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Theory of Structure — Complete Syllabus

BTEUP Diploma in Civil Engineering • 4th Semester • Session 2026-27

Subject 4.5 (Theory) • Total 100 Marks • 3 Credits • L 2 - T 1

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.5	Theory of Structure	Theory	2 - 0	3	Theory 40	Theory 60 (3 hrs)	100
Theory of Structure Total				3	40	60	100

What This Subject Aims To Do

To learn the concept of eccentric loading and stresses in vertical members like columns, chimneys and dams, analyse beams using methods like slope deflection, three moment and moment distribution, and understand different methods of finding axial forces in trusses.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Principal Stress and Strain	6	20%
2	Combined Direct and Bending Stress	6	20%
3	Strain Energy	6	20%
4	Moment Distribution Method and Slope Deflection Method	5	20%
5	Simple Trusses	5	20%

Unit 1 — Principal Stress and Strain (6 Periods, 20%)

Topics: Stress on inclined planes, principal plane and principal stress in elements subjected to direct and shear stress and their combinations; Mohr circle for calculation of stress on inclined planes and principal strain for above cases.

Unit 2 — Combined Direct and Bending Stress (6 Periods, 20%)

Topics: Eccentric loading, middle third rule, columns subjected to uni-axial and bi-axial eccentric loading; dams — application of middle third rule for fixing the base width, calculation of stresses at the base of dam and stability of dam against overturning and sliding; vertical structures like chimney subjected to movement due to wind forces.

Unit 3 — Strain Energy (6 Periods, 20%)

Topics: Strain energy stored in a member due to axial loading and bending; strain energy stored by a beam due to uniform bending moment; work done by a force on a member, law of reciprocal deflection, Betti's law; the first theorem of Castigliano; deflection of truss joints.

Unit 4 — Moment Distribution Method and Slope Deflection Method (5 Periods, 20%)

Topics: Moment distribution method: basic proposition, relative stiffness, continuous beams with and without fixed ends; sinking of support, portal frames with and without sway (simple problem only). Slope deflection method: basic concepts, stiffness of members with far end fixed or hinged; development of slope deflection equations and their application to beam and frames.

Unit 5 — Simple Trusses (5 Periods, 20%)

Topics: Types of trusses (simple, Fink, compound Fink, French truss, Pratt truss, Howe truss, north-light truss, king post and queen post truss); calculate support reactions for trusses subjected to point loads at joints; calculate forces in members of truss using method of joints and method of sections.

Reference Books (as listed in the syllabus)

- Ramamrutham. S, Theory of structures, Dhanpatrai & Sons.
- Khurmi, R. S., Theory of Structures, S. Chand and Co., New Delhi.
- Bhavikatti, S S, Structural Analysis Vol-1, Vikas Publishing House Pvt Ltd., New Delhi.

- Dr. Vijay Mittal, Amit Verma, Structural Mechanics, Asian Publishers, Muzaffarnagar, ISBN: 978-93-91541-23-1.
- Junnarkar, S. B., Mechanics of structures, Volume-I and II, Charotar Publishing House, Anand.
- Pandit, G.S. and Gupta, S.P., Theory of Structures, Tata McGraw Hill, New Delhi.
- Agor R, Structural Analysis, Khanna Publishing House, Delhi.

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.

