explain briefly, what is complimentary strain energy? **(04 Marks)**

Module-3

5 a. Three hinged parabolic arch at the supports and at the crown has a span of 24m and central rise of 4m. It carries a concentrated load of 50kN at 18m from the left support and UDL of 30kN over the half span. Determine the bending moment, normal thrust, and radial shear at a section 6m from the left support. **(10 Marks)**

    b. A suspension cable having supports at same level has a span of 40m and a maximum dip of 4m. The cable is loaded with UDL of 10kN/m throughout its length. Calculate minimum and maximum tension in the cable. Also find the length of cable. **(06 Marks)**

OR

6   A suspension bridge of 120m span has a central dip of 12m and supports a UDL of 15kW/m of entire span. Evaluate ;

   i) The maximum and minimum tension in the cable
   ii) The size of the cable if permissible stress = 200N/mm^2
   iii) The length of cable
   iv) If cable passes over a smooth pulley, what are horizontal force, vertical force and bending moment at the base of tower? Anchor cable inclination with horizontal is $\theta_A = 25°$. Height of tower = 20m.   **(16 Marks)**

Module-4

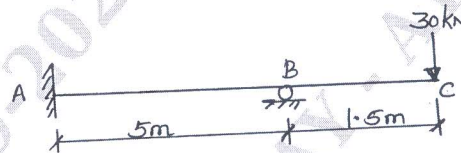7   a. By Consistent Deformation Method, analyse the cantilever beam shown in Fig Q7(a). Draw SFD and BMD.

Fig Q7(a)   **(08 Marks)**

   b. Find the fixed end moments for the beam shown in Fig Q7(b). By consistent deformation method.

Fig Q7(b)   **(08 Marks)**

OR

8   Analyse the continuous beam shown in Fig Q8. By theorem of three moments. Draw BMD and SFD.

Fig Q8   **(16 Marks)**
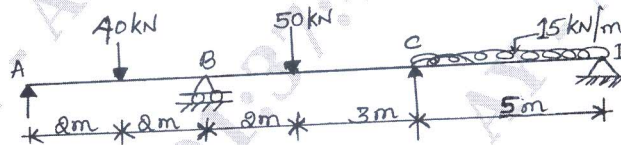
Module-5

9   Analyze the continuous beam shown in Fig Q9, by Slope Deflection Method. Draw BMD and Elastic curve.

Fig Q9   **(16 Marks)**
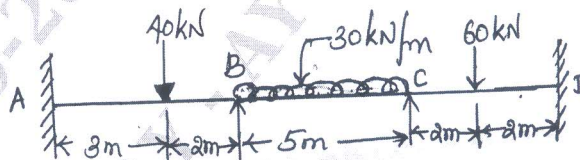
OR

10   Find the support moments. Draw SFD and BMD for continuous beam shown in Fig Q10, by Moment Distribution Method.

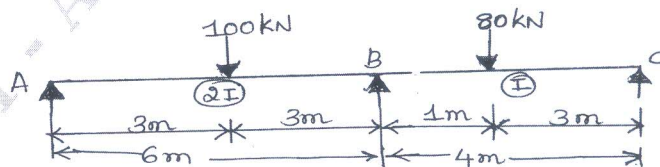Fig Q10   **(16 Marks)**