WORKSHOP ENGINEERING

Course Code: ME 103

Lecturer: 1 **Year:I**
Tutorial: 0 **Part: I**
Practical: 3 **Course Credit:1**
Course Objective:

To deliver fundamental concepts in the field of basic workshop technology required for manufacturing simple metal components and articles.

	Teaching Schedule Hours/Week			Evaluation Scheme				
				Internal Evaluation		Final Evaluation		Total
	Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	50
Cr	1	0	3	10	40	-	-	

Unit 1: Introduction to General Safety (2 hours)

1.1. Screw Drivers, Chisels, Punches, Scrapers, Files, Scribers, Bench Tools, Machinist's Hammers, Pliers and Cutters, Hacksaws, Wrenches, Bench Vise, Hand drills, Hand Shears, Taps and Dies, Rivets, Rules, Tapes and Squares, Soldering Iron etc.

Unit 2: Hand Working Tools Operation (1 hour)

2.1 Riveting, Sawing, Filing, Scribing, Shearing, Soldering, Threading

Unit 3: Measuring and Gauging (1 hour)

3.1 Introduction to Semi precision tools: Calipers, Depth Gauge, Feeler Gauge

3.2 Introduction to precision tools: Micrometers, Vernier Calipers, Hole Gauge, Vertical Height Gauge, Telescopic Gauge, Bevel protractor, Dial Indicator, Surface plate, and Gauge Blocks

Unit 4: Drills and Drilling Processes (1 hour)

4.1 Types of Drill Presses
4.2 Working Holding Devices and Accessories
4.3 Cutting Tools
4.4 Geometry and Grinding of Drill Bits
4.5 Cutting Speeds
4.6 Operations: Drilling, Counter boring, Sinking, Lapping, Honning, Reaming
4.7 Drilling safety

Unit 5: Machine Tools (4 hours)

5.1 General Safety

5.2 **Engine Lathes**: Introduction, Physical Construction, Types of Lathe, Operations: Facing, Turning, Threading
5.3 **Shapers:** Introduction, Types, Physical Construction, Applications
5.4 **Milling Machines:** Introduction, Types, Physical Construction, Applications, Milling cutters-Plain, Side, Angle, End form, Work Holding Devices, Cutter Holding Devices
5.5 **Grinding Machines:** Introduction, Abrasive Bonds, Grinding Wheels, Rough Grinders (Portable Grinders, Bench Grinders, Swing Grinders, Frame Grinders, Abrasive Belt Grinders), Precision Grinders (Cylindrical Grinders, Surface Grinders)

Unit 6: Metal Joining (2 hours)
6.1 Safety Consideration
6.2 Introduction
6.3 Soldering, Brazing
6.4 Welding: Gas Welding, Arc Welding, Resistance Welding, Tungsten Inert Gas Welding (TIG Welding), Metal Inert Gas Welding (MIG Welding)

Unit 7: Forging (1 hour)
7.1 Introduction,
7.2 Forging Tools
7.3 Forging Presses and Hammers
7.4 Operations: Upsetting, Drawing, Cutting, Bending, Punching
7.5 Applications, Advantages, and Limitations

Unit 8: Sheet Metal Works (1 hour)
8.1 Introduction to Sheet Metal Tools
8.2 Marking and Layout
8.3 Operations: Bending, Cutting, Rolling

Unit 9: Foundry Practices (1 hours)
9.1 Introduction to Foundry Tools
9.2 Pattern Making
9.3 Core Making
9.4 Melting Furnace
9.5 Sand Casting Process

Unit 10: Material Properties (1 hour)
10.1 Tool materials: Low, Medium, and High Carbon steels; Hot and Cold Rolled Steels; Alloy Steels; Ceramic and Carbide materials
10.2 Heat Treatment Methods for steels: Hardening, Quenching, Annealing, Normalizing and Tempering
10.3 Non-ferrous metals: Aluminum, Brass, and Bronze with their comparative properties

Practicals:

1. Bench Tools and hand Operations: Measuring, Marking, Layout, Cutting, Drilling, Filling, Tapping, Assembly
2. Drilling Machines

3. Measuring and Gauging Instruments
4. Lathe: Operations-Plain cutting, Facing, Turning, Cutting off, Knurling, Taper Turning, Drilling, and Boring.
5. Basic Operations: Shaper, Grinding machines, Milling machines
6. Welding: Gas welding, Arc welding
7. Practices in: Sheet metal works, Foundry, and Forging

References

1. S. K. Hajra Choudhary and A.K. Hajra Choudhary, "Elements of Workshop Technology-Vol-I (Manufacturing Processes)", Media Promoters and Publishers Pvt. Ltd., India
2. S. K. Hajra Choudhary, S.K. Bose, and A.K. Hajra Choudhary, "Elements of Workshop Technology-Vol-II (Machine Tools)", Media Promoters and Publishers Pvt. Ltd., India
3. R.S. Khurmi and J.K. Gupta, "A Text Book of Workshop Technology", S. Chand and Company Ltd, New Delhi, India
4. Prof. B.S. Raghuwanshi, " A Course in Workshop Technology-Vol-I", Dhanpat Rai and Co. (P) Ltd, Delhi, India
5. Prof. B.S. Raghuwanshi, " A Course in Workshop Technology-Vol-II", Dhanpat Rai and Co. (P) Ltd, Delhi, India
6. H.S. Bawa, " Workshop Technology-Vol-I", Tata Mc-Graw Hill Publishing Company Limited, New Delhi, India
7. H.S. Bawa, " Workshop Technology-Vol-II", Tata Mc-Graw Hill Publishing Company Limited, New Delhi, India

Distribution of marks:
The final evaluation will have questions from all the units. The marks distribution for all the units will be as follows:

		Scheduled Hours	**Marks and Remarks**
Unit 1	**Introduction to general safety**	2	10 marks Internal Remaining 40 Marks Internal Practical Examination No Final Examination
Unit 2	**Hand Working Tools Operation**	1	
Unit 3	**Measuring and Gauging**	1	
Unit 4	**Drills and Drilling Processes**	1	
Unit 5	**Machine Tools**	4	
Unit 6	**Metal Joining**	2	
Unit 7	**Forging**	1	
Unit 8	**Sheet Metal Works**	1	
Unit 9	**Foundry Practices**	1	
Unit 10	**Material Properties**	1	
Total		**15**	

Note: The marks distribution shown in the table above might be subjected to minor changes.