STRUCTURAL ANALYSIS -1

B.Tech. II Year/ II-Semester
2016-2017

Department of Civil Engineering

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY: KURNOOL

(Approved By Aicte, New Delhi, Affiliated To J.N.T.U, Anantapur)
Nandikotkur Road, Kurnool-518002(A.P)
Web: www.gpcet.ac.in

SHORT ANSWER QUESTIONS)

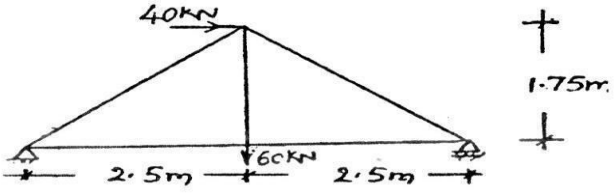
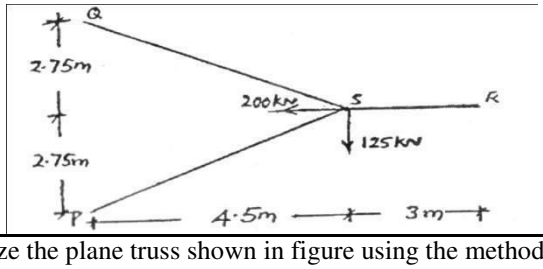
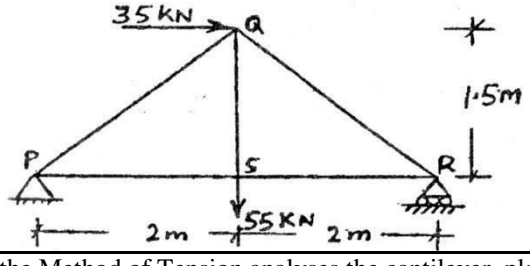
	Unit I
1	Define term deflection of a beam.
2	State conjugate beam theorem
3	Write relation between load, shear force and bending moment acting on a structure
4	State moment area theorems
5	Define strain energy
6	State the castagliano"s theorem
7	A steel rod has a square cross section of 10mm x 10mm and a length of 2M.
	Unit II
1	Define static indeterminacy
2	Explain different types of indeterminacies
3	Explain internal indeterminacy
4	Define ension Coefficient
5	State Kinematic indeterminacy
6	Write different methods for computing deflection of determinate beam
7	Difference between Internal and External Stability
8	What are the different types of frames based on stability
9	What are the different types of frames and explain the same with neat diagrams
10	Define Statically Indeterminacy and Degree of Indeterminacy

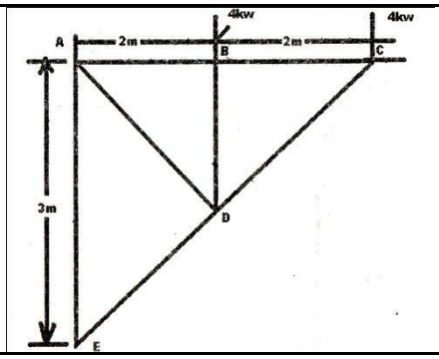
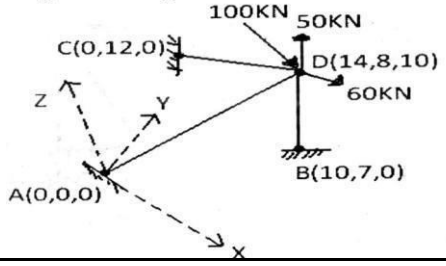
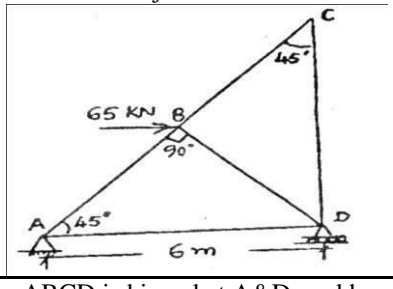
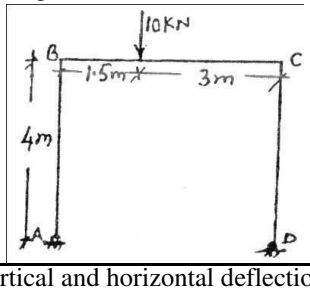
UNIT-III

