

OAT751 PRODUCTION OF AUTOMOTIVE COMPONENTS

DETAILED SYLLABUS

OBJECTIVES:

- To study in detail about the modern casting, forging, molding and machining processes followed in automotive components.
- To enhance the knowledge of the students in the field of non-ferrous materials, emerging metallic and non-metallic materials like polymers, fiber reinforced plastics (FRP), engineering ceramics, metal matrix composites (MMCs) and its manufacturing methods, selection criteria, properties and applications for automotive components.

UNIT I ENGINE COMPONENTS

Overview -Material selection and Manufacturing methods for the Engine Components. Engine block– Casting– Conventional and expendable pattern. Cylinder head– Casting, machining and thermal barrier coating. Crank shaft, connecting rod, camshaft–Forging, machining and heat treatment. Piston Gravity, squeeze, die casting, machining and finishing. Gudgeon Pin - Machining and Finishing, Valve forging, friction welding, machining, thermal barrier coating, heat treatment and surface improvement. Cylinder Liners, Piston ring -Centrifugal, HPDC, LPDC, machining and finishing. Castings Processes for Oil pan and Carburettors. Push Rods, Rocker Arm, Tappets, Spark Plug- Forging, Machining, Finishing and Heat treatment.

UNIT II TRANSMISSION COMPONENTS

Overview - Material selection and Manufacturing methods for transmission system. Flywheel -Casting and Machining. Clutch - Friction plate, clutch housing, pressure plate conventional and fine blanking, composite friction lining. Methods of Gear manufacture – Gear hobbing and gear Shaping machines - gear generation - gear finishing and shaving – Grinding and lapping of hobs and shaping cutters –gear honing –gear broaching. Gearbox -Casting, precision forging, powder metallurgy, heat treatment and finishing. Propeller shaft -Continuous casting, extrusion, dies heat treatment and surface hardening. Axle-Differential –Axle Shaft –Bearing –fasteners-Forging, casting and machining. Leaf and coil spring -Forging and machining, composite leaf spring and wrap forming of coil spring.

UNIT III BODY COMPONENTS

Surface treatment –Plastics – Plastics in Automobile vehicles –Processing of plastics - Body Panel -Thermoforming and hydro forming, press forming, stretch forming. Emission control system –catalytic converter –Hydro forming of exhaust manifold and lamp housing. Welding – Resistance welding and other welding processes with the use of Robots in Body weldment.

SSLC, HSE, DIPLOMA, B.E/B.TECH, M.E/M.TECH, MBA, MCA

Notes

Syllabus

Question Papers

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Instrument Panel -Principle of injection molding, injection molding of instrument panel.

Bumpers - Molding of bumpers, reinforced reaction injection molding, Manufacture of polymer panels.

UNIT IV CHASSIS COMPONENTS

Material selection and manufacturing methods for Vehicle Frame Manufacturing, Wheel drum, Brake drum, Brake shoes, wheel rim and wheel housing manufacturing. Steering systems, shock absorbers, dead axle – casting, forging, machining and finishing operation- Heat treatment procedures for chassis components.

UNIT V TYRES AND ADVANCED MATERIALS MANUFACTURING

Tire and tube manufacturing, spray painting, powder coating, Prototype Manufacturing - RPT,3-D Printing, chemical vapour deposition, physical vapour deposition, cryogenic grinding of powders, sealants, sound proof materials, structural adhesives, MMC liners – Selection of materials for Auto components.

OUTCOMES:

At the end of this course the student should

- Will be able to select an appropriate manufacturing process for particular Automotive Components.
- Have in-depth knowledge of various engineering materials used in automobile engineering and the corresponding manufacturing processes for the same.

TEXT BOOKS:

1. Heldt P M, “High Speed Combustion Engines”, Oxford IBH publishing Co., Calcutta, 1996.
2. Kalpakjian, “Manufacturing Engineering and Technology”, Pearson Education, 2005.

REFERENCES:

1. B.P. Bhardwaj, “The Complete Book on Production of Automobile Components & Allied Products”, NIIR Project Consultancy Services, 2014.
2. Degarmo E P, “Materials and process in Manufacturing”, Macmillan Publishing Co, 1997.
3. John A S, “Introduction to Manufacturing Processes”, Tata McGraw -Hill, 2012.
4. Kalpakjian, “Manufacturing Processes For Engineering Materials”, Pearson Education, 2009.
5. Philip F O and JairoMunuz, “Manufacturing Processes and Systems”, John Wiley & Sons, New York, 1998.