COURSE TITLE : PRODUCTION PROCESS OF AUTOMOBILE COMPONENTS

COURSE CODE : 3052

COURSE CATEGORY : B

PERIODS/WEEK : 5

PERIODS/SEMESTER : 75

CREDITS : 5

TIME SCHEDULE

Module	Topic	Periods
1	Understand the process of pattern making Understand the various steps involved in the manufacture of cast iron Comprehend the process of engine block manufacturing- cylinder heads- piston- gearbox	19
2	Understand the different process of manufacturing steel	19
3	Recognize the welding machines and the process of arc welding Recognize the advantages and disadvantages of soldering and brazing	19
4	Explain Lathe function, different types and its operations Locate Drilling Machine, Shaping Machine ,Slotting Machine and Grinding Machine	18
TOTAL		**75**

GENERAL COURSE OUTCOME

Module	G.O	Student will be able to
1	1	Identify various materials used in pattern making and moulding.
	2	Classify the patterns and pattern allowances.
	3	Describe various casting method.
	4	Describe the casting process of piston, gear box casting, Propeller style and rear axle casting.
2	1	Differentiate different steel manufacturing process.
	2	Summarize different hot working and cold working methods.
	3	Explain the method of machine forging
	4	Identify different production process for different automobile components.
3	1	Define principle of Arc welding.
	2	Identify different gas welding techniques.
	3	Distinguish between soldering and brazing.
4	1	Explain the operation of lathe.
	2	Describe various lathe works.
	3	Differentiate NC and CNC machines.
	4	Describe the working of shaping M/C, slotter and grinding wheels.
	5	Distinguish gear milling and gear hobbing.

SPECIFIC COURSE OUTCOME

MODULE I

1.1.0 Understand the process of pattern making

1.1.1 List the materials used in pattern making

1.1.2 Classify the patterns and pattern allowances.

1.1.3 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 Describe the sand casting, permanent mould casting, centrifugal casting

1.2.3 Explain the principle of die casting

1.2.4 Defects in casting

1.3.0 Comprehend the process of engine block manufacturing- cylinder heads- piston-gearbox

1.3.1 Describe Casting of engine block

1.3.2 Explain the casting for cylinder heads

1.3.3 Describe casting of piston, gearbox casing, propeller shaft, rear axle casing.

MODULE II

1.1.0 Understand the different process of manufacturing steel

2.1.1 Recognize the different processes used in steel manufacture - Open hearth process, Bessemer process, L-D process .

2.1.2 Explain metal working process

2.1.3 Summarize basic cold working like drawing, squeezing, bending, shearing, Cutting and blanking, extruding, shot peening.

2.1.4 Explain hydro forming process for vehicle body panels

2.1.5 Summarize basic hot working operations like rolling, drawing and extruding.

2.2.0 Understand the different process of manufacturing Automobile components

2.2.1 Describe machine forging process used for the production of crank shaft, connecting rod, transmission gear shafts, valves, gear blanks and steering columns

2.2.2 List forging machines employed for the above purpose

2.2.3 Appreciate powder metallurgy and its applications

2.3.0 Describe the production process for chassis frame; spring and suspension components

MODULE III

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

3.1.4 Describe gas welding technique.

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 State the application of soldering and brazing

MODULE IV

4.1.0 Explain Lathe function, different types and its operations

4.1.1 Identify lathe functions

4.1.2 List the lathe parts

4.1.3 Explain cylindrical turning and taper turning methods.

4.1.4 Explain the thread cutting operation

4.1.5 Differentiate NC and CNC machines

4.1.6 Appreciate Flexible Manufacturing Systems and its advantages

4.2.0 Locate Drilling Machine, Shaping Machine, Slotting Machine and Grinding Machine

4.2.1 List the parts of a drilling machine

4.2.2 List the parts of a shaper

4.2.3 Describe quick return motion arrangement-crank and slotted lever method and hydraulic quick return mechanism

4.2.4 Identify parts of a slotter.

4.2.5 List different types of grinding machines

4.2.6 List different grinding wheels.

4.2.7 Explain the process of Gear milling and Gear hobbing.

4.2.8 Appreciate rapid prototyping and its applications in automobile industry

CONTENT DETAILS

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 and methods of manufacture, casting methods - sand casting, permanent mould casting, centrifugal casting, special casting – die-casting- defects in casting.

Casting of -engine block, cylinder heads, piston, gearbox casing, propeller shaft, rear axle casing.

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. Machine forging. Production of crank shaft, connecting rod, transmission gear shafts, valves, gear blanks, steering column. Powder Metallurgy and its applications

Cold working process: - cold working – basic cold working operation like – drawing, squeezing, bending, shearing , cutting and blanking, extruding, shot peening, Hydro forming process. Hot working – rolling, drawing, extruding.

Production process for chassis frame spring – suspension components.

MODULE III

Welding- welding joints, welding positions ,Arc welding, AC and DC arc welding, DCSP, DCRP, Principles of arc welding, functions of electrode coating, welding machines and uses of arc welding. Types-Carbon arc welding, Shielded metal arc welding, GTAW(Gas Tungsten Arc Welding), GMAW(Gas Metal Arc Welding). Submerged arc welding , Thermit welding, Laser beam welding.
Gas welding – oxy acetylene welding, components, types of flames .Gas cutting,
Resistance welding – Spot, Seam, Projection. Comparison of soldering and brazing.

MODULE IV

Lathe-. Lathe parts and functions. Cylindrical turning, taper turning methods, thread cutting-basics only. NC and CNC machines, advantages of CNC systems over conventional systems. Drilling machines: -, Parts of a drilling machine. Shaping machines: - Use of a shaper – shaper components and their functions – quick return motion.– crank and slotted lever method and hydraulic quick return method. Slotting machines: slotter parts Grinding: - Grinding machine use and types, Grinding wheels – types. State - Gear manufacturing methods- gear milling and gear hobbing. Flexible manufacturing systems and its advantages. Rapid Prototyping and its applications.

TEXT BOOK

Hajra Chowdhary - Elements of Workshop Technology (Vol I, II) - Media promotors and publishers pvt. Limited 12th E

REFERENCES

1. Chapman - Workshop Technology (Vol I, II,III) - Viva Books Private Limited
2. P.C.Sharma - Production Technology - Chand (S.) & Company Limited
3. Reghuvamshi - A course on workshop Technology (Vol. II) – Dhanpat Rai Pub
4. P.N.Rao - Manufacturing Technology - Tata McGraw-Hill Education 3rd E
5. B.P. Bhardwaj. - The complete book on Production of Automobile Components & allied products.–NIIR Project Consultancy Services.
6. H. K. Shivanand - Flexible manufacturing system- New age international
7. P. C. Angelo, R. Subramanian - Powder Metallurgy: Science, Technology And Applications - PHI. Learning Pvt. Ltd
8. Chee Kai Chua, Kah Fai Leong, Chu Sing LimRapid Prototyping: Principles and Applications -World Scientific