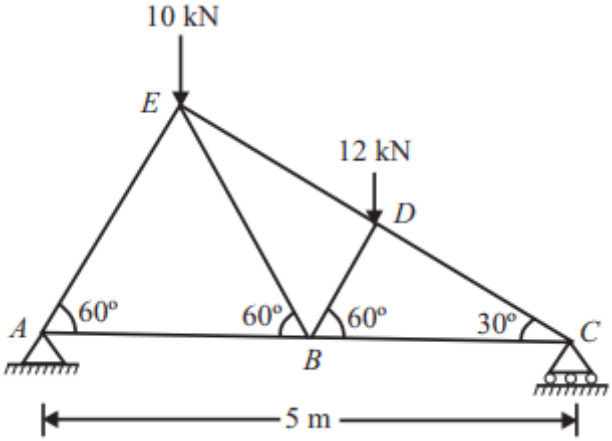
Roll No. _____

END SEMESTER EXAMINATION
SEMESTER- III

COURSE CODE : CE-406 | **DURATION : 3 (THREE)HRS**
COURSE TITLE : STRUCTURAL MECHANICS | **MAXIMUM MARKS : 75**
SESSION : JULY-DEC'2021 | **PASS MARKS : 35 %**

NOTE:
1. *All the questions are compulsory*
2. *Attempt any 5 (five) questions.*
3. *Mark for each question is shown against it.*
4. *Assume suitable logical data wherever necessary.*

1.	**(a)**	What are the types of loading in a beam? Briefly explain with neat sketch.	**(4)**
	(b)	What are the different types of beam? Explain with suitable diagram.	**(5)**
	(c)	What are the assumptions made in the theory of simple bending?	**(4)**
	(d)	Define Hook's law.	**(2)**
2.	**(a)**	Draw the shear force and bending moment diagram of a simply supported beam with a concentrated load at the Centre.	**(5)**
	(b)	Define slope and deflection of a beam.	**(3)**
	(c)	A rod is 2m long at a temperature of 10°C. Find the expansion of the rod, when the temperature is raised to 80°C. If this expansion is prevented, find the stress induced in the materials of the rod. Take E=1.0 X10^5 Mpa and α=0.000012 per degree centigrade.	**(5)**
	(d)	Define thermal stresses.	**(2)**
3.	**(a)**	Derive the equation for maximum slope and deflection of a simply supported beam with a uniformly distributed load over the entire span.	**(8)**
	(b)	A timber beam is 120mm wide and 200mm deep and is used on a span of 4 metres. The beam carries a UDL of 2.8 KN/m run over the entire length. Find the maximum bending stress induced.	**(5)**
	(c)	What is composite section?	**(2)**
4.	**(a)**	A simply supported beam of 6m span carries a uniformly distributed load of 1.5 KN/M over the entire span, it also carries the concentrated loads of 1KN, 2 KN and 3KN at a distance of 1.5 m, 3m and 4.5m respectively from left end. Draw S.F and B.M diagram and also determine the maximum bending moment.	**(12)**
	(b)	Define (i) Stress (ii) Strain (iii) poisson's ratio	**(3)**
5.	**(a)**	Determine the uniformly distributed load per metre of a rectangular beam 20cm deep and 30cm wide. The beam is simply supported with the length of 8m. The maximum bending stress is given by 120 N/mm^2.	**(7)**
	(b)	A column of timber section 20cm X 25cm is 8 metre long with both ends being fixed. Determine : i. Collapsing load ii. Safe load for the column. Factor of safety is 3 and young's modulus for timber is 17.5x10^3N/mm^2	**(8)**

6.	**(a)**	A truss of span 5m is loaded as shown in fig. find the reactions and forces in the members of the truss. 	**(15)**
7.	**(a)**	The external and internal diameters of a hollow cast iron column are 5cm and 4cm respectively. If the length of this column is 3m and both of its ends are fixed, determine the crippling load using Rankine's formula. Take the values of ultimate crushing stress 550 N/mm^2 and $\alpha = 1/1600$ in Rankine's formula.	**(5)**
	(b)	Write short notes on: i. Moment of joints ii. Conjugate beam method iii. Point of contraflexure	**(6)**
	(c)	A a rod 160cm long and of diameter 4cm is subjected to an axial pull of 20KN. If the Young's modulus of the materials is $2 \times 10^5 N/mm^2$. Determine the stress, the strain and the elongation of the rod.	**(4)**
8.	**(a)**	A cantilever beam of length 1.5m span is loaded with UDL of 2KN/m over the span of 1m from fixed end and 2KN at the free end. Draw the shear force and bending moment diagram.	**(6)**
	(b)	A cantilever beam of length 2m carries a uniformly distributed load of 2.5 KN/m run for a length of 1.25 m from the fixed end and a point load of 1KN at the free end. Find the slope and deflection at the free end if the section is rectangular 12 cm wide and 24 cm deep and $E = 1 \times 10^4 N/mm^2$	**(6)**
	(c)	Write the difference between column and strut.	**(3)**

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