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CIVIL ENGINEERING

CLASS NOTES

STEEL STRUCTURES

(For all Competitive Exams in INDIA)

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This is the class notes of course taught on UNACADEMY PLUS during 27.04.2022 to 18.06.2022 in 80 hours. This course will be very helpful for all students who are preparing for any competitive examination in India.

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A

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(All names mentioned here are with consent of Individuals)

CONTENTS

Recommended Literatures.

1. S.K. Duggal, 3rd edition, Limit State method.
2. My Class Notes.
3. WorkBook.
4. PYQ. paper of exams.
5. Test Series.

Chapters.

1. Basic Concepts.
2. Plastic Analysis — V.V.I.
3. Limit State Method.
4. Bolted Connection.
5. Welded "
6. Eccentric Connection
7. Tension Member.
8. Comp. Member.

(2)–(3): 50-60%

(4)–(6): V-V.I

(9) Beam.
(10) Plate Girder & Gantry Girder.
(11) Base plate
(12) Roof truss.
(13) WSM.

CHAPTER - 1

BASIC CONCEPTS

1.1. Introduction.

Structural Engineering.

- Analysis (SOM, SA)
  - Equilibrium
  - Compatibility.
  - Energy.
- Design. (Steel, RCC, PSC)
  - Safety
  - Serviceability.
  - Durability.
  - Economy.
  - Aesthetic.

1. Safety - A structure must be safe with appropriate FOS for loading that may come on it during its intended life.

2. Serviceability - A structure should provide the service for which it is constructed.

3. Durability - A structure should sustain loading for which it was designed & should perform well with safety & serviceability upto its whole life.

4. Economy - Design and Construction of any Structure should be economical without affecting, safety, serviceability & durability.

5. Aesthetic - If Huge investment is involved in design & Construction then aesthetic also plays important role.

For example, Considering steel beam.

Safety — Section Size.

Serviceability — Shape of Section.

Durability — Painting.

Economical — Shape of Section (Rectangular Vs I-Section)

Aesthetic — Shape of Section (Angle Vs Circular).

1.2. Examples of Steel Structure.

1. Railway Bridges.
2. Water Tank.
3. Transmission Tower.
4. Chimney.
5. Wind Mill.
6. Roof Truss.
7. Pipe Rack.

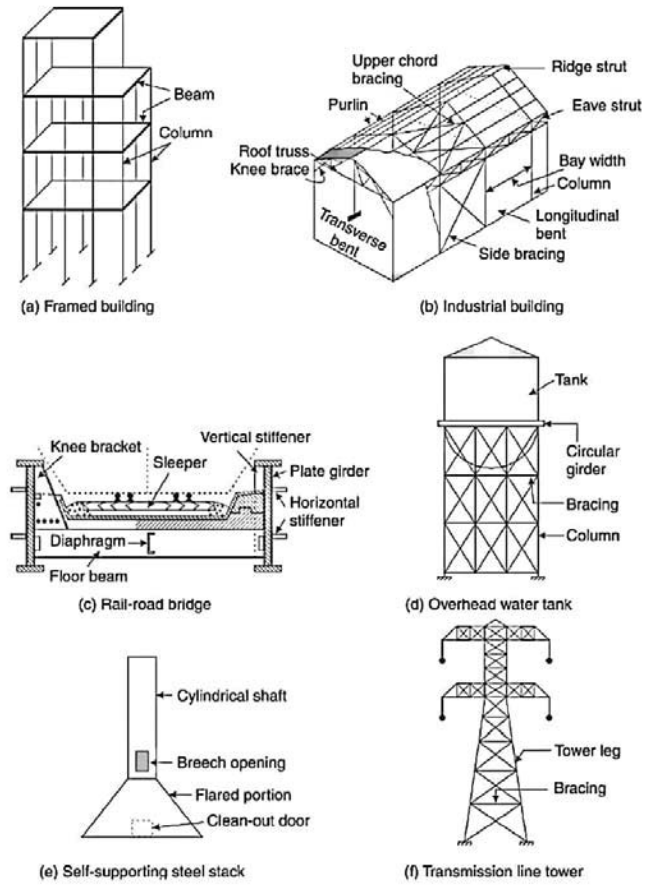

Fig. 1.1 Examples of steel structures

1.3. Why Steel Structures?

(A) ADVANTAGES.

1. High Strength per unit weight.
2. Smaller section so less dead load.
3. Suitable for large span.
4. Speedy Construction.
5. Easy Repair.
6. Long life.
7. High Scrap Value.
8. Ensuring quality is easy.
9. Easy to transport.
10. Ductile so give sufficient warning before failure.

(B) DISADVANTAGES.

1. Corrosion.
2. Vulnerable to fire.
3. Fatigue.
4. High Maintanance Cost.
5. Stress Concentration.
6. Costly.
7. Skilled Manpower required.