Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

USN [| | | | | | | | |]

10CV43

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the following with examples :
   i) Static indeterminacy and kinematic indeterminacy
   ii) Geometric nonlinearity and material nonlinearity. **(08 Marks)**

b. Determine kinematic indeterminacy for following structures.(Refer Fig,Q1(b)).

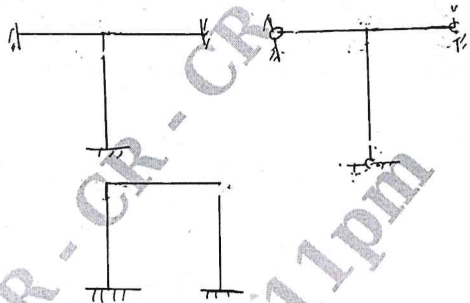

Fig.Q1(b) **(06 Marks)**

c. Derive the expression for strain energy due to bending moment. **(06 Marks)**

2 a. Determine maximum slope and deflection of a cantilever beam shown in Fig.Q2(a) by using moment area method. EI = 4000kN m^2.

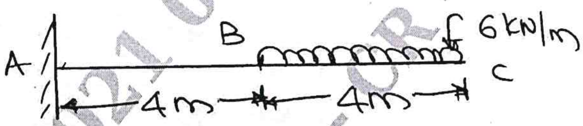

Fig.Q2(a) **(10 Marks)**

b. For the beam shown in Fig.Q2(b), determine midspan deflection, using conjugate beam method. E = 2 × 10^5 N/mm^2, I = 80 × 10^{6}mm^4.

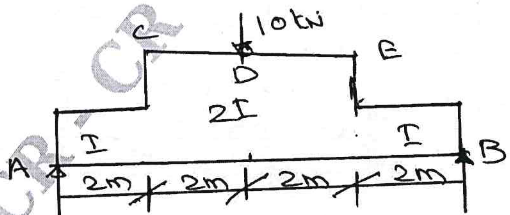

Fig.Q2(b) **(10 Marks)**

3 a. State Castigliano's first and second theorems. **(06 Marks)**

b. Determine slope at support and deflection at midspan for a simply supported beam of spanL carrying UDL w/m over entire span using Castigliano's theorem. **(14 Marks)**

VTU-09-03-2021 01:21:59pm
CR - CR - CR - CR - CR - CR
09-03-2021 01:35:11pm

4 a. Determine prop reaction for a propped cantilever shown in Fig.Q4(a) using strain energy method.

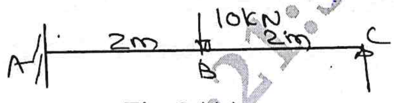

Fig.Q4(a) **(08 Marks)**

b. Analyse fixed beam shown in Fig.Q4(b) using strain energy method. Sketch SFD and BMD.

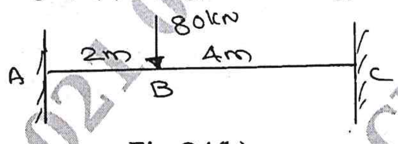

Fig.Q4(b) **(12 Marks)**

PART – B

5 a. A foot bridge 4m wide is carried over by a suspension bridge of span 30m by two cables with central dip of 3m. If the plat form load is $6 kN/m^2$, determine the maximum and minimum pull in the cables and also length of cable. **(10 Marks)**

b. For the three hinged parabolic arch shown in Fig.Q5(b), find normal thrust and radial shear at a section 5m from left.

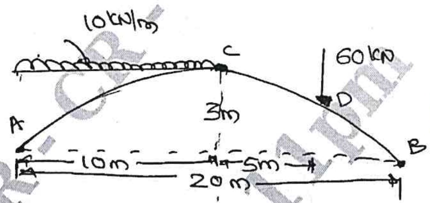

Fig.Q5(b) **(10 Marks)**

6 Analyse the beam shown in Fig.Q6 using consistent deformation method. Draw SFD and BMD.

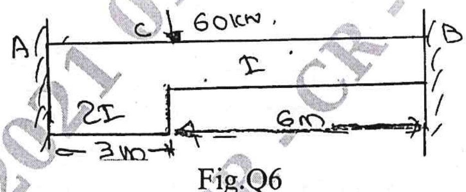

Fig.Q6 **(20 Marks)**

7 Analyse the continuous beam shown in Fig.Q7, using Clapeyron's theorem. Support C sinks by 5mm. Draw SFD and BMD E = 210GPa I = $25 \times 10^6 mm^4$. End A is fixed.

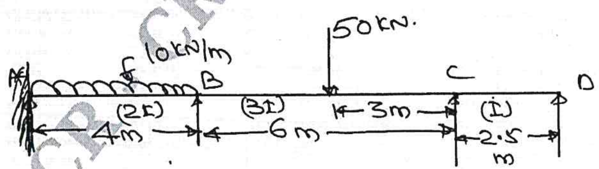

Fig.Q7 **(20 Marks)**

8 A two hinged parabolic arch of span 30m and central rise 6m is carrying UDL of 20kN/m for a length of 12m from left support. Find reaction at hinges. Draw BMD. Indicate maximum positive and negative bending moments. **(20 Marks)**

* * * * *

VTU-09-03-2021 01:21:53pm
CR - CR - CR - CR - CR
09-03-2021 01:33:11pm
C.M.R. INSTITUTE OF TECHNOLOGY BANGALORE