

Program : <b>Diploma in Mechanical Engineering / Manufacturing Technology / Automobile Engineering</b>	
Course Code : <b>4029</b>	Course Title: <b>Mechanical Workshop IV</b>
Semester : <b>4</b>	Credits: <b>3</b>
Course Category: <b>Program Core</b>	
Periods per week: <b>3 (L:0, T:0, P:3)</b>	Periods per semester: <b>45</b>

### Course Objectives:

- To provide practice to the students on machine tools like lathe, shaper, etc. so that they can acquire skills for performing operations like plain turning, taper turning, planning etc.
- To provide practice on fitting operations and impart skills on handling various measuring instruments
- To provide practice on different welding operations and impart skills on fabrication works on sheet metals
- To Introduce the casting process through foundry practice and impart the skill for carrying operations on smithy

### Course Prerequisites:

Topic/Description	Course Code	Course Title	Semester
Basic Manufacturing processes		Workshop practice	1 & 2

### Course Outcomes

\*On completion of the course, the student will be able to:

CO <sub>n</sub>	Description	Duration Hours	Cognitive Level
CO1	Perform machining operations on lathe and shaper	21	Applying
CO2	Apply technical skill to practice fitting operations and use of various gauges	12	Applying
CO3	Perform fabrication works by making semi-permanent joints in metal sheets and Practice welding operations	36	Applying
CO4	Apply technical skill to perform smithy and foundry work	15	Applying

	Lab Exam	6	
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\*Outcomes will be achieved after completing the 2 courses, Mechanical workshop III in third semester (45 hours) and Mechanical workshop IV in Fourth semester (45 hours)

### GENERAL INFORMATION:

Class is divided into 2 batches (Batch I and Batch II).

Batch I –**Machine Shop, Fitting shop and Smithy**

Batch II- **Sheet metal, Welding, and Foundry work**

The syllabus for Mechanical workshop III should be continued for Semester IV also by interchanging the batch of students.

### CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			3			
CO2		2		3			2
CO3			2	3			
CO4	3			3			

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

### Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
<b>CO1</b>	<b>Perform various operations on lathe/shaping machines</b>		
M1.01	Lathe practice	15	Applying
M1.02	Shaper Practice	6	Applying
Contents <b>Lathe work</b> -Familiarization with lathes- principal parts, work holding device, measuring instruments, accessories & attachments Plain turning to the given accuracy - Practice with Precision measuring devices - use of digital vernier and Micrometer - Taper turning- Form turning (ball and curve)- Combination of above operations (taper, ball and curve) <b>Work on shaper</b> Familiarize with the parts, accessories and attachments. Simple operations on Shaper (Planning) Shaping of a rectangular block Shaping a 'V' in a rectangular block			

<b>CO2</b>	<b>Apply technical skill to practice fitting operations and use of various gauges</b>		
M2.01	Fitting practice	12	Applying
	Lab Exam I	3	
<b>CO3</b>	<b>Perform fabrication works by making semi- permanent joints in metal sheets and Practice welding operations</b>		
M 3.01	Fabrication using sheet metal and various sections of metal and nonmetals & alloys.	18	Applying
M 3.02	Welding practice	18	Applying
<p><b>CONTENTS</b>  Familiarization of <b>sheet metal and fabrication</b> tools – scribes, dividers, trammel points, set square, punches –prick punches, center punches – hand Groover, rivet, chisels, hammers, riveting hammers, ball peen hammers – mallet, snips/ shears, pliers, hand seamers (tongs) files, stakes. Measuring instruments in sheet metal - folding rule, common rule, steel circumference rule, Vernier calipers, micrometer, combination set, and Thickness gauges – Plate gauge. Manufacturing of simple components using sheet metal and various sections of aluminum and other metals, nonmetals and alloys.</p> <p><b>Welding Practice work</b>  D.C. arc welding (review of practice)  A.C. arc welding (review of practice)  Gas welding (review of practice)  Horizontal, flat, vertical and overhead welding  Edge preparation of welded joint such as single V, double V etc...Pipe welding – linear and round  Flame cutting</p>			
<b>CO4</b>	<b>Apply technical skill to perform smithy and foundry work</b>		
M4.01	Smithy practice	6	Applying
M4.02	Foundry practice	9	Applying
	<b>Lab Exam II</b>	3	
<p>Contents  Exercise on basic smithy operations- Manufacturing of various models in smithy shop like hexagonal chisel, square, hexagonal &amp; octagonal prism using round rod  Exercise on basic foundry operations- Moulding using single/split piece patterns.</p>			

**Text /Reference:**

<b>T/R</b>	<b>BookTitle/Author</b>
1	Manufacturing process – Myro N Begman, 5 th edition, Tata McGraw Hill, New Delhi
2	Production Technology – HMT, 18th edition, Tata McGraw Hill, New Delhi

3	Elements of Workshop Technology (Volume I & II) – Hajra Chowdry & Bhattacharya, Media Promoters, 11th Edition, 2007
4	Production technology---By R.K. JAIN, Khanna publishers
5	Manufacturing technology—By R.K. RAJPUT, Laxmi publications (P) Ltd

### Online Resources

SI No	Website Link
1	<a href="https://nptel.ac.in/course.html">https://nptel.ac.in/course.html</a>
2	<a href="https://www.metalcuttingvision.com/machine-shop-tutorial/">https://www.metalcuttingvision.com/machine-shop-tutorial/</a>
3	<a href="http://www.thatlazymachinist.com/free-training.html">http://www.thatlazymachinist.com/free-training.html</a>
4	<a href="http://www.nptel.ac.in/courses/mechanical">www.nptel.ac.in/courses/mechanical</a>