

Analysis.

Proposed syllabus: M. O.S., Dec 2006

Proposed Syllabus of Mechanics of Structures' in Semester pattern (4026)
(in lieu of Theory of Structures – I and Theory of Structures – II of MPEECs)

Semester: V

Teaching Scheme		Examination Scheme					
Lecture	Practical	Duration of Paper	Theory Marks	Test Marks	Practical/Oral	Term-Work	Total
05	---	03 hrs.	75	25	---	---	100

Comparison Table of Course Contents:

Sr. No.	Chapter	Hrs.	Marks
Theory of Structures – I (4022)		64	100
1)	Flitched Beams	08	12
2)	Combined bending and axial loading	10	16
3)	Complex stress systems	14	20
4)	Influence lines for beams	08	12
5)	Rolling loads	07	12
6)	Stability of structures	07	12
7)	Torsion of circular shafts	10	16
Theory of Structures – II (4023)		48	100
1)	Slope and deflections	10	22
2)	Fixed beams of uniform sections	10	22
3)	Moment distribution method	12	24
4)	Columns	08	16
5)	Three hinged arches	06	16
Mechanics of Structures		80	75
1)	Flitched Beams	10	09
2)	Combined bending and axial loading	10	09
3)	Complex stress systems	15	15
4)	Slope and deflections	10	09
5)	Fixed beams of uniform sections	10	09
6)	Moment distribution method	15	15
7)	Columns	10	09

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Analysis of Structures (4026)

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Chapter: 1	Filtched Beams	Hrs.:10.	Marks: 09
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Definition of flitched beams, flitched beam theory, transformed section and modular ratio. Moment of resistance of composite section, permissible stresses, stress distribution across composite section. Analysis of beams of composite sections, symmetrical and asymmetrical above the neutral axis. Shear connectors.

Chapter: 2	Combined bending and axial loading	Hrs.:10.	Marks: 09
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Typical cases of structure subjected to bending and axial loading. Eccentricity about one principal axis, standard cases of stress distribution. Limits of eccentricity for uniform stress distribution system, middle third rule, middle quarter rule. Eccentricity about both principal axes. Limits of eccentricity, core section for different standard sections. Extreme intensities of stress. Equation of zero -stress line.

Chapter: 3	Complex stress systems	Hrs.:15.	Marks: 15
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Uni-axial stress system, resolution of stress on oblique plane, magnitude and direction of oblique stress, graphical solution using Mohr's stress circle, location of principal plane and planes of maximum shear. Two dimensional stress system, normal and tangential component stress on oblique plane, magnitude and direction of resultant stress, maximum obliquity of the resultant stress, schematic representation. Construction of Mohr's circle of stress, stresses on mutually perpendicular oblique planes. Location of principal planes and planes of maximum shear. General two-dimensional stress system. Normal and tangential components of resultant stress, maximum obliquity of resultant stress. Location of principal planes and planes of maximum shear. Principal stress and maximum shear stresses, Mohr's circle of stress. Principal stresses in beams.

Chapter: 4	Slope and deflections	Hrs.:10.	Marks: 09
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Formulation of differential equations of elastic line for a beam subjected to bending. Derivation of formula for slopes and deflection for standard cases. Macaulay's method (cubic equations are not to be considered) simple problems B.M.D and S.F.D

Chapter: 5	Fixed beams of uniform sections	Hrs.:10.	Marks: 09
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Determination of fixed end moments for the beams carrying point loads and U.D.L on full part span. Construction of shear force and bending moment diagrams.

Chapter: 6	Moment distribution method	Hrs.:15	Marks: 15
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Definition, stiffness, relative stiffness, distribution factor. Sign conventions. Analysis of continuous beam uniform section, supports at the same level and carrying point load and U.D.L over the entire spans. Analysis of single storied single span portal frame carrying point load or U.D.L over entire span (only non-sway analysis).

Chapter: 7	Columns	Hrs.:10.	Marks: 09
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Types of columns, deflection, short and long columns. Buckling of columns under axial loading. Euler's formula for crippling load (derivation not needed). End conditions, effective length, and slenderness ratio. Limitations of Euler's formula. Rankine's formula. Column formula as per I S: 800 – 1984.

REFERENCE BOOKS

- 1) Theory of Structures by S. Ramamrutham.
- 2) Mechanics of Structures Vol I and II by S.B Junarkar and Alvai
- 3) Theory of Structures by O.P Jain and B .K . Jain
- 4) Analysis of Structures by B.C. Punmia
- 5) Strength of Materials by B. B.Lord
- 6) Mechanics of Materials by E. S. Herman
- 7) Strength of Materials by Singer
- 8) Strength of Materials by Warnock
- 9) Theory of Structures by Smith
- 10) Strength of Materials by S. Timoshenko
- 11) Theory of Structures by S. Timoshenko and Young
- 12) ~~Theory of Structures by S. Ramamrutham~~

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