**COURSE TITLE : PRODUCTION PROCESS OF AUTOMOBILE**
**COURSE CODE : 3051**
**COURSE CATEGORY : B**
**PERIODS /WEEK : 5**
**PERIODS / SEESTER : 90**
**CREDITS : 5**

## TIME SCHEDULE

| MODULE | TOPICS | PERIODS |
|---|---|---|
| 1 | Introduction to manufacture of automobile components<br>Pattern making and Foundry<br>Casting | 21 |
| | Test I | 1 |
| 2 | Forging and Manufacture of Automobile Components using forging.<br>Metal working process used for Chassis, Frame Spring | 22 |
| | Test II | 1 |
| 3 | Welding | 22 |
| | Test III | 1 |
| 4 | Lathe, NC and CNC Machine<br>Drilling, Shaping &Slotting<br>Grinding, Milling & Gear manufacturing | 21 |
| | Test IV | 1 |
| | **Total** | **90** |

## OBJECTIVES

Upon completion of the study of subject the student should be able to

1.1.0 Justify the process of pattern making
- 1.1.1 List the materials used in pattern making
- 1.1.2 Classification of patterns and pattern allowances.
- 1.1.2 Identify the types of moulding - green sand moulding, dry sand moulding, plaster moulding, shell moulding

1.2.0 Understand the various steps involved in the manufacture of cast iron-

1.2.1 List the different types of cast iron.
1.2.2 Understand the casting methods of manufacturing engine block, cylinder heads and cylinder liners - sand casting, permanent mould casting, centrifugal casting
1.2.3 State the die casting

2.1.0. Understand the different process of manufacture of steels
2.1.1 Recognize the different furnaces used in steel manufacture - Open-hearth, closed hearth furnaces.
2.1.2 Describe machine forging process used for the production of crank shaft, connecting rod, transmission gear shafts, valves, gear blanks and steering columns
2.1.3 List forging machines employed for the above purpose
2.1.4 Explain Open hearth process,Bessemer process, L-D process

2.2.0 Explain Metal working process
2.2.1 Summarize basic cold working like drawing, squeezing, bending, shearing, cutting and blanking, extruding, shot peening Summerize basic hot working operations like rolling, drawing and extruding

2.2.3 Describe production processes for chassis frame spring and suspension components

3.1.0 Recognize the welding machines and the process of arc welding
3.1.1 Explain the principles of arc welding
3.1.2 State use of arc welding
3.1.3. Describe welding machines
3.1.4 Describe gas welding techniques
3.1.5 Describe resistance welding

3.2.0 Recognize the advantages and disadvantages of soldering and brazing
3.2.1 Distinguish between soldering and brazing
3.2.2 Explain the application of soldering and brazing

4.1.0 Locate different types of lathes and operations
4.1.1 List the types of lathes
4.1.2 Explain the lathe construction
4.1.3 Identify lathe function
4.1.4 Identify lathe parts
4.1.5 State grinding, drilling, reaming etc done on lathe
4.1.6 Explain cylindrical turning, taper calculations and measurements
4.1.7 Explain taper turning methods- tail stock setover and swiveling the tool post.
4.1.8 State other operations on lathe such as thread cutting, drilling, boring, reaming, key way cutting,knurling
4.1.9 Define NC and CNC machines

4.2.0. Locate drilling machine, shaping machine, slotting machine and grinding machine
4.2.1 Identify parts of a drilling machine
4.2.2 Explain shaper components and their functions
4.2.2 Describe quick return motion arrangement-crank and slotted lever method.
4.2.3 State the use of slotter
4.2.4 List slotter parts and their functions
4.2.5 List different types of grinding machine
4.2.6 List different grinding wheels.

4.2.7 Define gear manufacturing methods
4.2.8 State Gear milling
4.2.9 State Gear hobbing

## CONTENT OUTLINE

**MODULE – I**: Introduction to manufacture of automobile components
Foundry-Pattern making and materials – classification of patterns and pattern allowances. Types of moulding and moulding operations – green sand moulding, dry sand moulding, plaster moulding, shell moulding. Cast iron-types ,methods of manufacture, casting methods - sand casting, permanent mould casting, centrifugal casting, special casting – die-casting.

**MODULE– II:** Manufacturing methods of automobile components using Forging and Metal Working Process
Steels-different process of steels making, open hearth process,Bessemer process, L-D process. Forging operations. Open-hearth, closed hearth furnaces. Machine forging. production of crank shaft, connecting rod, transmission gear shafts, values, gear blanks, steering column.
Cold working process: - cold working – basic cold working operation like – drawing, squeezing, bending, shearing , cutting and blanking, extruding, shot peening, Hot working – rolling, drawing, extruding. production process for chassis frame spring – suspension components.

**MODULE– III: Welding**

Welding- Arc welding: - Principles of arc welding, welding machines and uses of arc welding-submerged arc weldig,thermit welding, safety in welding. Gas welding – oxy acetylene welding, Resistance welding – classification of resistance welding. TIG and MIG welding. Soldering and brazing explanation and application of soldering and brazing, advantages and limitations

**MODULE – IV** Machine tools
Lathe-types – Engine and tool room lathe. Lathe parts and functions. Cylindrical turning, taper calculations and measurements taper turning methods-tail stock setover and swiveling the tool post, thread cutting-basics.Other operations on lathe – drilling, boring, reaming, key way cutting,and knurling. NC and CNC machines, advantages of CNC systems over conventional systems.
Drilling machines: - Bench type,Parts of a drilling machine.
Shaping machines: - Use of a shaper – shaper components and their functions – quick return motion.– crank and slotted lever method.
Slotting machines: - Use of a slotter, slotter parts
Grinding: - Grinding machine use and types, Grinding wheels – types.
Fundamentals of Gear manufacturing methods- gear milling, gear hobbing.

**TEXT BOOK- Elements of Workshop Technology (Vol I, II) - Hajra Chowdhary**

**REFERENCES**

1. Workshop Technology (Vol I, II,III) - Chapman.
2. Production Technology - P.C.Sharma

3. A course on workshop Technology (Vol. II) - Reghuvamshi
4. Manufacturing Technology - P.N.Rao