Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Industrial Engineering (MEC- 530)

B.Tech.(VI-Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Industrial Engineering (MEC 530)	60	30	10	-	-	-	3	-	-	3	100

Course Objective: The course is designed to provide the conceptual learning of the engineering practices employed in the industries to achieve maximum productivity with the available resources.

Unit 1: Concept of Productivity Management:

Productivity concept and definition, factors influencing productivity, standards of living and productivity, Total productivity model. Short term and Long term Productivity Planning Models. Productivity improvement Techniques: Technology based, Material based, Employee based, Product and time based, Measuring productivity of an enterprise.

Unit 2: Method Study:

Definition and objectives, procedure of method study, Productivity and work study & Time study, selection of work, techniques of recording the work and activities, classification of activities, Representation of activities with different charts and diagrams: Flow process chart (Man type, Machine type Chart), examination of the work developing methods, evaluation and implementation of methods.

Unit 3: Time Study (Work measurement):

Work measurement: Definition, basic procedure, methods of measurement, time study and equipment needed for time study, time study formats, Selection of the job and worker for time study, estimation of standard time, Work sampling, determination of sample size, conducting work sampling study, Performance rating systems, various types of allowances and calculation procedures, MTM, PMTS and work factor systems in work measurement, Principles of motion economy: Classification of movements, micro motion study and SIMO chart& Therbligs, Gantt Chart, string diagram,. Principles of motion economy, workplace layout and workstation design concepts.

Unit 4 : Ergonomics:

Concept of Ergonomics, its application in multi-disciplinary field, components, importance of ergonomics in equipment and work design, Concept types and characteristics of man-machine system; Rest Pause design based on physiological & psychological consideration, Anthropometry and Work place design, safety and hazards, accident prevention and protection methods.

Unit 5: Job Evaluation: Wage & Incentive system:
Various types of wage Incentive schemes and their impact on productivity, Comparison of different incentive plans, design of incentive plans, Group system of Wage payment, Supervisory incentive plans. Job Evaluation: Purpose, Various types of jobs evaluation system and their application of classification. Wage Cure, Designing salary structure and Grade, Merit Rating, Performance Appraisal.

References:

1. Sumanth D.J., Productivity Management, TMH.
2. I.L.O., Introduction of Work Study,
3. Industrial Engineering by O.P. Khanna

Course Outcomes: After learning the course the student will be able to understand the techniques of improving the productivity and application of engineering principles to utilize the available resources for the advantage of society.

Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Computer Aided Engineering(CAE) (MEC-580)

B.Tech. (VI-Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name & Code No.	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Computer Aided Engineering (MEC580)	---	---	---	50	---	50	2	-	4	4	100

Course Objective:- : Finite Element Method is a key method to analyse engineering problem. To understand the concepts of FEM this course is designed.

Unit 1 Methods to solve engineering problems- analytical, numerical, experimental, their merits and comparison, discretization into smaller elements and effect of size/ shape on accuracy, importance of meshing, boundary conditions, Computer Aided Engineering (CAE) and design, chain-bumping-stages vs concurrent-collaborative design cycles, computer as enabler for concurrent design and Finite Element Method (FEM), degree of freedom (DOF).

Unit 2 Types of analysis in CAE, static (linear/ non linear), dynamic, buckling, thermal, fatigue, crash NVH and CFD, review of normal, shear, torsion, stress-strain; types of forces and moments, tri-axial stresses, moment of inertia, how to do meshing, 1-2-3-d elements and length of elements; force stiffness and displacement matrix.

Unit 3 Two-dimension meshing and elements for sheet work and thin shells, effect of mesh density and biasing in critical region, comparison between tria and quad elements, quality checks, jacobian, distortion, stretch, free edge, duplicate node and shell normal.

Unit 4 Three-dimension meshing and elements, only 3 DOF, algorithm for tria to tetra conversion, floating and fixed trias, quality checks for tetra meshing, brick meshing and quality checks, special elements and techniques, introduction to weld, bolt, bearing and shrink fit simulations, CAE and test data correlations, post processing techniques.

Unit 5 Review of linear optimization, process and product optimization, design for manufacturing (DFM) aspects in product development, use of morphing technique in FEA, classical design for infinite life and design for warranty life, warranty yard meetings and functional roles, climatic conditions and design abuses, case studies.

Experiment: Practical Problem based on above contains.

Outcome: The various methods of FEM have been learnt. Element type, assembly of elements, higher order and isoperimetric concepts has been learned.

References:

1. Seshu P; Textbook of Finite Element Analysis; PHI.
2. Reddy JN; An introduction to finite element method; TMH
3. Desai Chandrakant S et al; Introduction to finite element Method; CBS Pub
4. Rao, S.S., The Finite Element Method in Engineering; Peragamon Press, Oxford.

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Department of Mechanical Engineering

Syllabus of

Energy Conversion System-II (MEC- 560)

B.Tech.(VI -Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name &Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Energy Conversion System-II (MEC560)	40	20	10	30	-	-	2	1	2	4	100

Course objective : understanding about energy conversion processes and systems will be enhanced

UNIT-I: ENERGY CLASSIFICATION : Energy Classification, Principle fuels for energy conversion: Fossil fuels, nuclear fuels, conventional & Non-conventional energy sources : prospecting, extraction and resource assessment and their peculiar characteristics. Direct use of primary energy sources, conversion of primary into secondary energy sources such as Electricity, Hydrogen, and Nuclear energy etc. Energy conversion through fission and fusion, Nuclear power generation.

