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Workshop Practice — Complete Syllabus

BTEUP Diploma in Mechanical Engineering • 3rd Semester • Session 2026–27
Subject 3.4 (Practical) • Total 100 Marks • 2 Credits • L 0 – P 4

About this subject: Workshop Practice is a fully practical subject — there is no theory paper. You work in three shops (Smithy, Advance Welding, Advance Fitting), make real jobs with your own hands, and are assessed on your practical work: 60 marks internal and 40 marks external (3-hour practical examination).

Examination Scheme

Code	Paper	Type	L – P	Credits	Internal	External	Total
3.4	Workshop Practice	Practical	0 – 4	2	Practical 60	Practical 40 (3 hrs)	100
Workshop Practice Total				**2**	**60**	**40**	**100**

What This Subject Aims To Do

Workshop Practice forms a crucial foundation in the education of mechanical engineering diploma students. It introduces the fundamental manufacturing processes, tools, equipment, and basic fitting, machining and fabrication techniques used in industry. This hands-on exposure bridges the gap between theoretical knowledge and practical application, and builds skill, accuracy, safety consciousness and confidence in working with machines and materials. The course is divided into three parts — Smithy Shop, Advance Welding Shop and Advance Fitting Shop — and aims to give hands-on experience and practical skills in each, so students can handle real-world tasks efficiently and understand the techniques and safety measures each shop requires.

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Part 1 — Smithy Shop

General Shop Talk

Purpose of the smithy shop; different types of hearths used in the smithy shop; purpose, specifications, uses, care and maintenance of the various tools and equipment used in hand forging, grouped as cutting tools, supporting tools, holding tools and measuring tools; types of fuel used and the maximum temperature obtained; types of raw materials used in the smithy shop; uses of fire bricks and clays in the forging workshop.

Practice

Firing of the hearth/furnace, cleaning of clinkers and temperature control of the fire. Basic smithy/forging operations: cutting, upsetting, drawing down, setting down, necking, bending, fullering, swaging, punching and drifting. Demonstration: making a cube, a hexagonal cube and a hexagonal bar from a round bar. Simple heat treatment processes: tempering, normalizing, hardening.

Job Practice

- **Job I** — Making a cold/hot, hexagonal/octagonal flat chisel, including tempering of the edges.
- **Job II** — Production of utility goods, e.g. hexagonal bolt / square shank boring tool / fan hook (long S-type). Two jobs are to be done by the students.
- **Job III** — Preparing a cube from an M.S. round by the forging method.

Part 2 — Advance Welding Shop

General Shop Talk

Basic introduction to all types of welding techniques and equipment familiarisation, with an overview of advanced welding equipment. Overview of advanced welding processes — a brief review of foundational processes (SMAW, GMAW, GTAW, TIG, Plasma Arc, Submerged Arc) with their applications in industries such as aerospace, automotive, oil and gas, and manufacturing. Safety protocols and hazard awareness: personal protective equipment (PPE) — welding helmets with appropriate shade levels, gloves, flame-resistant jackets, safety boots and respiratory protection; proper storage of gas cylinders and handling of welding consumables; awareness of fire and explosion risks from flammable materials or gases. Weld imperfections and quality standards: common weld imperfections (porosity, cracks, lack of fusion) and their causes.

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Practice

Preparation of key components (power sources, torches, wire feeders, shielding gas regulators); maintenance tips to prevent equipment malfunctions (cleaning nozzles, checking cables); complete awareness of workstation setup, calibration and shutdown procedures; selecting appropriate filler metals, shielding gases and welding parameters for specific materials; practising flame generation with oxy-acetylene equipment and the classification of all types of flames.

Job Practice

- **Job 1** — Preparing a gas welding joint in vertical/horizontal position joining M.S. plates.
- **Job 2** — Gas cutting of a mild steel plate with an oxy-acetylene gas torch.
- **Job 3** — Gas welding of a cast iron and brass part or component.
- **Job 4** — Preparation of a T joint by arc welding.
- **Job 5** — Spot welding / seam welding.
- **Job 6** — MIG and TIG welding.
- **Job 7** — Arc welding pipe joint (M.S.).

Part 3 — Advance Fitting Shop

General Shop Talk

Introduction to the application of all types of tools used in the fitting shop. Basic knowledge of limits, fits and tolerances, necessary for precision fitting work. Familiarisation with interchangeable parts fitting. Introduction to jigs and fixtures that improve efficiency and accuracy. Understanding of advanced shop safety and the proper handling of tools and materials.

Practice

Precision use of tools such as scrapers, micrometers, vernier calipers and gauges; hacksawing, drilling, reaming and tapping with precision; use of taps and dies for internal and external threading; accurate chisel and file work to meet tight tolerances.

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Job Practice

- **Job 1** — Drilling, reaming, counter boring, counter sinking and tapping.
- **Job 2** — Dovetail fitting in mild steel.
- **Job 3** — Radius fitting in mild steel.
- **Job 4** — Pipe threading with die.

How to Prepare

Workshop Practice is learned at the bench, not from a book alone. Attend every shop session — the 60 internal marks rest on your actual practical work through the semester. Learn the safety rules of each shop first (especially PPE and gas cylinder handling in the welding shop), practise each forging, welding and fitting operation until the job comes out to size, and keep your jobs and record neat: the external practical examination (40 marks, 3 hours) tests the same jobs you practised. Revise the shop-talk topics — hearths, fuels, welding processes, weld defects, limits, fits and tolerances — because the viva around your practical work draws on them.

Note: the official syllabus gives no marks-distribution table for the three shops, so no shop-wise marks split is shown here.

Reference Books (as listed in the syllabus)

- Elements of Workshop Technology, Volume I & II — Hajra Chowdhary & Bhattacharya, 11th Edition, Media Promoters & Publishers Pvt. Ltd.
- A Textbook of Workshop Technology — R.S. Khurmi & J.K. Gupta, 2nd Edition, S. Chand & Co., New Delhi, 2018.
- Manufacturing Process — Begeman, 5th Edition, McGraw Hill, New Delhi, 2011.
- Workshop Technology — W.A.J. Chapman, Volume I, II & III, Viva Books Pvt. Ltd., New Delhi.
- Production Technology — HMT, 18th Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2018.

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Source: BTEUP IRDT Kanpur NEP-2020 curriculum for Diploma in Mechanical Engineering (Automobile), effective session 2025-26 (urise.up.gov.in). 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.