

Mark Distribution

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	40	60	2.5 hrs

Continuous Internal Evaluation Pattern:

Attendance	: 5 marks
Continuous Assessment Test	: 20 marks
Continuous Assessment Assignment/Field visit report	: 15 marks

SYLLABUS

Module 1 (12 hours)

Introduction to strength of materials; Concept of stress, strain and elastic constants. Hook's Law and Stress-Strain curve of Mild Steel. Axially loaded bars with uniform and varying cross-sections (with basic problems). Theory of columns and struts: Euler's Equation & Rankine's Equation (with basic problems). Shear Force Diagram and Bending Moment Diagram for cantilever, simply supported and overhanging beams subjected to combination of point loads and uniformly distributed loads.

Module 2 (12 hours)

Statically indeterminate structures: Slope and deflection of beams using integration techniques, Moment Area Theorems, Conjugate Beam method; Clapeyron's Three-Moment Theorem: analysis of propped beams, fixed beams and continuous beams; Analysis of beam using moment distribution method.

Module 3 (16 hours)

Types of Loads and load combinations. Specifications & use of IS code (IS 800-2007), steel table and BIS code; Design of steel structures- Connections: analysis of bolted connections and welded connections (with problems). Design concept of steel members under tension and compression, Structural failure modes in agricultural buildings and prevention. Cost-effective structural design concepts for rural development.

Module 4 (16 hours)

Design of RCC structures- specifications, use of IS code (IS 456-2000), Design of singly and doubly reinforced sections. Design of columns. Design considerations for retaining walls and silos. Structural safety of rural water supply systems.

Field Visit

Field Visits to Rural bridge / culvert site/Steel fabrication workshop for farm structures / Greenhouse / polyhouse demonstration farm.

Text Books

1. Bansal, R. K. (2005). *A textbook of engineering mechanics*. Laxmi Publications.
2. Khurmi, R. S. (2006). *Strength of materials*. S. Chand Publishing.
3. Punmia, B. C., Jain, A. K., & Jain, A. K. (2016). *Limit state design of reinforced concrete*. Laxmi Publications.
4. Raju, N. K. (2019). *Design of reinforced concrete structures: IS 456:2000*. CBS Publishers & Distributors.

Reference Books

1. Gupta, J. K., & Gupta, S. K. (2024). *Strength of materials* (2nd ed.). Cengage India.
2. Bedi, D. S. (2023). *Strength of materials*. Khanna Publishing House.

END SEMESTER EXAMINATION - MODEL QUESTION PAPER (STC 2025 SCHEME)

Course Code	25UAGT301
Course Name	STRENGTH OF MATERIALS & THEORY OF STRUCTURES
Max. Marks: 60	Duration: 2.5 Hours

Part A

(Answer all questions. Each question carries 3 marks)

Qn No.	Question	Marks	CO	BL
1.	Explain stress and strain and state Hooke's law.	3	CO1	L2
2.	Differentiate between Euler's and Rankine's approach to column buckling.	3	CO1	L2
3.	Explain moment area method to state how the slope at a support of a simply supported beam is obtained.	3	CO2	L2
4.	Explain Clapeyron's three-moment theorem and mention its use in continuous beams.	3	CO2	L2
5.	Explain the types of loads and load combinations considered as per IS 800-2007.	3	CO3	L2
6.	Differentiate bolted and welded connections used in steel agricultural structures.	3	CO3	L2
7.	Explain the IS 456-2000 assumptions used in design of singly reinforced sections.	3	CO4	L2
8.	Describe the design considerations for a retaining wall in a rural structure.	3	CO4	L2

Part B

(Answer any one full question from each Module. Each question carries 9 marks)

Module I				
Qn No.	Question	Marks	CO	BL
9	Explain the stress-strain curve of mild steel and mark its salient points.	9	CO1	L2
OR				
10	Explain how the total elongation of a bar of varying cross-section subjected to an axial tensile load is determined.	9	CO1	L2
Module II				
Qn No.	Question	Marks	CO	BL
11	Apply the conjugate beam method to determine of slope and deflection of a simply supported beam carrying a central point load.	9	CO2	L3
OR				
12	Apply the moment distribution method to explain the analysis of a propped cantilever beam.	9	CO2	L3
Module III				
Qn No.	Question	Marks	CO	BL
13	Design and explain the analysis of a bolted connection for a steel tension member used in a farm structure as per IS 800-2007.	9	CO3	L3
OR				
14	Explain the design concept of steel members under compression and the structural failure modes to be prevented in agricultural buildings.	9	CO3	L3
Module IV				
Qn No.	Question	Marks	CO	BL
15	Apply IS 456-2000 provisions to explain the design steps of a singly reinforced concrete beam section.	9	CO4	L3
OR				
16	Apply the Design considerations for an RCC column and a silo for rural applications.	9	CO4	L3
