TED (21) - 3014
(REVISION-2021)

2110220089

Reg.No……
Signature…….

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER - 2024

THEORY OF STRUCTURES

[Maximum Marks:75] [Time: 3 Hours]

PART - A

I. Answer all the following questions in one word or one sentence. Each question carries 'one' marks.

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1	Define shear force.	M 1.01	R
2	Write the bending equation.	M 1.04	R
3	Define slenderness ratio.	M 2.01	R
4	Define angle of repose.	M 2.05	R
5	Write the torsion equation.	M 3.03	R
6	Write the principle of superposition.	M 3.04	R
7	Define stiffness factor.	M 4.01	R
8	A beam that has more than two supports is ……..……..…..	M4. 01	R
9	A rigid structural frame consisting essentially of two uprights connected at the top by a third member is ……...	M4.03	R

PART - B

II. Answer *any eight* questions from the following. Each question carries 'Three' marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1	Define beam and list the different types of beams based on support condition.	M1.01	R
2	State the assumptions in theory of simple bending	M1.03	R
3	Illustrate any 3 end conditions of column.	M2.02	U
4	Write the causes by which a dam is liable to fail and the minimum requirement to resist them.	M2.05	R

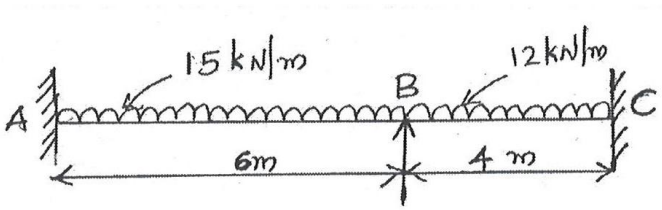
5	Write any 3 advantages of fixed beam.	M3.04	R
6	Find the slope and deflection at the free end of a cantilever beam 2m long carrying UDL of 30kN/m on entire span. Take E as $2x10^5 N/mm^2$ and I as $160x10^6 mm^4$.	M3.03	U
7	Illustrate core of section for columns of rectangular and circular cross sections.	M2.04	U
8	Illustrate stress variation across cross section circular cross section of shaft under torsion.	M3.03	U
9	Write down the Clapeyron's three moment equation for a two- span continuous beam with constant EI (i) under general loading (ii) for no settlement.	M4.02	R
10	Define distribution factor and carryover factor.	M4.03	R

PART - C

Answer all the questions from the following. Each question carries 'seven' marks.

(6 x 7 = 42 Marks)

		Module Outcome	Cognitive level
III.	Draw the SFD and BMD for a simply supported beam of length 10m and carrying a uniformly distributed load of 12kN/m for a distance of 4m from the left end.	M1.02	U
	OR		
IV.	An I section beam 400x200 mm has web thickness of 125mm and a flange thickness of 25mm. It carries a shear force of 250kN at a section. Find out the maximum and average shear stress across the section.	M1.04	U
V.	Give the assumptions of Euler's theory.	M2.02	U
	OR		
VI.	A trapezoidal dam 10m high 1.6m wide at top and 3.4m wide at bottom with its water face vertical. To what height water can be stored in the dam so that there is no tension at the base of dam. Take unit weight of water $Y= 10kN/m^3$	M2.05	A
VII.	Calculate the slope and deflection of simply supported beam of size 250x350mm having UDL of 60kNm for the entire length of span of 2m. Take $E=2x10^5 N/mm^2$.	M3.01	U
	OR		
VIII.	A shaft has to transmit power of 105kN at 160rpm. If the shear stress is not to exceed $65N/mm^2$ and twist in a length of 3.5m must not exceed i. Find the suitable diameter. Take modulus of rigidity $G=8x10^4 N/mm^2$.	M3.04	A
IX.	A two span continuous beam has two equal spans with a point load W at the middle of each span. Find the fixed moment at the middle support and sketch the BM diagram and shear force diagram, EI is constant.	M4.02	U
	OR		

X.	Find the support moments by method of moment distribution for the beam shown in figure and sketch BMD. EI is constant for beam.  	M4.03	U
XI.	A cantilever beam of length 2m fails when a load of 2kN is applied at the free end, If the section of the beam is 40x60mm. Find stress at failure.	M1.04	U
	OR		
XII.	Find the diameter of strut 1.50m long fixed at one end and free at other end. Euler's collapse load is 1 5 kN. Cross section is hollow circular with internal diameter 3/4th the external diameter.	M2.02	A
XIII.	A fixed beam AB 6 m long is carrying a point to load of 50 kN at its centre the moment of inertia of the beam is $78x10^6$ mm^4 and the value of E for the material is 2.1 x 10^5N/m^2. Determine fixed end moments at A and B and maximum deflection.	M3.02	U
	OR		
XIV.	Write short note on portal frame.	M3.03	R

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