

Subject: Theory of Structures

Class: Third year

Hours : 2hrs (Theoretical) , 1hrs (Practical)

Objectives :

The student will be able to define all types of structures and their stability, define the methods of determination of the structure deformation under the load , study the methods of analysis and internal forces determination of determinate and indeterminate structures ,study the methods used for analysis of structural elements due to moving loads using the influence lines. The student will also learn the methods of structural analysis and the theories used, application of different methods of structural analysis and the methods of presenting the actual structure, connection between the theoretical analysis and the actual engineering structures.

Week	Syllabus
1&2	Introduction <ul style="list-style-type: none">• Definition of engineering structures• Classification of engineering structures• Forces applied on engineering structures• Types of loads and supports
3&4	Stability and determinacy of structures <ul style="list-style-type: none">• Method used for stability of engineering structure• Stability and determinacy of beams• Stability and determinacy of trusses• Stability and determinacy of rigid frames
5&6 &7&8 &9&10	Statically determinate structures <ul style="list-style-type: none">• Statically determinate beams Drawing of shear force and bending moments diagram• Analysis of statically determinate truss• Statically determinate rigid frames Drawing of shear force and bending moments diagram
11&12&13	Influence line for statically determinate structures
14&15&16	Moving concentrated loads <ul style="list-style-type: none">• Criteria for maxima• Absolute maximum bending moment
17&18	Approximate analysis for statically indeterminate structures

19&20&21	Elastic deformation of structures (Beams, Truss, Rigid frames) <ul style="list-style-type: none"> • Virtual work method (Unit load method) • conjugate-beam method
22&23 &24&25	Slope-deflection method for statically indeterminate beams and rigid frames <ul style="list-style-type: none"> • Without joint translation • With joint translation
26&27 &28&29	Moment distribution method without joint translation <ul style="list-style-type: none"> • Fixed-end moment • Element stiffness • Distribution factor, carry-over factor • Distribution of external moment applied to a joint • The process of locking and unlocking :one joint • The process of locking and unlocking :two joint • Modified stiffness factor Moment distribution method with joint translation <ul style="list-style-type: none"> • Analysis of statically indeterminate rigid frames with one degree of freedom
30	Computer applications

References:

- 1. Elementary theory of structures / Yuan Y. Hsieh**
- 2. Structural analysis / Russell C. Hibbeler**
- 3. Structural and Stress Analysis / T.H.G. Megson**
- 4. Fundamentals of structural analysis/ Kenneth M. Leet, Chia Ming Hang and Anne M. Giberl**