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Design of Steel Structure and Drawing — Complete Syllabus

BTEUP Diploma in Civil Engineering • 5th Semester • Session 2026-27
Subject 5.4 (Practicum/Theory) • Total 100 Marks • 3 Credits • L 1 – P 4

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.4	Design of Steel Structure and Drawing	Practicum/ Theory	1 - 4	3	Theory 20 + Practical 20	Theory 60 (3 hrs)	100
Design of Steel Structure and Drawing Total				3	40	60	100

What This Subject Aims To Do

An applied engineering subject for diploma holders who will supervise steel construction and fabrication and may have to design simple structural elements or change a design as materials allow. It deals with elementary design principles as per BIS code of practice IS: 800 — structural steel, connections, tension and compression members, beams, trusses and column bases, with drawings.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction	5	10%

2	Riveted, Bolted and Welded Connections	20	25%
3	Tension and Compression Members	15	20%
4	Beams, Roof Trusses and Column Bases	10	10%
5	Steel Structure Drawings	20	35%

Unit 1 — Introduction (5 Periods, 10%)

Topics: Structural steel and sections: properties of structural steel, designation and classification of structural steel sections as per IS handbook and IS: 800:2007; tubular sections; types of sections used for beams, tension and compression members.

Unit 2 — Riveted, Bolted and Welded Connections (20 Periods, 25%)

Topics: Riveted connections: types of rivet, permissible stresses in rivets, types of riveted joints, specifications as per IS 800, failure of riveted joint, strength and efficiency of riveted joint, design of riveted connection only axially loaded member (no staggered riveting). Bolt connections: types of bolt, permissible stresses in bolt, types of bolted joints, specifications for bolted joints as per IS 800, failure of a bolted joint, assumptions in the theory of bolted joints, strength and efficiency of a bolted joint, design of bolted joints for axially loaded members (no staggered bolts). Welded connections: types of welds and welded joints, advantages and disadvantages of welded joints, design of fillet and butt weld for axially loaded members.

Unit 3 — Tension and Compression Members (15 Periods, 20%)

Topics: Tension members: analysis and design of single and double section tension members and their rivetted and welded connections with gusset plate as per IS: 800-2007; introduction to lug angle and tension splice. Compression members: angle struts, type of section used, effective length, radius of gyration, slenderness ratio and its limits, permissible compressive stress; analysis and design of single and double angle sections compression members subjected to axial load; introduction to analysis and design of axially loaded column; introduction to lacing and battening (no numerical problem on lacing and battening).

Unit 4 — Beams, Roof Trusses and Column Bases (10 Periods, 10%)

Topics: Beams: analysis and design of single section simply supported laterally restrained steel beams; introduction to plate girder and functions of various elements of a plate girder. Roof trusses: form of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering; connection between purlin and principal rafter (no design, only concept). Column bases: types of column bases i.e. slab base, gusseted base; design of slab base and concrete block; introduction to gusseted base (no numerical problems on gusseted base); introduction to beam columns, design of simple built up beams (symmetrical I section with cover plates only).

Unit 5 — Steel Structure Drawings (20 Periods, 35%)

Topics: (i) Drawing No. 1: Roof truss — drawing of Fink roof truss with details of joints, fixing details of purlins and roof sheets. (ii) Drawing No. 2: Column and column bases — drawing of splicing of steel columns; drawings of slab base, gusseted base and grillage base for single section steel columns. (iii) Drawing No. 3: Column beam connections — (a) sealed and framed beam to beam connections, (b) sealed and framed beam to column connections. (iv) Drawing No. 4: Plate girder (bolted) — plan and elevation of plate girder with details at supports and connection of stiffness, flange angles and cover plate with web highlighting curtailment of plates. (v) Drawing No. 5: Draw at least one sheet using CAD software.

Reference Books (as listed in the syllabus)

- Civil Engineering Drawing by Loyal JS; SatyaParkashan, New Delhi.
- Civil Engineering Drawings by Chandel RP.
- Civil Engineering Drawing by Kumar; NS; IPH, New Delhi.
- Civil Engineering Drawing by Malik RS and Meo GA; Asian Publishing House, New Delhi.
- Steel Structures Design and Drawing by Singh Birinder; Kaption Publishing House, New Delhi.
- e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.
- Gharpure, D.V.Gupta, Vikram Singh, Design Of Steel Structures, Asian Publishers, Muzaffarnagar, ISBN No. 978-93-5502-160-1.

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Source: BTEUP 3rd 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.