

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Civil Engineering			
Semester	V				Version	1.0.0.0			
Effective from Academic Year			2020-21		Effective for the batch Admitted in			July 2018	
Subject code	1CI2501		Subject Name		DESIGN OF STEEL STRUCTURE & MASONRY STRUCTURE				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	40	60	100
Hours	3	0	4	0	7	Practical	60	40	100

Pre-requisites:

The students should have adequate knowledge of the subject Engineering Mechanics, Engineering Materials, Mechanics of Structure – 1, Mechanics of Structures-II so that they can understand the subject better.

Course Learning Outcomes:

The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:

CO1. Understand the fundamentals of various design philosophies.

CO2. Explain essential features and requirements of design and detailing.

CO3. Acquire knowledge of basics of masonry structure.

CO4. Calculate all loads on panel points of a Roof Truss as per IS code requirements & analyze and design axially loaded tension member made up of angle section, strut made up of angle section, axially loaded column.

The practical should be carried out in such a manner that students are able to acquire different learning outcomes from covered course.

Course Content

Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hr
UNIT – 1 INTRODUCTION	1.1 Properties of steel 1.2 Stress-strain curve for mild steel 1.3 Types of steel structures 1.4 Limit state method 1.5 Partial safety factors	1a Explain limit state of strength and serviceability. 1b Explain how carbon content affects the properties of steel. 1c Explain partial safety factors for loads and materials.	05	02
UNIT – 2 BOLTED AND WELDED CONNECTION	2.1 Rigid connection, pinned connection, semi rigid connection, black bolts, turned bolts, HSFG bolts, grade of bolts. 2.2 Lap and Butt Joint, Minimum and Maximum Pitch, Tack Bolting, Edge Distance, Gauge Distance, Bolt Hole 2.3 Shear Capacity of Bolt – V_{dsb} , Bearing Capacity of Bolt – V_{dpb} as per IS-800-2007, Bolt Value, Efficiency of Joint 2.4 Numerical on bolted connection of angle section to gusset plate and for efficiency of joint having chain	2a Design Bolt Connection of Angle Section to Gusset Plate 2b Design Welded Connection of Angle Section to Gusset Plate	15	12

	bolting			
UNIT – 3 TENSION MEMBER & COMPRESSION MEMBER	<p>3.1 Examples of Tension Members in Civil Engineering Structures</p> <p>3.2 Design Strength of Tension Member, Design Strength due to Yielding of Gross Section, Design Strength due to Rupture of Critical Section for Angle Section, Design Strength due to Block Shear in Angle Section as per IS – 800-2007</p> <p>3.3 Slenderness ratio of Tension Member as per IS – 800 – 2007</p> <p>3.4 Numerical for Analysis & Design of Single and Double Angle Sections on same side and either side of Gusset Plate</p> <p>3.5 Strut, Maximum Slenderness Ratio, Classification of Cross – Sections and Buckling Class as per IS-800-2007</p> <p>3.6 Angle Strut as per Cl. 7.5, IS-800-2007</p> <p>3.7 Design Compressive Stress – f_{cd} according to Tables of IS-800-2007</p> <p>3.8 Numerical on Strut made up of Single Angle, Double Angle same and either side of G.P as per 1.2 & 1.3 Built up Column, Effective Length of Column as per Table 11, IS-800-2007</p> <p>3.9 Design Compressive Stress – f_{cd} according to Tables of IS-800-2007</p> <p>3.10 Numerical on Column made up of ISHB, ISHB with Flange Plate, Double Channels Back to Back and Toe to Toe</p>	<p>3a Analyze and Design Axially Loaded Tension Member made up of Angle Section.</p> <p>3b Solve Numerical for Analysis & Design for Single and Double Angle Sections on same side and either side of Gusset Plate.</p> <p>3c Analyze and Design Strut made up of Angle Section.</p> <p>3d Analyze and Design Axially Loaded Column.</p> <p>3e Solve Numerical on Column made up of ISHB, ISHB with Flange Plate, Double Channels Back to Back and Toe to Toe.</p> <p>3f Solve Numerical on Strut made up of Single Angle, Double Angle same and either side of Gusset Plate, Built up Column as per Table 11, IS-800-2007</p>	15	12
UNIT – 4 DESIGN OF BEAM & PURLIN	<p>4.1 Main Beam, Secondary Beam, Standard I Sections, Laterally restrained and unrestrained beam</p> <p>4.2 Plastic Section Modulus, Annexure H, IS-800-2007, Section classification as per Table 2 – IS-800-2007, Shear buckling, Shear Strength and Bending Strength of Section as per Cl. 8.4.1 and Cl. 8.2.1.2 of IS-800-2007, Deflection as per Table-6 of IS-800-2007, Shear Leg Effect, Web Crippling</p>	<p>4a Design of laterally Restrained Simply Supported beam</p> <p>4b Design of Purlin made up Angle Section</p>	05	06

