Form A: Paper –Setting Blank

Ref No. –Ex/CE/T/216/2019 (Old)
B.E. CIVIL ENGINEERING
SECOND YEAR FIRST SEMESTER EXAM 2019 (Old)
(1ˢᵗ / 2ⁿᵈ-Semester /~~Repeat / Supplementary / Annual / Bianual~~)
SUBJECT: *Structural Mechanics-II*
(Name in full)

Time: ~~Two hours~~/Three hours/~~Four hours/ Six hours~~

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Question	PART – I	
	Answer any TWO	
1.a)	Find the ratio of bending and shear strain energy in the cantilever beam of 4m length carrying uniformly distributed load of 2kN/m with square c/s 400mm each side. Take Poisson's ratio as 0.15.	10+4+11=25
b)		
c)	State and explain Castigliano's second theorem.	
	Find out the deflection and slope at the center of the cantilever beam (Fig.1) with constant **EI**. Use Strain Energy method.	

Fig. 1

Fig.2

2.a)	Solve the simple continuous beam as shown in Fig. 2. Draw SFD and BMD showing the salient points.	18+3+4=25
b)	What is static and kinematic indeterminacy? Find the static and kinematic indeterminacies of the beam shown in Fig. 2.	
3.a)	Find the forces in each member of the truss as shown in Fig. 3. Member AC is found to be 1.5 mm short of required length. The diagonal members are each 1000mm² in area and remaining members are 1500mm² in area. Take E = 200kN/mm².	13+12=25

Fig.3

Fig.4

b)	Analyze the portal frame as shown in fig. 4 and draw bending moment diagram. Apply strain energy method.	

B.E. Civil Engineering , Second Year, First Semester Examination 2019 (Old)

SUBJECT – Structural Mechanics– II
Full Marks 100

Time: Three hours

(50 marks for each part)
Use a separate Answer-Script for each part
PART II
Answer any two questions

1 a Explain and derive the theorems of Area Moment .   5

  b Consider a beam ABCDE , so that AB=0.5 m , BC = CD = 3 m and DE = 0.5 m .A   20
     and E are free ends , B and D are on knife edge supports .A point load of 1 t acts at A
     and a point load of 1 t acts at E .Span BD is under a udl of intensity 3t/m .Flexural
     rigidity is 1.5EI for portions AB and DE and is 2EI for portion BD ..Calculate the
     slopes and deflections at A , B , C , D and E .

2 A propped cantilever beam ABC has AB=5m and BC=1 m .It is fixed at A and   25
   propped by a knife edge support at B , the end C is free .The beam is under a udl of
   intensity 2t/m all through . Flexural rigidity is 2EI for portions AB and is EI for
   portion BC .Solve the beam and hence draw the complete bending moment and shear
   force diagrams .

3 A fixed beam of uniform flexural rigidity is subjected to a point load P applied at an   25
   arbitrary distance from the left support . Derive the expressions of its support
   moments and hence use the result to get the values of moments induced in the
   supports of the beam being subjected to a uniformly distributed load of ω per unit
   run all through .