000102

PRN		Course Code :	UAE502

Third Year **B. Tech** End Semester Examination Winter 2024

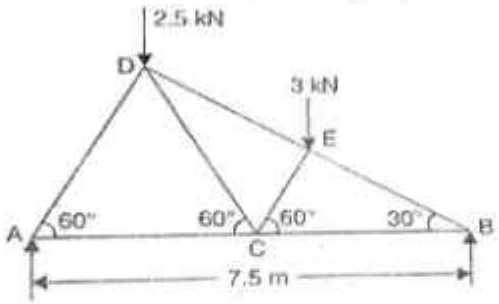
Aircraft Structures I

Day and Date: Thu 21 NOV 2024 Max Marks: **100**

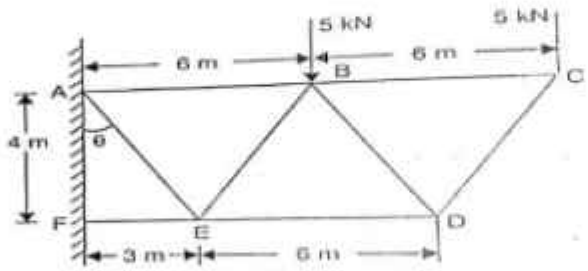
Time : 10:30AM To 01:30PM Duration: **03** hrs

Instructions: All questions are compulsory.

		Marks	Bloom's Level	CO
Q.1	**Attempt the following**			
a)	A truss of span 7.5m is loaded as shown in fig. Find the reactions and forces in the members of truss.	08	2	1



b)	A cantilever truss is loaded as shown in fig. Find forces and reactions in the members.	08	3	1



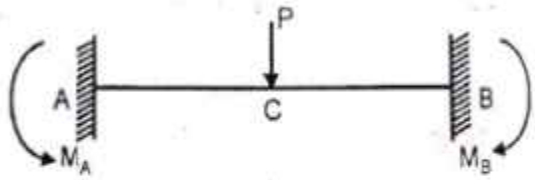
OR

b)	A continuous beam ABC consists of two spans AB and BC of lengths 6 m and 8 m respectively. The span AB carries a load of 120kN at 4 m from A while the span BC carries a point load of 160 kN at 5 m from C. Find the moments and reactions at the support. Also draw the B.M diagram. By using Moment Distribution Method.	08	2	1

Q.2	**Attempt the following**			
a)	Using Castigliano's theorem calculate the vertical deflection at the middle of simply support beam which carries a UDL of intensity 'q' over the full span. The flexural rigidity EI of the beam is constant and only strain energy of bending is to be considered.	08	3	2

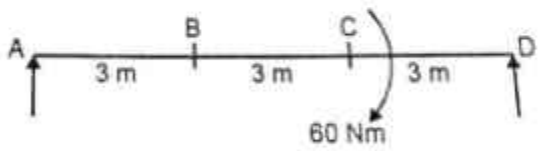
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b)	A fixed beam show in figure determines the support moments and deflection at the midpoint.	08	3	2



OR

b)	Find the deflection at B of a simply supported beam as shown in fig. By unit load method.	08	2	2



Q.3 Attempt any two from the following

a)	Drive the critical Buckling load equation for one end fixed and another end free condition.	08	3	3
b)	Derive the expression column with eccentricity.	08	1	3
c)	Derive the expression for deflection and maximum bending moment of a beam column of span '*l*' is subjected to an axial load 'P' and a and point load W.	08	2	3

Q.4 Attempt any two from the following

a)	Derive the expression for shear strain energy theory.	08	2	3
b)	Explain in detail about the Ductile and Brittle materials with stress strain curve.	08	3	3
c)	Mild steel shaft of 100mm dia is subjected to a maximum torque of 10kNm and maximum bending moment of 5kNm. Find the factor of safety according to (i) Maximum shear stress theory, (ii) Maximum strain energy theory and (iii) Maximum shear strain energy theory. If elastic limit in simple tension is 260MPa and v = 0.6.	08	2	4

Q.5 Attempt any Two of the following

a)	A vertical compound member rigidly fixed at its upper end consists of a steel rod 2.5m long and 20mm dia placed within equally long brass tube 21mm internal dia and 30mm external dia. The rod and the tube are fixed together at the ends. The compound member is then suddenly loaded in the tension by the weight of 10kN falling through a height of 3mm on to a flange fixed to its lower end. Calculate maximum stress in steel and brass. Take E_s=200GPa and E_b=100GPa	09	3	4
b)	The maximum instantaneous extension, produced by an unknown falling weight through a height of 6cm in a vertical bar of length 4m and of cross-sectional area 5cm3, δ =2.1mm. Determine: (i) The instantaneous stress induced in the vertical bar (ii) The value of unknown weight. Take E = 70 GPa	09	2	4
c)	Drive the expression for the stress due to impact loading.	09	2	5

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Q.6 Attempt any Two of the following

a)	Explain about Allowable Damage Limit (ADL) Analysis in detail.	09	2	5
b)	What are the different types of repair work in aircraft structural components.	09	3	5
c)	Write short notes i. Repair Considerations ii. Best Practices for Repair	09	2	5

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