UNIT – 5 COLUMN BASE & FOUNDATION	5.1 Slab Base, Gusseted Base, Base plate and its Thickness as per IS-800-2007, Concrete Block, SBC of Soil, Anchor Bolt, Cleat and Dummy Angle 5.2 Numerical on Slab Base Foundation under Column made up of Single H Section	5a Design of Slab Base Foundation under Axially Loaded Column made up of Single H Section. 5b Solve Numerical on Slab Base Foundation under Column made up of Single H section.	05	04
UNIT – 6 LOAD ON ROOF TRUSS	6.1 Rolled Steel Section – ISA, I & H Section, Channel Section and its application in Steel Structure 6.2 Types of Truss, Pitch of Truss, Rise, Spacing of Truss, Purlin, Principal Rafter, Main Tie, Sag Tie, Members of Truss, Roofing material- GI and AC Sheets 6.3 Dead Load of Truss per panel point Self Weight, Weight of Purlin, Wind Bracing, Weight of Roofing Material 6.4 Live Load per panel point in Truss as per IS – 875 – Part II -1984 when access is not provided 6.5 Wind Load per panel point in Truss using IS – 875 – Part III -1984	6a Calculate Dead Load, Live Load and Wind Load on panel points of a Roof Truss. 6b List out types of Truss.	10	05
UNIT – 7 MASONRY STRUCTURES	7.1 Introduction to IS 1905-1987 7.2 Column, pier and buttress 7.3 Types of walls 7.4 Design considerations 7.5 Workmanship	7a Explain the structural components involved in the masonry structural system. 7b Explain design considerations as per IS 1905-1987	05	04
		Total	60	45

List of Practical		
No.	Unit	Name of Practical
1	VI	Prepare following Neat sketches in Sketch Book: Different Types of Truss, Truss Details – Spacing of Truss , Principal Rafter, Main Tie, Members, Ridge, span, Roof Covering, Purlin etc., Eaves Level Joint of Truss Ridge Level Joint of Truss Beam to Beam Connection at Same Level, Beam to Beam Connection at Different Level Column to Beam Seated Connection (Weld & Bolt Connection), Column to Beam framed Connection (Weld & Bolt Connection), Gusseted Slab Base Foundation
2	VI	Find Forces in given Truss Members using Graphical Method due to D.L, L.L and W.L and Design Forces in the Members – Drawing Sheet – No: 01, A1 Size.
3	V	Draw Plan & c/s Elevation of Eaves Level Joint , Ridge Joint and Two Other Joints of a Truss Selected in Sheet No:01 with all design details like Size of Angle Section , G.P , Connection Details , Purlin , Roofing Material . Drawing Sheet – No: 02 , A1 Size, Draw Plan and c/s Elevation of Built up column made up of Double Channel provided back to back with Single or Double Lacing Draw Plan and c/s Elevation of Slab Base Foundation under column made up of H section Sheet No:03 – A1 Size.
4	V	Prepare a Report File related to Calculation work of Drawing Sheet No: 1 , 2 & 3
5	I	Site Visit of Industry Truss, Steel Structure Railway Platform – Report, Photographs

List of Text Books			
No	Title of Reference Books	Authors	Publication
1	Design of Steel Structures	L.S.Negi	Mc Graw Hill
2	Design of Steel Structures	S.K.Duggal	Mc Graw Hill

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Design of Steel Structures	S.S.Bhavikatti	Wiley
2	Design of Steel Structures	S. Ramamrutham	Dhanpat rai

Link of Learning Web Resource	
1	nptel.ac.in
2	www.springer.com
3	nptel.ac.in
4	www.steel-insdag.org