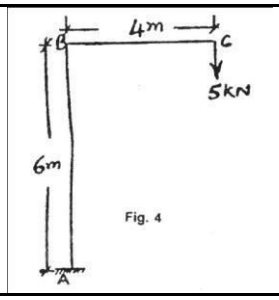
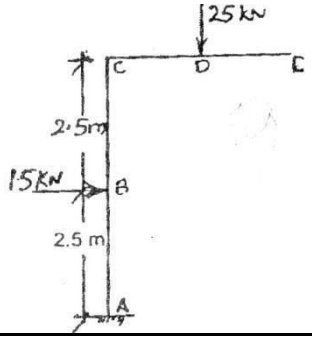
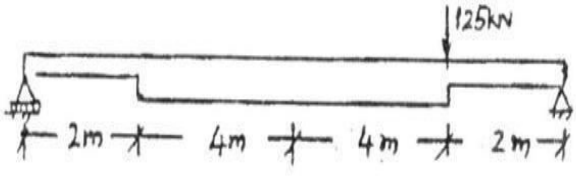
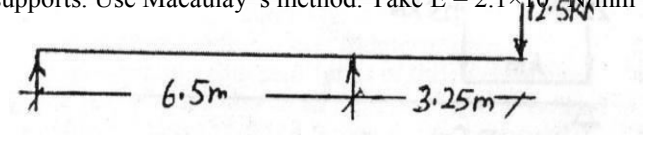
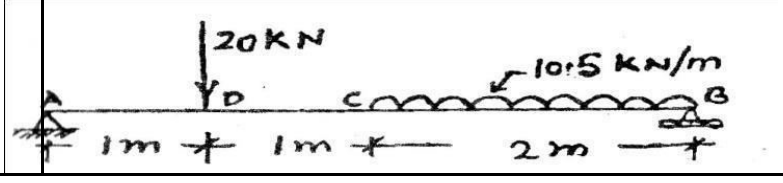
1	What are the reaction values for propped cantilever beam when it carries point load and udl
2	Calculate maximum bending moment for a propped cantilever beam which carries a udl of 10Kn/m for a span of 2m
3	Calculate point of contra flexure for propped cantilever beam has a 4m engthcarries point load of 20KN at free end
4	Difference between cantilever beam and propped cantilever beam
5	Calculate deflection at mid span for a propped cantilever beam f l ad 10Kn/m for a span of 4m
6	What is the effect of sinking of support for fixed beam
7	What is effect of rotation
8	Calculate slope and deflection for a fixed beam of ad 10Kn/m f r a span f 4m
9	Difference between propped cantilever beam and fixed beam
10	A fixed beam of length 3m is subjected to two point loads 9KN at the middle third point. Calculate Bending moment at the fixed end.
	UNIT-1V
1	State Clapeyron"s three moment theorem and write equation also.
2	What is the effect of sinking of support in Three moment theorem
3	Explain Continuous beam with neat diagram
4	Derive Slope deflection equation in continuous beam
5	What is the effect of sinking of support in slope deflection method
	UNIT-V
1	Define stiffness and relative stiffness of a member with different far end conditions
2	Define Carry over factor
3	Define Distribution factor and its importance at fixed end and simply support end
4	Define Elastic curve
5	Importance of Elastic curves in beams.

