

Course No. : MEF112  
Course Title : Workshop practice  
Instructor-in-Charge : Rajiv A Shinde

**Course description:**

Shop practice involving machining (turning, facing, thread cutting, drilling, and grinding etc.) casting, metal forming, welding, fitting and wood-working etc. Demonstrations of metal cutting machines, e.g., shaper and CNC machines

**1. Scope and Objective of the Course:**

This course is an entry level course for all first degree students. The course will provide an overview of the techniques and applications of basic manufacturing processes required to produce a finished product from raw materials.

The primary objective of this course is to learn how a product is manufactured and to gain technical knowledge and skills involved in the processes. This knowledge will be useful in whatever discipline a student belongs to.

The manufacturing processes covered include Machining, Casting, Joining processes, metal forming, Sheet metal work processes. The students are exposed to modern manufacturing machines like CNC. A brief review of the properties of engineering materials and of measuring and gauging tools are also included.

The course is practical orientated and requires that basic skills in handling of tools, machines and machine tools used in different manufacturing processes are acquired through the hands-on experience.

Practical classes will be conducted in the Workshop, and they are intended to provide hands-on experience in handling of basic tools, machines, machine tools and produce simple utility jobs.

**2. Reference books**

**Text Book**

- I. B S Nagendra Parashar and R K Mittal, *Elements of Manufacturing Process*, Prentice Hall of India, 2008.

**Reference Books**

- I. Campbell J.S., *Principles of Manufacturing Materials and Processes*, Tata McGraw-Hill, New Delhi, 1995 print.



- II. Richard R. Kibbe et al, *Machine Tool practices*, Sixth edition, Prentice Hall of India Pvt. limited, New Delhi, 2003.
- III. E. Paul Degarmo, J.T. Black, Ronald A. Kosher, *Materials and processes in Manufacturing*, PHI 2005.
- IV. Mikell P. Groover, *Fundamentals of Modern Manufacturing*, Second edition, John Wiley & Sons Pvt Ltd.

### 3. Course Plan:

#### A) Practical Part

Exercise No.	Description	No. of Jobs
1	Metrology	4 Experiments
2	Metal Turning Lathe	1
3	Fitting	1
4	Electric Arc Welding	1
5	Gas Welding	1
6	Carpentry	1
7	Foundry Practice	1
8	Pipe Threading & Bending	1
9	Demonstration of the CNC machines	-----
10	Demonstration of Shaper machine	-----



## B) Theory Part

Lech. No.	Learning objectives	Topics for syllabus	Ref. [book]-Ch.
1	Course Instructions	Basics of manufacturing, types of production systems.	T-1
2	Engineering Materials	Mechanical properties of material, Poisson's ratio, Mode of fracture, FOS, Stress strain curve for ductile and brittle material, Common engineering material, Selection of material and numerical examples on stress, change in length and % elongation	T-2
3	Role of measurements in manufacturing	Metrology, inspection, measuring, gauging, limits & fits. numerical examples on type of fits	T-3
4	Theory of metal cutting	Machine tool classification, Tool material, Types of tool, Tool geometry, Tool signature, Left and right hand tools, Orthogonal oblique cutting, Type of chips, cutting fluids	T-4
5	Production of cylindrical surfaces: machine tool and operations	Lathe machine tool, operating conditions, various operations on a lathe and Machining time calculation and numerical examples	T-5
6	Production of cylindrical holes and allied operations	Drilling machine, drill, operating conditions, boring, reaming, tapping, Machining time in drilling numerical examples	T-6
	Production of flat surfaces: shaping	Shaping machines, operations on shapers and planers	T-7
7	Production of complex and flat surfaces	Milling machine, type of milling processes & operations	T-8
8	Obtaining surface finish	Abrasive machine, abrasives, grinding, grinding wheel, grinding machines and fine finishing operations.	T-9
9	Production of parts by casting	Casting processes, pattern making, moulding sand, moulding process, cores, casting defects, advantages and disadvantages of casting, Special casting process	T-11
10	Production of parts by forming	Metal forming processes, rolling, extrusion, and forging processes.	T-12
	Production of sheet metal parts	Punches & dies, sheet metal operations.	T-13
11	Mechanical joining processes	Mechanical joining, arc welding, gas welding, soldering, brazing and mechanical fastening.	T-15
12	Powder Metallurgy	Manufacturing process, Production of powder, mixing, compaction, sintering, Advantages and limitation	T-14
13	Plastic processing and additive manufacturing	Types of plastic, forms of raw plastic material, Methods of processing, Introduction to additive manufacturing,	T-16
14	Revision		

#### 4. Evaluation Scheme:

Component	Duration (Min)	Marks (%)	Date & Time	Nature of Component
Laboratory Practical Regular Class Work + Laboratory Report	Continuous	50%	Regular	Evaluation by Staff / Instructor
Laboratory Practical Comprehensive Exam	90	25%	Will be announced later	Evaluation by Staff / Instructor
Comprehensive Exam	90	25%	14/12/24(FN) 10.00 am-11.30 am	Offline Classroom & Closed Book

#### 5. Workshop Practice and some points of Safety:

Since the students may not be fully conversant with the operating mechanisms of the machinery of the workshop, direct handling of the machines should always be avoided. They should do it with supervision of the concerned Workshop staff and faculty only.

**The student must wear apron meant for the practical.** The aprons should be stitched within the first week of the admission. **The students should wear shoes during lab hours.** If any student is found without the apron or shoes, he/she will not be admitted to the workshop and will lose attendance. Any loose garment which can hangout and thus endanger the personal safety of the student, are not allowed in the workshop. Therefore admission to workshop is conditional on the basis of these conditions of the protective wear. Instructor In Charge / Workshop Superintendent's discretion is final.

#### 6. Make-up Policy:

Make up for shop practice will not be permitted. In case of a genuine difficulty, the student can complete his practical in some other batch, by taking prior permission from the concerned instructor as well as the instructor of the practical batch in which student is going to work.

**Make up will not be given for Quiz exam in any case.**

#### 7. Notices:

All notices concerning the course will be displayed either on Workshop Notice Board or on course folder 'Announcement' of Quanta.

#### 8. Others:

Any creative activity to promote the understanding of the subject is encouraged. Students can come up with simple projects to familiarize themselves with various manufacturing practices. For this, the students can consult the Instructor/ the Instructor in Charge / Workshop Superintendent.

#### 9. **Note:** Will be announced soon.

**INSTRUCTOR-IN-CHARGE**

