4.4 WORKSHOP TECHNOLOGY - III

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RATIONALE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various machining processes and modern machining methods is required to be imparted. Hence this subject.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: To understand the concept of gear manufacturing using different methods.
CO2: To understand grinding and finishing processes.
CO3: Explain the working and applications of modern machining practices.
CO4: Explain the working principle of metal forming.
CO5: Explain the working principle of metallic coating and finishing processes.

DETAILED CONTENTS

UNIT I

1. Gear Manufacturing

Gear materials and specifications, Gear manufacturing by Casting, Moulding, Stamping, Machining; Gear generating methods: Gear Shaping with pinion cutter & rack cutter; Gear hobbing; Description of gear hob; Operation of gear hobbing machine; Gear finishing processes;

UNIT II

2. Grinding

Principles of metal removal by Grinding; Abrasives – Natural & Artificial; Bonds and binding processes: Vitrified, silicate, shellac, rubber, bakelite; Factors affecting the selection of grind wheels: size and shape of wheel, kind of abrasive, grain size, grade and strength of bond, structure of grain, spacing, kinds of bind material; Standard marking systems: Meaning of letters & numbers sequence of marking, Grades of letters; Truing, dressing, balancing and mounting of wheel. Selection of grinding wheel. Grinding machines classification: Cylindrical, Surface, Tool

& Cutter grinding machines; Construction details; Principle of centreless grinding; Advantages & limitations of centreless grinding;

UNIT III

3. Modern Machining Processes

Introduction – comparison with traditional machining; Ultrasonic Machining: principle, Description of equipment, applications; Electric Discharge Machining (EDM): Principle, Description of equipment, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, applications. Wire cut EDM: Principle, Description of equipment, Controlling parameters; applications; Abrasive Jet Machining: principle, description of equipment, application; Laser Beam Machining: principle, description of equipment, application; Electro Chemical Machining: description of equipment, application.

UNIT IV

4. Metal Forming Processes

Press Working - Types of presses, type of dies and punches, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping.

Forging - Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging.

Rolling - Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies.

Extrusion and Drawing - Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing, wire drawing

UNIT V

5. Metal Finishing Processes

Purpose of finishing surfaces. Surface roughness-Definition and units, Honing Process, its applications, Description of hones. Brief idea of honing machines. Lapping process, its applications. Description of lapping compounds and tools. Brief idea of lapping machines. Polishing, Buffing, Burnishing and super finishing

6. Metallic Coating Processes

Metal spraying – Wire process, powder coating process, applications, Electroplating: Basic principles, Plating metals, applications; Hot dipping: Galvanizing, Tin coating, Parkerising, Anodizing. Organic coatings: Oil base Paint, Lacquer base, Enamels, Bituminous paints, rubber base coating; Finishing specifications.

RECOMMENDED BOOKS

1. P N Rao, "Manufacturing Technology Vol.-I &II", Tata McGraw-Hill Publications.
2. S. K. Hajra Chaudhary, Bose and Roy, "Elements of Workshop Technology (Volume I and II)", Media Promoters and Publishers Limited.
3. O. P. Khanna & Lal, "Production Technology (Volume I & II)", Dhanpat Rai Publications.
4. BL Juneja, GS Sekhon and Nitin Seth, "Fundamental of Metal Cutting and Machine Tools", New Age International Limited.
5. R. K Jain, "Production Technology", Khanna Publication, New Delhi
7. Raghuwanshi, "Workshop Technology Vol.-II", Khanna Publishers, New Delhi.
8. B. L. Juneja, "Fundamental of Metal Forming", New Age International Limited, Delhi.

INSTRUCTIONAL STRATEGY

Teachers should lay special emphasis in making the students conversant with concepts, principles, procedures and practices related to various manufacturing processes. Use of audio-visual aids/video films should be made to show specialized operations. This subject contains five units of equal weightage.