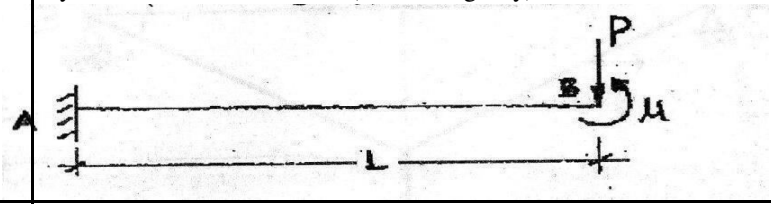
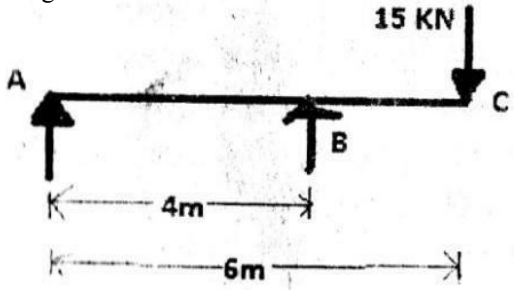
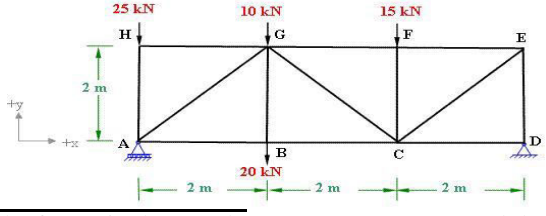
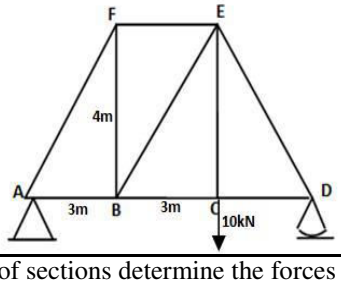
LONG ANSWER QUESTIONS).

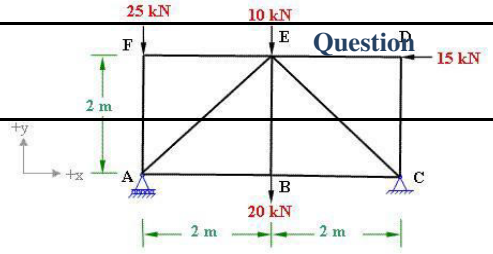
UNIT – I

`1	Differentiate between pin-jointed and rigid jointed plane frames
2	Using method of Tension Coefficient analysis, determine the fo ces in the membe s of the plane truss shown in fig. 
3	Fig shows the plan of a tripod ; the feet P, Q, R being in the h riz ntal plan and the apex S being 4m above the plane Horizontal loads of 125kN and 200kN are applied at D as shown. Find the forces in all the members assuming that all the joints are pin joints. 
4	Analyze the plane truss shown in figure using the method Tension Coefficients and find the forces in the members. 
5	Using the Method of Tension analyses the cantilever, plan truss shown in figure. Find the member forces.

S. No	Question
	
6	Calculate the forces in members of pin jointed space truss shown in figu e, using Tension Coefficient method. 
7	Each bar of the truss shown in fig 2 has a cross section of 625mm^2. Calculate the horizontal deflection of the joint C. 
8	A portal frame ABCD is hinged at A&D and has rigid joints. The frame is loaded as shown in Fig. Analyze the frame using minimum strain energy method. Plot the bending moment diagram. 
9	Determine the vertical and horizontal deflections of the free end of the lamp post shown in fig. 1. Take EI = 16000kN- m$^{2.}$

S. No	Question
	 Fig. 4
10	Determine the vertical and horizontal deflection at the free end of the bent shown in fig. 4. Use the unit load method. Assume uniform flexural rigidity EI th oughout. 
	UNIT - II
1	Define moment area theorem and explain its applications in beams 
2	A beam of 12m span is subjected to a point load of 125kN at point E as shown in figure 1. Find the slopes at point A, B, C & E and the deflections at points C, D & E . Use conjugate beam method.
3	An overhanging beam PQR is loaded as shown in figure 2 . Find the slopes over each support at the right end. Find the maximum upward deflection between the supports. Use Macaulay"s method. Take E = 2.1×10^5 N/mm^2 , I = 6×10^8 mm^4. 
4	A beam AB of 4m span is simply supported as shown in figure 3, determine : TakeE=2×10^8k /mm^2,I=2×10^{-5}m^4 a) Deflection at C, b) Maximum deflection 

S. No	Question
5	A cantilever AB of length L is subjected to a concentrated load w and a couple u at the free end, as shown in figure 4, determine the slope and deflection at the free end by moment area method. EI (flexural rigidity) is constant. 
6	Evaluate slope at point A and deflection at point C for the beam shown in fig no. 5, using castigliano"s theorems. Take e = 2×10^5 N/mm^2 and I = 2×10^8mm^4. 
7	Analyse the pin-jointed frame loaded as shown in figure by the stiffness meth . Find the force in any one of the diagonal member. All members have the same cross sectional area.
8	Using Method f sections determine the forces in the members BC, GC and GF of the pin jointed plane truss as shown in fig. 
9	Find the forces in the members AF, AB, CD, DE and the reaction forces in A and D. CD=3M. 
10	Using Method of sections determine the forces in all the members of pin jointed truss.

