

1152AU120 AUTOMOTIVE COMPONENTS MANUFACTURING**L T P C****3 0 0 3****1. Preamble**

This course enables the students to select suitable materials for manufacturing Automobile components and recent developments in materials and manufacturing technologies will be discussed.

2. Pre-Requisite

1151AU104 Manufacturing Technology

3. Links to Other Courses

- Strength of materials

4. Course Educational Objectives

Students undergoing this course are expected to

- Develop the knowledge for identifying and selecting the suitable materials for automotive applications.
- Understand the various types of manufacturing process.

5. Course Outcomes:

Upon the successful completion of the course, students will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Explain the elastic and plastic behavior of materials	K2
CO2	Select suitable materials and explain the manufacturing process of clutch and brake components	K2
CO3	Explain the forging and extrusion process involved in manufacturing of valves, connecting rod, crank shaft, cam shaft, propeller shaft, transmission gear blanks, steering column, wheel disc and body panels.	K2
CO4	Discuss the operation involved in manufacturing of cylinder block and liners, flywheel, piston rings, bearing bushes, carburetor, front and rear axle housings through casting and machining process.	K2
CO5	Generalize the recent techniques in production of automobile components	K2

6. Correlation of COs with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	H	H	L						M		H	M
CO2	H	H	H	H	L						M		M	M
CO3	H	H	H	H	L						M		H	H
CO4	H	H	H	H	L						M		M	H
CO5	H	H	H	H	L						M		L	M

H- High; M-Medium; L-Low

7. Course Contents

UNIT I ELASTIC AND PLASTIC BEHAVIOR OF MATERIALS L- 9

Elasticity - Forms - Stress and Strain Relationship in Engineering Materials - Deformation Mechanism - Strengthening Material - Strain Hardening, Alloying, Polyphase Mixture, Martensitic Recipitation, Dispersion, Fiber and Texture Strengthening - Iron Carbon Diagram.

UNIT II POWDER METALLURGY AND PROCESSING OF PLASTICS L- 9

Powder Metallurgy Process – Sintering Process Variables, Manufacture of Friction Lining Materials for Clutches and Brakes – Plastics - Raw Material – Automobile Components – Molding – Injection, Compression and Blow – PU Foam Molding - Machining of Plastics.

UNIT III FORGING AND EXTRUSION PROCESS L- 9

Forging Materials - Process Flow Chart, Forging of Valves, Connecting Rod, Crank Shaft, Cam Shaft, Propeller Shaft, Transmission Gear Blanks, Steering Column. Extrusions - Basic Process Steps, Extrusion of Transmission Shaft, Housing Spindle, Steering Worm Blanks, Piston Pin and Valve Tappets. Hydro Forming - Process, Hydro Forming of Manifold and Comparison with Conventional Methods - Hydro Forming of Tail Lamp Housing – Forming of Wheel Disc and Rims. Stretch Forming - Process, Stretch Forming of Auto Body Panels – Super Plastic Alloys for Auto Body Panels.

UNIT IV CASTING AND MACHINING L- 9

Sand Casting of Cylinder Block and Liners - Centrifugal Casting of Flywheel, Piston Rings, Bearing Bushes and Liners - Permanent Mould Casting of Piston, Pressure Die-Casting of Carburetor Other Small Auto Parts. Machining of Connecting Rods – Crankshafts - Cam Shafts - Pistons - Piston Pins - Piston Rings - Valves - Front and Rear Axle Housings - Fly Wheel - Honing of Cylinder Bores - Copy turning and profile grinding machines.

UNIT V RECENT TRENDS IN MANUFACTURING OF AUTO COMPONENTS

L- 9

Powder Injection Molding - Production of Aluminum MMC Liners for Engine Blocks - Plasma Spray Coated Engine Blocks and Valves - Recent Developments in Auto Body Panel Forming – Squeeze Casting of Pistons - Aluminum Composite Brake Rotors. Sinter Diffusion Bonded Idler Sprocket – Gas Injection Molding of Window Channel – Cast Con Process for Auto Parts - PVD and CVD Coatings.

8. Text Book

1. Heldt.P.M., " High Speed Combustion Engines ", Oxford Publishing Co., NewYork, 1990.

9. References

1. Haslehurst.S.E., " Manufacturing Technology ", ELBS, London, 1990.
2. Rusinoff, " Forging and Forming of metals ", D.B. Taraporevala Son & Co. PvtLtd., Mumbai, 1995.
3. Sabroff.A.M. & Others, "Forging Materials & Processes ", Reinhold BookCorporation, New York, 1988.
4. Upton, "Pressure Die Casting ", Pergamon Press, 1985.
5. High Velocity "Forming of Metals ", ASTM, prentice Hall of India (P) Ltd.,New Delhi, 1990.