

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B. Tech. Winter 2023-23 - Examination

Semester: 3

Subject Code: 203115204

Subject Name: BASICS OF STRUCTURAL ANALYSIS

Date: 06/10/2022

Time: 2.00 pm to 4.30 pm

Total Marks: 60

Instructions:

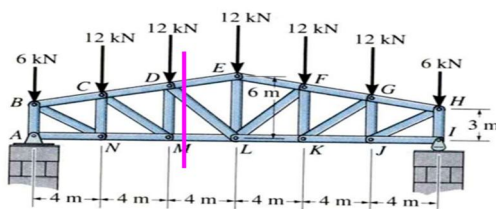
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start a new question on a new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark)**(15)**

1. If the bending moment is constant, there is no _____ force.
2. Simple trusses are most often used as the _____.
3. _____: twisting of a structural member, when it is loaded by two equal and opposite forces.
4. Kinematic indeterminacy of cantilever beam is _____.
5. _____ are the balancing forces so that the structure doesn't undergo rigid body motion.
6. _____ trusses are mostly used as Electrical and telecom towers.
7. Define Tri-axial stress.
8. Define the Neutral axis.
9. What is the change of slope in the loaded beam?
10. What is the kinematic indeterminacy of a structure?
11. _____ is the member of force required to produce unit deflection.
A) Stiffness B) Flexibility C) Both D) None
12. In which year Moment Distribution method was introduced?
A) 1948 B) 1932 C) 1942 D) 1938
13. In uniaxial stress on the oblique plane, the shear stress will be maximum when $\Theta =$ _____°
A) 90 B) 45 C) 60 D) 30
14. Stiffness of all intermediate members is given as a, $k =$ _____ * EI/L
A) 2 B) 1 C) 4 D) 3
15. Due to vertical or horizontal shear release, the force release = _____
A) 2 B) 1 C) 4 D) 3

Q.2 Answer the following questions. (Attempt any three).**(15)**

- A) List out the formulas for the principal stress and principal plane.
- B) Enlist the Advantages of Fixed Ends or Fixed Supports.
- C) For the given roof truss, find out the forces in the member DE, DL and ML.



- D) What is the kinematic indeterminacy of a below-listed structure?

1. propped cantilever
2. cantilever beam
3. simply supported beam
4. fixed-fixed beam

Q.3 A) Find out the slope at A & B, and also the maximum deflection value for the "simply-supported beam AB of length L and stiffness EI, subjected to a UDL". (07)

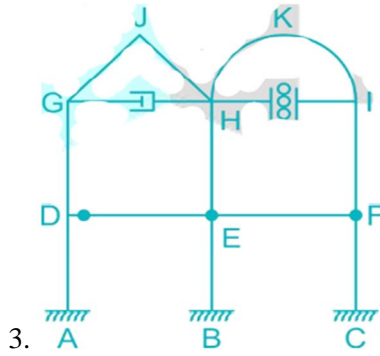
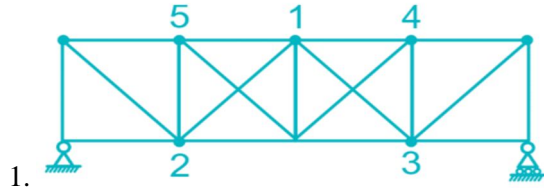
- B) In the wall of a cylinder the state stress is given by, $\sigma_x = 85\text{MPa}$ (compressive), $\sigma_y = 25\text{MPa}$ (tensile), and shear stress $\tau_{xy} = 60\text{MPa}$ Calculate the principal planes on which they act. Show it in a figure. (08)

OR

- B) What are the assumptions made for the design of the truss & types of the truss? With which criteria the truss will be classified as a perfect truss or an imperfect truss? (08)

Q.4 A) Calculation of Static Indeterminacy for the below-given structures.

(07)



OR

A) Drive Mohr's First Theorem (Mohr - I) with a neat sketch.

(07)

B) Find the distribution factor for the given beam.

(08)