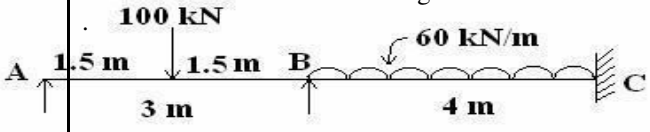
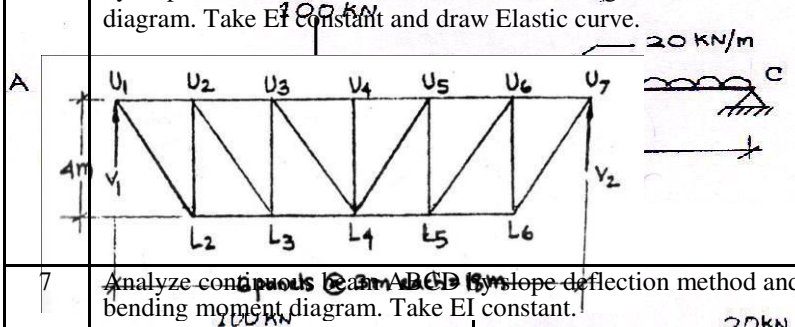
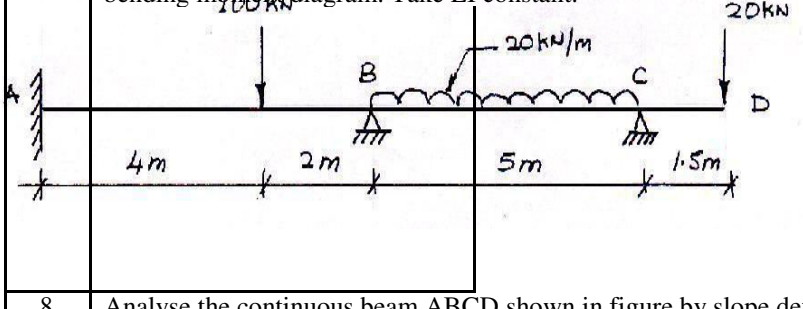
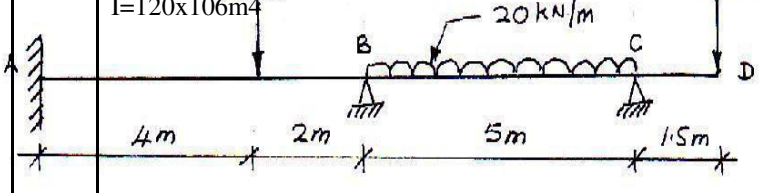
S. No	Question
	

UNIT-III

1	A cantilever of length 10 m carries udl of 800N/m length over the who e ength. The free end of the cantilever is supported on a prop. The prop sinks by 5mm. If E=3X10^{5}N/mm^{2} and I=10 ^{8} mm ^{4} , then the prop reaction
2	A cantilever of length 8m carries udl of 2Kn/m run over the whole length. The cantilever is propped rigidly at the free end. If E=1X10^{5}N/mm^{2} and I=10 ^{8} mm ^{4}, then determine reaction at the rigid prop and deflecti n at the center
3	A cantilever of length 5m carries a point load of 24kn at its center. The cantilever is propped rigidly at the free end. Determine the reacti n at the rigid pr p.
4	A cantilever of length 4m carries a UDL of 1Kn/m run ver the wh le span length. The cantilever is propped rigidly at the free end. If the value f If E=2X10^{5}N/mm^{2} and I=10 ^{8} mm ^{4}, Determine the reaction at the rigid pr p and deflecti n at the center.
5	A cantilever of length 8 m carries UDL of 0.8Kn/m length over the whole length. The free end of the cantilever is supported on a prop. The prop sinks by 5mm. If E=2X10^{5}N/mm^{2} and I=10 ^{8} mm ^{4} , then the prop reaction
6	A fixed beam AB, 5m long, carries a point load of 48kn at its center. the moment of inertia of the beam is 5x10 ^{7} mm^{4} and value of E for the beam materials is 2x10^{5} N/mm^{2}. Determine Fixed end moments at A and B, and Deflection under the load.
7	A fixed beam of length 5m carries a point load of 20KN at a distance of 2m from A. Determine the fixed end moments and deflection under the load, if the flexural rigidity of the beam is 1x10 ^{4} Kn/m^{2}
8	A fixed beam of length 6m carries point loads of 20kn and 15kn at distance 2m and 4m from the left end A. Find the fixed end moments and the reactions at the supports. Draw B.M and S.F diagrams.
9	A fixed beam of length 3m carries tow point loads of 30kn each at a distance of 1m from both ends. Determine the fixing moments and draw B.M diagram.
10	A fixed beam AB of length 6m carries a uniformly distributed load 3kn/m over the left half of the span together with a point load of 4kn at a distance of 4.5m from the left end. Determine the fixing end moments and support reactions.

