

AUTOMOBILE ENGINEERING

Week	Topic	No. of Lectures planned	No of Lectures Delivered
1	Brief history of automobiles, Main components of an automobile, Brief description of each component. Brief description of constructional details and working of a four stroke I.C. Engine (S.I. Engines and C.I. Engines) including lately developed overhead cam shaft,	4	
2	Clutch: Clutch Introduction to Clutch and its different types, Principle of Friction Clutch, Clutch Lining and friction materials used in Friction Clutches, Torque transmitted,	4	
3	Plate and Multiplate Clutches, Dry and wet clutches, Automatic clutch action, Centrifugal clutches, Electromagnetic clutches, Fluid Flywheel.	4	
4	Multi-cylinder engines, Introduction to recent developments in I.C. Engines- Direct injection systems, Multi-point fuel injection systems, Introduction, Brief description of different components of Transmission System. description of Cone Clutch, Single	4	
5	Gear Box: Gear Box Air resistance, gradient resistance and rolling resistance coming across a moving automobile, Tractive effort, Variation of tractive effort with speed, Performance curves (object and need of a gear box),	4	
6	Torque converter with direct drive, Lubrication of Gear Box. Propeller Shaft: Functions and requirements of a propeller shaft, Universal joints, Constructional forms of universal joints, Flexible-ring joints, Rubber-bushed flexible joints. Constant-velocity joints. Differential :	4	
7	Principle of operation, Constructional details of a typical Differential unit, Traction control differentials, Multi-plate clutch type traction control device.	4	
8	Functions and methods of operation, Brake efficiency. Elementary theory of shoe brake, brake shoe adjustments, A modern rear-wheel brake, Disc brakes, Brake linkages, Leverage and adjustment of the brake linkage, Servo- and power operated brakes,	4	
9	Vacuum brake operation,' Hydraulic Brakes-constructional details and working, Direct action vacuum servos, Power-operated brakes, A dual power air brake system	4	

10	Suspension principles, Road irregularities and human susceptibility, Suspension system, Damping, Double tube damper, Single tube damper, Lever arm type damper, Springs-Leaf springs, Coil and torsion springs, variable rate springs,	4	
11	Composite leaf springs, Rubber springs, Air springs, Adjustable and self-adjusting suspensions, Interconnected suspension system, Interconnected air and liquid suspensions, Independent suspension system, Different independent suspension layouts, McPherson strut type, Rear suspension-live axle, McPherson strut rear suspension.	4	
12	Castor, Camber, Kingpin inclination, Combined angle, Toe-in, Steering system-basic aims,	4	
13	Ackerman linkage, Steering linkages for independent suspension,	4	
14	Center point steering, Costarring or trailing action, Cornering power, Self-righting torque, Steering characteristics-over steer and under steer, Axle beam, Stub-axle construction,	4	
15	Steering column, Reversible and irreversible steering, Rack-and-pinion steering mechanism	4	

LUBRICATION TECHNOLOGY

Week	Topic	No. of Lectures planned	No of Lectures Delivered
1	Terminology related to Lubricants & Lubrication: Viscosity; Absolute & Kinematic Viscosity; Newtonian & Non-Newtonian Fluids; Viscosity Measurement; Viscosity Index; Additives; Base Stocks;	4	
2	Lubricants: Introduction; Functions of lubricants, types and properties; Mineral Oils, Synthetic Oils, Biodegradable, Environment friendly oils; Automotive Engine Oils; Metal Working Fluids; Aviation Oils; Greases.	4	
3	Corrosion Inhibitor; Demulsibility; Detergent; Dielectric Strength; Diester; Dispersant; Dropping Point; Dry Running; Emulsifier; Extreme-Pressure Agent; Film Strength (Lubricity); Hydrolytic Stability; Neutralization Number; Oxidative Stability; Paraffinic etc.	4	
4	Mineral & Chemically modified lubricating base oils: Introduction; Steps Involved in production of Mineral base oils in refineries; Vacuum Distillates characteristics &	4	

5	Properties; Conventional refinery production of Lubricating base oils; Synthesized base oils:Introduction, Need, Application & Uses,Classification, Properties.	4	
6	Metal Working Fluids: Classification of Metal Working Fluids; Emulsions & Lubricants; Surface Active compounds in metal working fluids; rolling oils for steel; performance evaluation of steel rolling oils.	4	
7	Lubrication, Friction & Wear Introduction; Dry friction;Boundary lubrication;Hydrodynamic, ;	4	
8	Hydrostatic and Elasto-hydrodynamic lubrication; Lubricant additives	4	
9	Principles, application to rolling contact bearings, cams, Gears.	4	
10	Industrial Lubricants Steam & Gas Turbine Oils: Classification of Turbine Oils, Properties & Functions of Turbine Oils,	4	
11	Anti-Foam Agents; Anti-oxidant; Anti-Wear Agents; Aromatic agents; Role of lubricants in Asperity; Boundary Lubrication;	4	
12	Viscosity, Rust & Corrosion Protection, Demulsibility,	4	
13	Air Release, Foam Control, Anti-wear Property, Oxidation Stability, Gas Turbine Oils.	4	
14	Compressor, Vacuum Pump & Refrigeration Oils: Classification & Specifications of Compressor Oils, Functions of Compressor Oils; Lubrication of Reciprocating	4	
15	Compressor: Compressor Oil properties; Synthetic compressor oils; Vacuum Pump oils; Refrigeration compressor oils; requirement & specification of Refrigeration oils.	4	

