R18

ANURAG Engineering College
(An Autonomous Institution)
II B.Tech II Semester Supplementary Examinations, December – 2024
STRUCTURAL ANALYSIS-I
(CIVIL ENGINEERING)

Time: 3 Hours   Max. Marks: 75

Section – A (Short Answer type questions)   (25 Marks)
**Answer All Questions**

		Course Outcome	B.T Level	Marks
1.	Define the terms: Perfect frame, Redundant frame.	CO1	L1	2M
2.	What are the different methods of analyzing a perfect frame?	CO1	L1	3M
3.	Define strain energy and complimentary strain energy.	CO2	L1	2M
4.	A cantilever beam of length L carries a point load W at the free end. Find the deflection at free end using energy theorem	CO2	L2	3M
5.	Draw the B.M.D for a propped cantilever carrying U.D.L throughout.	CO3	L2	2M
6.	Draw the B.MD for a fixed beam carrying U.D.L throughout the span.	CO3	L2	3M
7.	What are the sign conventions used in slope deflection equations and write the equations.	CO4	L1	2M
8.	Write the equations of the Claypeyron's theorem with sinking of supports.	CO4	L2	3M
9.	What is the condition for absolute maximum bending moment due to moving UDL longer than the span?	CO5	L1	2M
10.	Draw influence line diagram for shear force and bending moment at mid span of a simply supported beam of length "L".	CO5	L2	3M

Section B (Essay Questions)
Answer all questions, each question carries equal marks.   (5 X 10M = 50M)

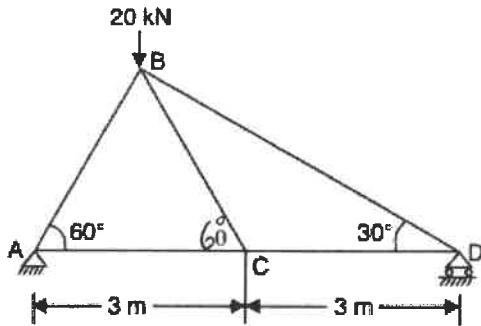|				
11. A)	Analyze the pin jointed frame and tabulate the results.	CO1	L3	10M
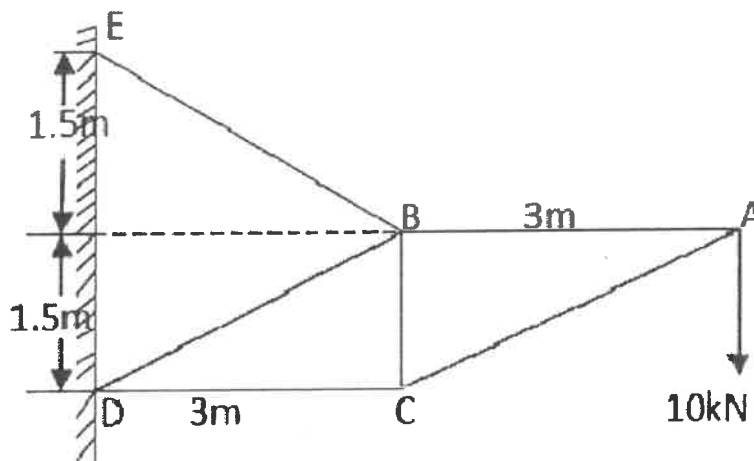
OR

B) Determine the forces in all the members of the truss by using method of joints shown in Fig.   CO1   L3   10M

12. A) i) State and prove Castigliano's second theorem.   CO2   L3   10M
   ii) Derive the strain energy equation due to axial loading.

OR

B) A three hinged parabolic arch hinged at the supports and at the crown has a span of 26m and a central rise of 6m. It carries a concentrated load of 55kN at 8 m from the left support and a udl of 25 kN/m over the right half portion. Determine the maximum moment for the arch.   CO2   L3   10M

13. A) Find the support moment for the propped cantilever loaded as shown in below figure if the support rotates clockwise by 0.003 radians. EI= 1×10^6 kgm^2.   CO3   L3   10M
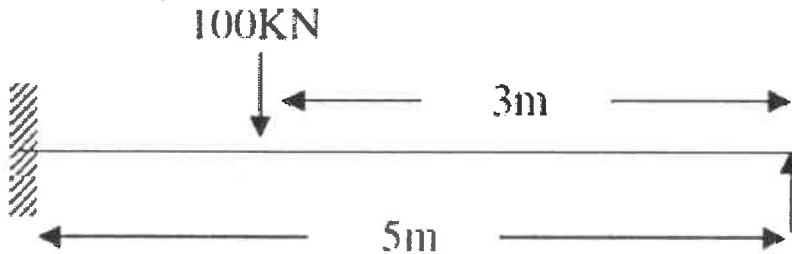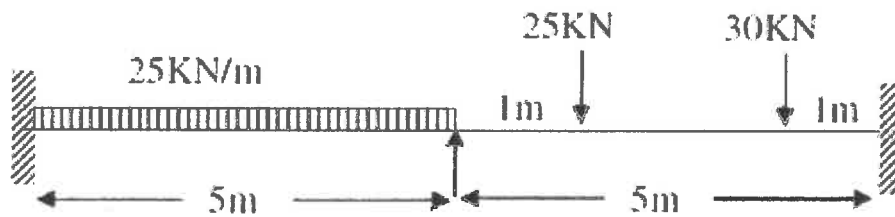

OR

B) A fixed beam AB of span 8 m is subjected to a point load of 64 kN at 2m from A and a clockwise couple of 20 kN-m at mid-span. Find the fixed end moments. Draw the B.M.D. and S.F.D.   CO3   L3   10M

14. A) Solve the continuous beam in below figure by using theorem of three moments.   CO4   L3   10M

OR

B) A Continuous beam is fixed at A and is supported over rollers at B and C. AB=BC=12M.The beam carries a uniformly distributed load of 30kN/m over AB and a point load of 240kN at a distance of 4M from B on span BC.B has an settlement of 30mm.
E= 2 x10⁵ N/mm², I= 2 x 10⁹ mm⁴.Analyse the beam by slope deflection method.   CO4   L3   10M

15. A) Draw the influence line diagram for B.M at a point 8m from the left abutment on a bridge girder of span 30m and find the maximum B.M at that point due to a series of wheel loads 80kN, 160kN, 160kN and 160kN at centre to centre distances of 4m, 2.5m, 2.5m and 2.5m respectively. The loads can cross in either directions with the 80kN load leading.   CO5   L3   10M

OR

B) A single rolling load of 100 kN moves on a girder of span 20m. Construct the influence lines for (i) shear force and (ii) bending moment for a section 5m from the left support. (b) Construct the influence lines for points at which the maximum shears and maximum bending moment develop. Determine these values   CO5   L3   10M