B. Construction Engineering 2nd year 2nd Semester Examination – 2019

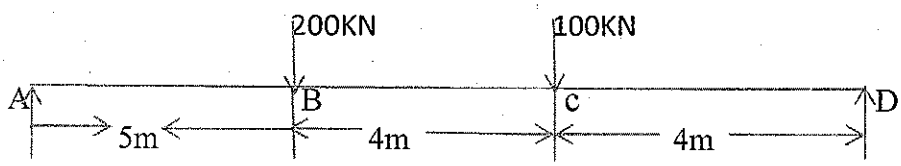
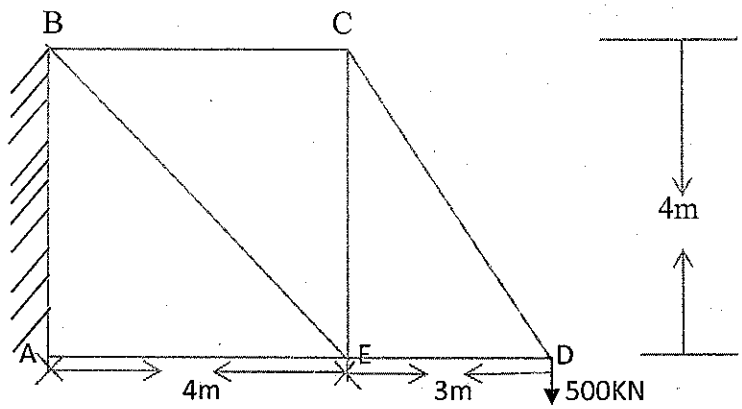
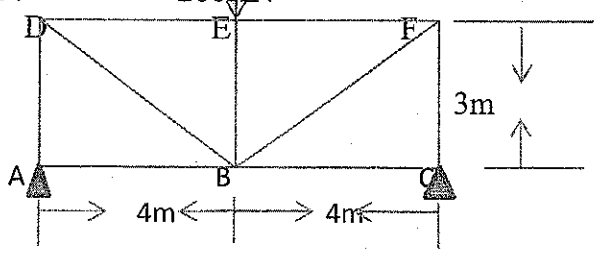
Subject: Theory of structure-I

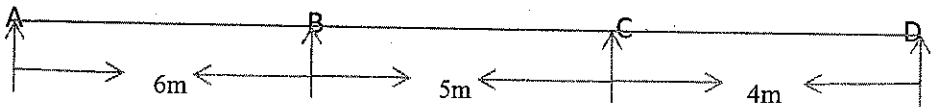
Total Time: Three hours

Full Marks: 100

PART-I (Full Marks-50)

Use Separate answer sheet for each part.

CO1 [10]	[1] *Answer any one* from **(a) & (b)** *in this block:* (a)Show that the deflection of a fixed beam subjected to a UDL is 1/5 times of deflection of Simply supported beam subjected to a same kind of loading. [10] (b) Show that the deflection of a fixed beam subjected to a point load is 1/4 times of deflection of Simply supported beam subjected to a same kind of loading. [10]
CO2 [15]	[2]Answer (a) ,(b) in this block (a) Find the slope & deflection of the continuous beam ABCD as shown in figure. Assume any other data if required. Apply conjugate beam method. AB= 1.5I, BC=2I, CD=I [10]  (b)What do you mean by conjugate beam? Write the assumptions of conjugate beam.[5]
CO3 [10]	[3] *Answer any one* from **(a), (b)** *in this block:* (a) Determine the vertical downward deflection at point E of the truss as shown in figure. The cross sectional area of AB=BC=CD=3300mm^2 and AE=ED=2500 mm^2. BE=CE=4000 mm^2. Take E= 2.1X10^{5}N/mm^2. [10]  (b) Find the vertical deflection at point B of the truss as shown in figure. The cross sectional area of all AD=BE=CF=5000mm^2 and DE=EF=AB=BC=6000 mm^2. BD=BF=4000 mm^2. Take E= 2.1X10^{5}N/mm^2. [10] 

CO4 [15]	3.Answer any one from (a), (b) in this block (a) Draw the SFD & BMD of the continuous beam as shown in figure. Use Three moments equations. AB=15KN/m, BC= 20 KN/m, CD= 20 KN/m. [15],  (b) State & explain the claypeyrons three moments theorem. [15]

CO1: **Explain and discuss deflection** of beams , Columns and Struts & **Solve** Area-moment theorems, Classify and solve problems regarding Fixed and Continuous beams(K2)

CO2: **Solve Conjugate beam theorems and** Statically determinate and indeterminate structures, supports and reactions (K2)

CO3: **Apply Unit load Method to calculate the deflection of Trusses** (K3)

CO4: **Explain & Solve Theorem of three moments** structural systems.(K2)

CO5: Analyse Columns and Struts in terms of buckling by Euler's theorem, Rankine's formulae, Columns with eccentric load, Bi-axial bending(K4)

EX/ CON/T/222/2019

BE SECOND SEMESTER SECOND YEAR (CONSTRUCTION) EXAMINATION - 2019

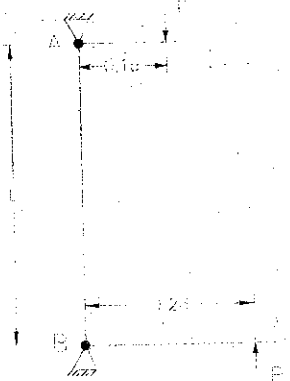
Subject : **THEORY OF STRUCTURES - I**

Time : Three hours **Full Marks: 100**

PART – II

Answer parts of any question SERIALLY.

Answer ***question no. 1*** & any ***TWO*** from the rest. Please start answering a question or part thereof from a **NEW** page. All questions carry equal marks. Answers should be brief. Different parts of the same question should be answered together.

CO6 [20]	1. Prove that for a beam column with an axial load P at each of the pin jointed ends, the expression for bending moment at mid span is $[M]_{x=L/2} = wL^2/8\,[1+1.03(P/P_E)+1.04(P/P_E)^2+\ldots]$ OR $= wL^2/8$ when P is such that $P/P_E \le 1/10$ where w = transverse load per unit run along the beam span, P_E = Euler critical load & L is the effective span of the beam column.
CO5 [20]	2. Determine the expression of maximum compressive & tensile stress of a slim long column with initial curvature in the plane of the least radius of gyration, subjected to axial load P with effective length l. Determine the experimental analysis as pronounced by ***Southwell*** in the case of this column.
CO4 [20]	3. A column AB of a diameter 'd' is hinged at ends carrying two equal & opposite loads P each at eccentricities as in the figure. Assuming end moments to be applied at the points of support find the condition of the occurance of the maximum bending moment at a distance 'x' from A in the column. 
CO4 [20]	4. A column of length '**L**' ***fixed*** at the base is dragged by a chord tied to its top to make a bent shape as in the figure below making a small angle '**θ**' with the vertical. The top end is deflected by a distance '**δ**' from the vertical. Prove that a state of elastic instability occurs when the load '**P**' is such that $\tan \mu L/\mu L + a/L = 1$