GANPAT UNIVERSITY									
FACULTY OF ARCHITECTURE DEISGN & PLANNING									
Programme	Bachelor of Architecture					Branch/Spec.	INSTITUTE OF ARCHITECTURE		
Semester	VI					Version	2.0.0.0		
Effective from Academic Year			2021-22			Effective for the batch Admitted in			June 2019
Subject code	2VIA04SDS		Subject Name			Structural Design and Systems VI			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	-	-	-	2	Theory	40	60	100
Hours	2	-	-	-	2	Practical	-	-	-

OBJECTIVE:

- This subject is applications of structural engineering principles to design basic structural elements using of steel as materials.
- This subject is specifically aim to develop understanding of various design philosophy, Indian codal provisions, design basis used in design of basic elements of steel frame structures and its detailing requirement.

LEARNING OUTCOME**:**

LO1: Understand various design philosophy to be used in the design of structural elements.
LO2: Evaluate the loading conditions and to calculate loads as per IS Specifications.
LO3: Explain various design philosophies understand analytical approach to be used in the design of structural elements.
LO4: Propose design of basic structural elements like connection, slab, beams, columns, truss and foundation etc. using steel as materials using limit state approach.

CONTENT & TEACHING UNITS

Unit	Content	Hrs
1	**INTRODUCTION:** Mechanical properties of Structural Steel, Structural Sections- rolled beams, channels, angles, etc. Loads & load combinations, Methods of Analysis, Codes & specifications, Design Philosophies - Working stress Method, Ultimate Load Method, and	02

	Limit State Method.	
2	**TYPES OF CONNECTIONS (RIGID AND PINNED CONNECTION):** Bolted Connections- Definition of riveted joints, rivet strength and capacities, Design of Bolted Connections. Welded Connections - Weld shapes, types and symbols allowable stresses in weld material, Fillet and Butt weld, Design of Welded Connections. Design of simple connections such as lap and butt joints, truss joint connections.	04
3	**AXIAL FORCE DESIGN: Tension member-** types of tension member, behavior, modes of failure, Slenderness ratio. Analysis and design of axially loaded tension member made up of angle section, splices, Lug angle.	04
4	**COMPRESSION MEMBER-** behaviour, classification of sections, possible modes of failure, elastic buckling of slender member, design of compression member having single & built-up section. Importance of bracing: Objectives of lacing, single lacing, double lacing, IS-800-2007 requirement for lacing system. Objectives of batten. IS-800-2007 requirement for battening system. Columns with lacing and battens.	06
5	**DESIGN FOR BEAMS AND BEAM-COLUMNS:** Type of sections, classification, Lateral stability, Design strength of laterally restrained and unrestrained beams, shear strength, deflection, web buckling & crippling, Design of simply supported beam. Combined axial and flexural design of member (Beam-Column)	06
6	**DESIGN OF A SIMPLE ROOF TRUSS:** Steel trusses, its types, geometry, spans, pitches, spacing etc. Various loads on a roof truss. i.e., Dead, Imposed & Live Load. Analysis & Calculation of Dead load, Live load & wind Load. Analysis of a truss under various loads and Design of a truss members.	06
7	**DESIGN OF FOOTING:** Introduction to footings for steel columns, Slab based and gusseted based. **CONCEPTUAL STUDY OF GENERAL CONNECTIONS:** Beam to beam connections, Beam to column connections, Column to column connections, and Column to foundation connection.	04

TEXT BOOKS	
1	NA

REFERENCE BOOKS	
1	N. Subramanian; Steel Structures, Oxford Publication.
2	Dayaratnam P.; Design of Steel Structures; Wheelor pub. co., Delhi
3	Ramamrutham S. & Narayanan R.; Design of Steel Structures; Dhanpatrai & Sons, Delhi
4	S. S. Bhavikatti, Design of Steel Structures: By Limit State Method as Per IS: 800-2007, I K International Publishing House Pvt. Ltd
5	IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards.

6	IS 800:2007, General Construction In Steel - Code of Practice, Bureau of Indian Standards, New Delhi.

LIST OF TUTORIALS:

1. Development of spread sheets for design of various structural components of steel structure.
2. Draw plan and elevation of different types of trusses with details, built up column.
3. Design and testing of steel beam section.
4. Prepare model of various connections/elements in steel structures.
5. Prepare model for detailing of beam column junction and column-footing junction or any one steel

Structure of the syllabus.

	BA - PO 1	BA - PO 2	BA PO 3	BA PO 4	BA PO 5	BA PO 6	BA PO 7	BA PO 8	BA PO 9	BA PSO 1	BA PSO 2	BA PSO 3
VIAD35111 - C01	2	2	2	2	2	3	1	1	2	2	3	2
VIAD35111 - C02	3	1	1	1	1	1	2	2	1	2	2	3
VIAD35111 - C03	2	0	3	3	2	2	2	2	2	2	2	3
VIAD35111 - C04	3	1	1	3	2	2	1	2	3	2	2	3