Name: A N Shankar

Enrolment No: 40000706

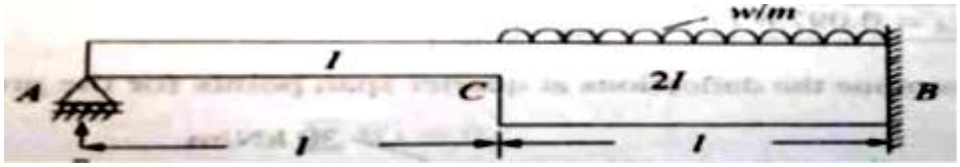
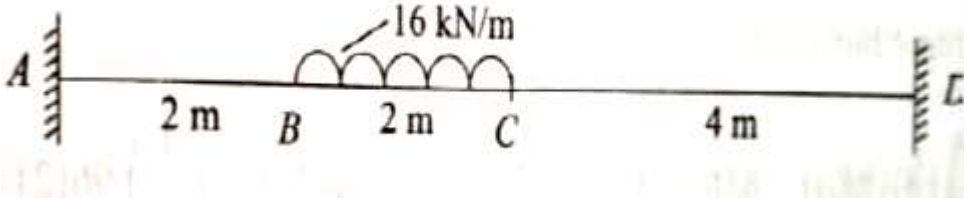
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

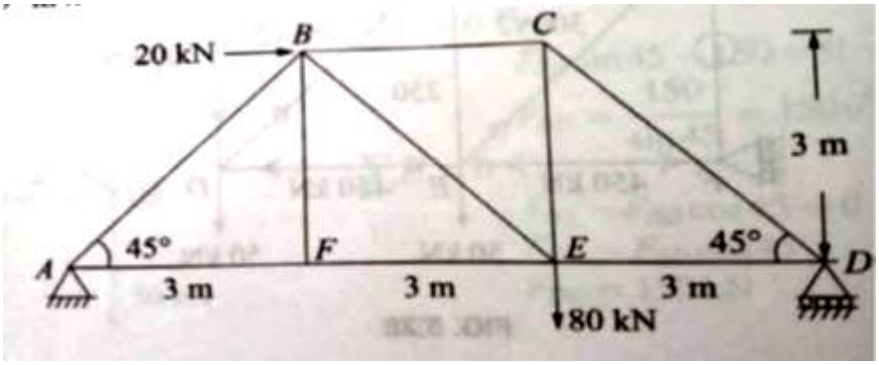
Course: Structural Engineering & vibration in pipelines
Semester: II
Program: M. Tech
Time: 03 hrs. **Max. Marks: 100**
Instructions:

SECTION A

S. No.		Marks	CO
Q.1	Explain the difference between propped cantilever & fixed beams	05	CO1
Q.2	How moment area method differs from energy method for analyzing beams.	05	CO2
Q.3	Briefly explain the different kinds of cement with properties	05	CO3
Q.4	Explain the advantages of welded connections over bolted connections	05	CO4

SECTION B

Q.5	Calculate the area of steel required for short R.C column 400mm X 450mm in cross section to carry axial load of 1160kN. Assume the grade of Concrete M20 & fe415. Also draw the ductile reinforcement connections.	10	CO3 & CO5
Q.6	Design the Tie member of roof pipe using to carry load of 300kN. Use 14mm thick Gusset plate & diameter of 20mm PDSR. Design the bolted connection. How you ensure the Safety of connections?	10	CO4
Q.7	Analyze the stepped ABC simply supported at A & fixed at C carries load of intensity "w" per unit length over BC. Draw the bending moment & shear force. 	10	CO1
Q.8	A UDL of 16kN is on portion of fixed beam ABCD. Calculate the reactions & moments at the supports by energy methods. 	10	CO2

Q.9	**OR** A Timber beam is 150 X 300mm. It carries a uniformly distributed load of 5kN/m over the left half span of beam. The beam is supported over a span of 4m. The Modulus of Elasticity is 10Gpa. Determine the deflection at mid-span of beam. Use Unit load method	**10**	**CO3**
	SECTION-C		
Q.10	A 2 km Steel Oil pipeline was proposed to be constructed with 914mm outer diameter, 8.74mm wall thickness & made up of Fe500 steel. The maximum allowable operating pressure is 5.7Mpa. After five years, the defect was found in leakage. As a pipeline engineer, what remedial measures you will propose to plug up the cracking caused by stress corrosion & thermal fatigue.	**20**	**CO4**
Q.11	Determine the vertical deflection of the Joint E of the truss shown in figure below Take AE = 3.6 X 10^5.  	**20**	**CO1 & CO2**
Q.12	**OR** Design the column section to withstand the load of 150 kN. Use M20 Grade of Concrete & Fe415 steel.	**20**	**CO3**