Manufacturing Management

Week	Topic	No. of Lectures planned	No of Lectures Delivered
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1	Introduction to Production and Operation Management: Introduction, Historical Evolution of Production and Operation Management,	4	
2	Concept of Production, Production System, Production Management, Operation System,	4	
3	Operation Management, Managing Global Operations, Scope of Production and Operation Management.	4	
4	Plant Location and Layout: Introduction and Meaning, Need for Selecting a Suitable Location,	4	
5	Factors influencing Plant location, Location theories,	4	
6	Location models, Location economics, Plant layout, Classification of layout, Design of Product layout,.	4	
7	Design of Process layout, Service layout, Organization of physical facilities	4	
8	Material Handling and Management: Introduction, Objectives of Material Handling, Principles of Material Handling,	4	
9	Selection of Material Handling Equipment, Evaluation of Material Handling System,	4	
10	Material Handling Equipment, Guidelines for Effective Utilization of Material Handling Equipment,	4	
11	Relationship Between Plant Layout and Material Handling, Scope and Function of Material Management, Material Planning and Control, Inventory Control, Standardization,.	4	
12	Simplification, Ergonomics, Just-in-Time(JIT) Manufacturing	4	
13	Waste Management: Introduction Reasons for Generation and Accumulation of Obsolete, Surplus and Scrap Items, Identification and Control of Waste, Disposal of Waste. Automation: Introduction,	4	
14	Types of Automation, Computer Integrated Manufacturing, Reasons for Automation, Advantages and Disadvantages of Automation,	4	
15	Automation Strategies, Automated Flow Lines, Automated Guided Vehicles System, Automated Storage/Retrieval System.	4	

POWER PLANT ENGINEERING

Week	Topic	No. of Lectures planned	No of Lectures Delivered
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1	Energy Sources: Conventional and non-conventional sources of energy, Geothermal power plants, Tidal power plants, Windmills, Solar power plants, Solar thermal, Solar Photovoltaic: Direct energy conversion systems, Energy sources in India, Recent developments in power plants.	4	
2	Hydroelectric Power Plant: Hydrology, Rainfall, runoff, hydrographs, flow duration curves, Site selection for hydro power plants, Classification of hydro power plants, Storage type hydro power plant and its operation,	4	
3	Estimation of power availability, Selection of water turbines, Combination of hydro power plants with steam plants, advantages and disadvantages of hydro power plants.	4	
4	Analysis of Steam Cycle: The Carnot, The ideal Rankine cycle, externally irreversible Rankine cycle, Superheat, Reheat, Regeneration, internally irreversible Rankine cycle, open feed water heaters, closed type feed water heaters, Typical layout of steam power plant, Efficiency and heat rate.	4	
5	Ultra supercritical technology, Advanced Ultra supercritical technology, Flue gas de-nitrification and desulphurization, fabric filters and baghouses, feed water treatment, Deaeration, Internal treatment, boiler blowdown, steam purity.	4	
6	Steam Generators: Introduction to steam generators, Steam generator control, Fluidized bed boilers, Modern high pressure boilers, Supercritical boilers,	4	
7	Fuel and Combustion: Coal as fuel, classification of coals, analysis of coal, Coal handling, Dead and live storage, Combustion of coal,	4	
8	combustion equipment for coal burning, mechanical stokers, pulverized fuels and burners, Cyclone furnace, Low NOX burners, Ash handling and disposal, Dust collectors. Heat balance sheet for thermal power plants, environmental aspects of power generations.	4	

9	Diesel Engine Power Plants: Applications of diesel engines in power field, Advantages and disadvantages of diesel plants over thermal power plants, Schematic arrangement of diesel engine power plant, Different systems of diesel power plant, Performance Characteristics, Supercharging, Layout of Diesel Engine power plant.	4	
10	Gas Turbine and Combined Cycles: Gas turbine cycles, the ideal Brayton cycle, the non-ideal Brayton cycle, Modification of the Brayton cycle, Gas turbine characteristics, .	4	
11	Combined Cycles: combined cycles with heat recovery boiler, The STAG combined-cycle power plant, combined cycles with multi-pressure steam, combined cycle for nuclear power plants	4	
12	Nuclear Power Plants: Basic theory and terminology, Nuclear fission and fusion processes, Fission chain reaction, Moderation, Fertile materials,	4	
13	Economics of Power Generation: Introduction to economics	4	
14	Nuclear fuels, General components of nuclear reactor, Different types of reactors: PWR, BWR, GCR, LMFBFR, CANDU-PHW,	4	
15	India's nuclear power program, Disposal of nuclear waste and related issues.	4	