UNIT-IV

1	If support B of the continuous beam of Question No. 1 settles by 30 mm, obtain the support moments by slope deflection method, taking I = 400 cm^{4} and E= 2×10^{5} N/mm^{2}. Sketch the B.M.D.
2	Using Slope Deflection method obtain the support moments for the 2-span continuous beam shown below. Sketch BMD.

S. No	
3	Using Claperoyn"s method finds the support movements for the 2-span continuous beam loaded as shown below figure 2. Sketch the B.M.D 
4	Using moment distribution method, analyse the 2-span continuous beam ABC, having end supports A and C fixed. There is a load of 5 kN in span AB=5 m at 3 m from A, while on span BC there is a ad f 8 kN at 2.5 m from C. Sketch the B.M.D
5	If the end spans A and C of the beam given in Questi n N .2 are simply supp rted analyse using slope deflection method. Sketch the BMD.
6	Analyze two span continuous beam ABC in which supp rt B sinks by 5mm by slope deflection method. Then draw Bending m ment & Shear f rce diagram. Take EI constant and draw Elastic curve. 
7	Analyze continuous beam ABCD by slope deflection method and then draw bending moment diagram. Take EI constant. 
8	Analyse the continuous beam ABCD shown in figure by slope deflection method. The support B sinks by 15mm. Take E=200x105 KN/m2 and I=120x106m4 

UNIT-V

1.	A 3-span continuous beam ABCD has fixed end supports. On end span AB= 6m there is u.d.l. of 20 kN/m, while on CD = 5 m there is a point load of 80 kN at mid span on the central span BC = 5 m, there is a point load of 50kN at 3m from B. If the moment of inertia of BC is twice that of AB and CD analyze by moment distribution method and sketch the B.M.D
2.	Using moment distribution method, analyze the 2-span continuous beam ABC, having end supports A and C fixed. There is a load of 5 kN in span AB=5 m at 3 m from A, while on span BC there is and f 8 kN at 2.5 m from C. Sketch the B.M.D
3.	A continuous beam ABCD 18m long is continuous over 3 spans. AB=8m,BC=4m, CD=8m. Moment of inertia is constant over the whole span. A concentrated load of 4000N is acting of AB at 3m from support A. There is a UDL load of 1000 N/m on BC. On the span CD there is a central load of 4000N. The ends are fixed and during loading the support B sinks by 1cm. Find the fixed end moments using slope deflection method. I=1600cm4 and E=200GPa
4.	Analyze the continuous beam ABCD 3l long using MDM is continuous over 3 spans with a uniformly distributed load of w per unit length.AB=BC=CD=l. The beam is of constant section throughout its length and supports remain at same level after loading.
5.	A continuous beam ABCD 18m long is continuous over 3 spans. AB=8m, BC=4m, CD=8m. Moment of inertia is constant over the whole span. A concentrated load of 4000N is acting of AB at 3m from support A. There is a UDL load of 1000 N/m on BC. On the span CD there is a central load o4000N. The ends are fixed and during loading the support B sinks by 1cm. Find the fixed end moments using slope deflection method. I=1600cm4 and E=200GPa
6.	A continuous beam ABC consists of two consecutive spans of 4m each and carries a distributed load of 60Kn/m run. The end A is fixed and the end C simply supported. Find the support moments and the reactions.