Lok Jagruti Kendra University
University with a Difference

Diploma in Architectural Assistantship

LJ Polytechnic

Course Code:025080404

Structure

Programme / Branch Name	Diploma in Architectural Assistantship					
Course Name	Structure				**Course Code**	025080404
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	0	3	50	50	-	100

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Technical understanding of forces
- ✓ Use of scientific calculator
- ✓ Basic maths understanding

3. Rationale

Knowledge and understanding of various types of civil engineering structures is very important for architects to draw details of various civil engineering projects. It is essential to draw details before the execution of any projects. This course imparts basic concepts of mechanics along with its classification as well as concepts, principles, applications, and practice covering coplanar concurrent force system, coplanar non-concurrent force system, the center of gravity, bending moment and shear force. This knowledge is required to understand the basics of civil engineering structures. The course is designed in such a manner so that the students get knowledge and understanding of various types of civil engineering structures. At the diploma level students are expected to develop their understanding of these aspects of various civil engineering works to apply their knowledge and skills in preparing architectural drawings of various structures.

4. Objectives

- ✓ Apply various laws of mechanics in various civil engineering structures.
- ✓ Understand the importance of the moment of inertia of solid sections like rectangle, circle, I-section and T-section.
- ✓ Calculate forces in different types of structures under various types of loads on the beam.
- ✓ Calculate bending and shear moments and stresses.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcomes	% Weightage	Hours
1.	**Introduction, Stress and Strain**	1.1. Concept of Force 1.2. Resultant and Composition of Forces 1.3. Parallelogram of Forces 1.4. Moment of a Force 1.5. Types of Stress and Strain. 1.6. Defination of Shear and Stress 1.7. Defination of Elastic Limit, Hook's Law and Poisson's Ratio, Bulk Modulus 1.8. Relation Between Bulk Modulus and Young's Modulus	• Explain the Concept of Force and Various Force System • Compute Resultant of Forces • State Types of Stress and Strain. • Explain Stress, Strain, Shear Stress and Shear Strain. • Explain Elastic Constants • Relation Between Elastic Constants	10	06
2.	**Centre of Gravity and Moment of Inertia**	2.1. Centroid of Simple Geometric Mass 2.2. Methods for Centre of Gravity 2.3. Centre of Gravity of Various Sections 2.4. Moment of Inertia of Plane Area 2.5. Moment of Inertia Various Sections 2.6. Theorem of Perpendicular Axis 2.7. Theorem of Parallel Axis 2.8. Moment of Inertia of Composite Sections	• Compute Centroid of Line and Area. • Compute the Centre of Gravity of Solids. • Describe the Moment of Inertia and its Importance. • Compute Moment of Inertia of Various Sections • Compute Moment of Inertia of Composite Sections	25	10
3.	**Bending and Shear Moment, Bending and Shear Stress**	3.1. Introduction 3.2. Types of Loading 3.3. Shear Force, Bending Moment and its Sign Conventions 3.4. Shear Force and Bending Moment Diagrams at Different Conditions 3.5. Bending Stress 3.6. Theory of Simple Bending 3.7. Assumpions in the Theory of Simple Bending	• Enlist Different Types of Loads • Describe Shear Force and Bending Moment • Draw Shear Force and Bending Moment Diagrams • Enlist Various Assumptions of Simple Bending • Draw Bending Stress Diagrams Across the Sections	30	14

		3.8. Moment of Resistance 3.9. Position of Neutral Axis 3.10. Distribution of Bending Stress Across the Sections 3.11. Modulus and Strength of Section 3.12. Shear Stress of a Section 3.13. Distribution of Shearing Stress Across the Sections	• Draw Shear Stress Diagrams Across the Sections • Compute the Bending Stress of Sections • Compute Shear Stress of Sections		
4.	**Columns and Struts**	4.1. Introduction 4.2. Short and Long column 4.3. Euler's Column Theory 4.4. Assumptions in the Euler's Column Theory 4.5. Types of End Conditions of Columns 4.6. Euler's Formula and Equivalent Length of a Column 4.7. Selenderness Ratio 4.8. Rankine's Formula for Columns	• Define Column and Strut and Enlist the End Conditions of Columns • Calculate the Load-Carrying Capacity of Column and Strut Using Euler's formula and Rankine's Formula. • Explain the Assumptions of Euler's Column Theory	10	06
5.	**Riveted Joints and Welded Joints, Reinforcement Details of Structural Components**	5.1. Introduction 5.2. Types of Riveted Joints 5.3. Failure of Rivets 5.4. Types of Welded Joints 5.5. Advantages and Disadvantages of Welded Joints 5.6. Rolled Steel Sections 5.7. Typical Steel Beam-Beam Framed Connection and Typical Beam-Column Section for Steel Structure 5.8. One Way and Two Way Slab and their Arrangement of Reinforcement Details 5.9. Show the Arrangement of Reinforcement in Column,Singly, Doubly and Cantilever Reinforced Beams With the Necessary Details	• Explain Riveted Joints and Welded Joints • List Rolled Steel Sections • Differntiate Between One Way and Two Way Slab • Draw the Arrangement of Reinforcement Details of One Way and Two Way Slab • Differentiate Between Singly and Doubly Reinforced Beam • Draw the Arrangement of Reinforcement in Column,Singly, Doubly and Cantilever Beam With the Necessary Details	25	06

		5.10. Advantages of RCC Structures and its Assumptions in Theory			
				Total Hours	**42**

6. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1.	Introduction, Stress and Strain	20	20	40	10	05	05
2.	Centre of Gravity and Moment of Inertia	20	10	40	20	05	05
3.	Bending and Stress Moment, Bending and Shear Stress	30	20	30	05	05	10
4.	Column and Strut	20	20	30	10	10	10
5.	Riveted Joints and Welded Joints, Reinforcement Details of Structural Components	20	50	10	10	-	10

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

7. Textbooks

1) Strength of Materials (Mechanics of solids) – R.S. Khurmi.

8. Reference Books

1) Strength of Materials (Mechanics of solids) – B.C. Punamia.
2) Strength of Materials – Dr. R.K.Bansal

9. Open Sources (Website, Video, Movie)

1) nptel.iitm.ac.in/courses/.../IIT.../lecture%2023%20and%2024.htm
2) www.freestudy.co.uk/mech%20prin%20h2/stress.pdf
3) www.engineerstudent.co.uk/stress_and_strain.html
4) https://www.iit.edu/arc/workshops/pdfs/Moment_Inertia.pdf
5) https://www.gangainstitute.com/wp-content/uploads/2019/DIP-3RD-SEM-STRUCTURAL-MECHANICS