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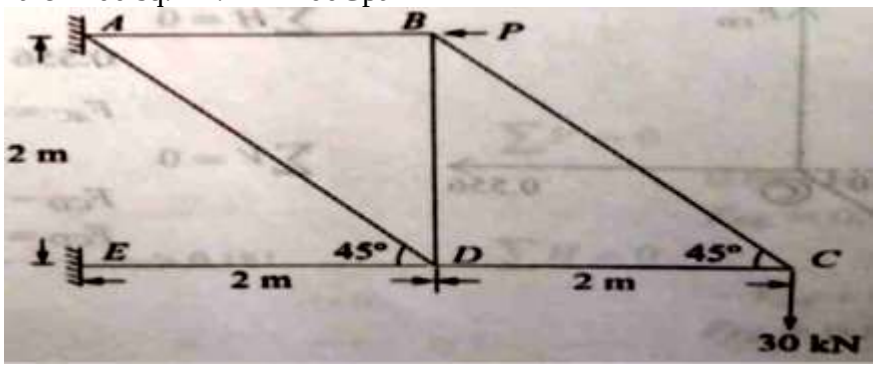
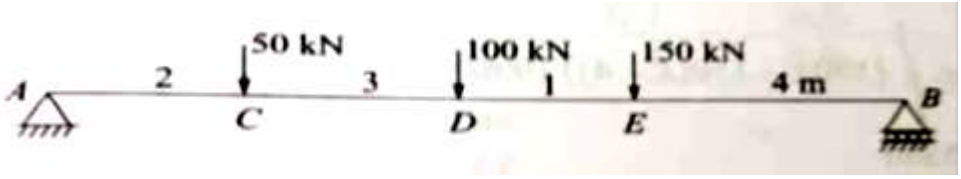
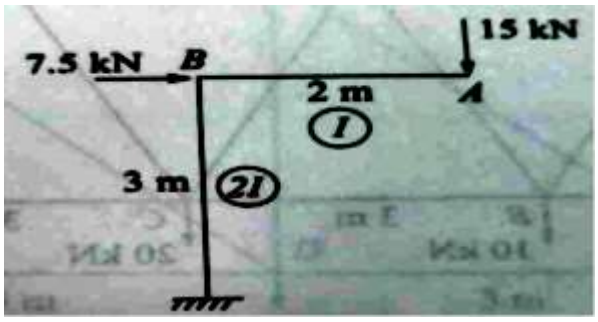
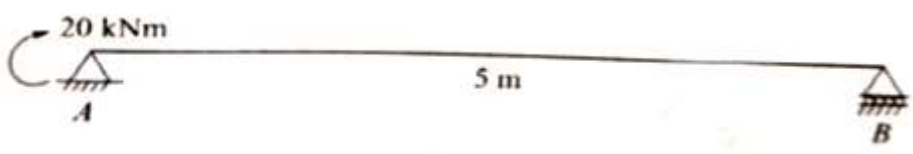
SECTION A

S. No.		Marks	CO
Q.1	What are the advantages of steel structures over conventional RCC structures	**05**	**CO4**
Q.2	How the presence of aggregates influence the strength of Concrete mix	**05**	**CO3**
Q.3	What are the stresses induced due to total strain energy in a beam or frame	**05**	**CO2**
Q.4	What are the advantages of fixed beams? How it can be made statically determinate.	**05**	**CO1**

SECTION B

Q.5	A reinforced concrete pipe of length 4.5m carries uniformly distributed load of 30kN/m inclusive of self-weight. How do you design the smallest concrete pipe section? Use M20 Grade concrete & mild steel reinforcement. Also show the ductile reinforcement.	**10**	**CO3 & CO5**
Q.6	Design a tie member for the roof pipe consisting of Angle 80 X 50 X 8mm with the ultimate stress of 220Mpa. The connection has to be connected to Gusset plate. Design the weld to transfer the load to its full strength. Check the safety of connection?	**10**	**CO4**
Q.7	Calculate the magnitude of horizontal load which must be applied at B in the frame in order that the vertical deflection at C is zero. The cross sectional areas of all members are 1200 sq.mm. E = 200Gpa 	**10**	**CO2**

Q.8	A steel pipe of uniform cross section is simply supported on a span of 10m & carries concentrated loads of 50, 100 & 150kN at distances 2, 5 & 6m from the left support. Compute the deflections under 150kN load using unit load method. Take EI = 400 X 10^4 kNm^2?  **OR**	**10**	**CO1**
Q.9	Determine the horizontal & vertical component of deflection at A by Strain energy.  	**10**	**CO3**
	SECTION-C		
Q.10	A Steel pipeline was proposed to be constructed under the sea. The pipeline was subjected to side forces of 20kN possibly lifting off its dead weight supports due to extremely transient loads. What precautions you will propose such that change in Bending moments, axial forces, displacements & deformations along the pipeline is minimum. Give your suggestion with critical explanation.	**20**	**CO3 & CO4**
Q.11	Determine the maximum slope & minimum deflection for the beam shown in figure below using Conjugate beam method.  **OR**	**20**	**CO1**
Q.12	A 300mm IS Flat 8mm thick is used as a tie member & is connected to 12mm PDSR. Calculate the connected to 12mm thick plate by 18φ diameter. Calculate maximum force that member can carry if 1. The connection is by bolting. 2. Zig- Zag bolting is used. Take F_y = 250Mpa	**20**	**CO4**