UNIT-2 SOLAR THERMAL ENERGY: Solar thermal devices: Radiation geometry, Various types of solar collectors, Flat plate and Concentrating collectors, their construction, working and applications, hot water and hot air systems, industrial hot water systems, low pressure steam generation , solar dryers, solar pond , space heating and space conditioning, Design criteria and methodologies for solar thermal applications Solar concentrator and their applications, solar thermal power generation.

UNIT-3: ENERGY STORAGE: Need and importance of Energy storage in conventional and Non-conventional energy systems, Various forms of energy storage : Thermal, Chemical, Mechanical, Electrical and Nuclear energy storage, Energy storage devices and systems, Thermal insulation.

UNIT-4: HYDEL AND INTEGERATED ENERGY SYSTEMS: Mini and Microhydel power(MHP) generation, Classification of hydel plants, concepts ofmicrohydel, merits, MHP plants Components, design and layout, Turbines, efficiency etcIntegrated energy systems & their cost benefit analysis.

UNIT-5: HYDROGEN & FUEL CELL: Hydrogen as a renewable energy source, source of hydrogen , fuel for vehicles. Hydrogen production : Direct electrolysis of water, direct thermal decomposition of water, biological and biochemical methods of hydrogen production. Storage of hydrogen: Gaseous, Cryogenic and Metal hydride. Utilization of hydrogen : Fuel cell- principle of working, construction and applications.

References:

1-Nag PK; Power plant Engg; TMH
2-Al-Wakil MM; Power plant Technology; TMH
3-Sharma PC; Power plant Engg; Kataria and sons, Delhi
4- Domkundwar; Power Plant Engg; Dhanpatrai & sons.
5- Rajput RK; A text book of Power plant Engg.; Laxmi Publications.

List of Experiments

1- Study of solar collector – efficiency V/s delta T/ I
2- Study of hot water system.
3- Study of heat loss coefficients in flat plate collector.
4- Study of solar hot air collector/ solar dryer.
5- Study of solar still.
6- Study of vacuum tube collectors.
7- Performance evaluation of box type and concentrating type solar cooker.

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Syllabus of

Heat & Mass Transfer (MEC- 570)

B.Tech.(VI -Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Heat & Mass Transfer (MEC570)	40	20	10	30	-	-	2	1	2	4	100

Course Objectives:

The course is designed to explore the concepts of mechanisms of heat transfer under steady and transient condition .to understand the concepts of heat transfer through extended surfaces and its practical applications, to learn the thermal analysis and sizing of heat exchangers and to understand the basic concepts of mass transfer from the industrial applications point of view.

Unit : 1 Basic Concepts of Heat Transfer :

Modes of heat transfer: Basic laws governing conduction, convection, and radiation heat transfer; Thermal conductivity; convective heat transfer coefficient; radiation heat transfer; combined heat transfer mechanism. **Conduction:** General Heat Conduction equation – Cartesian and Polar Coordinates, , thermal diffusivity, conduction through a slab, tubes, and composite structures, electrical analogies, critical-insulation-thickness for pipes, variable thermal conductivity. Unsteady heat conduction**:** Transient and periodic conduction, Newtonian cooling . Extended surfaces (fins): Heat transfer from a straight and annular fin (plate) for a uniform cross section; error in measurement of temperature in a thermometer well, in efficiency, fin effectiveness, applications of fins.

Unit: 2: Convection:

Free and Forced Convection - Hydrodynamic and Thermal Boundary Layer. Free and Forced Convection during external flow over Plates and Cylinders and Internal flow through tubes. Buckingham 'pie' theorem, application of dimensional analysis of free and forced convection, correlations for laminar and turbulent flow over flat plate and tubular geometry; calculation of convective heat transfer coefficient.

Unit : 3: Heat Exchangers and Phase Change Heat Transfer:

Nusselt's theory of condensation - Regimes of Pool boiling and Flow boiling. Correlations in boiling and condensation. Heat Exchanger Types - Overall Heat Transfer Coefficient – Fouling Factors - Analysis – LMTD method - NTU method ,effectiveness of heat exchanger, industrial applications of heat exchangers.

Unit :4: Heat transfer through Thermal radiation:
Nature of radiation, emissive power, absorption, transmission, reflection and emission of radiation, Planck's distribution law, radiation from real surfaces; Black Body Radiation ,grey body radiation - Shape Factor , Electrical Analogy, radiation shields, radiation through gases.

Unit 5: Mass Transfer Concepts

Basic Concepts – Diffusion Mass Transfer – Fick's Law of Diffusion – Steady state Molecular Diffusion – Convective Mass Transfer – Momentum, Heat and Mass Transfer Analogy – Convective Mass Transfer Correlations, diffusion of vapour in a stationary medium.

Course Outcome:

Upon completion of this course, the students will be able to understand and apply different heat and mass transfer principles in practical field for different applications.

List of Experiments (expandable):
(1) Conduction through a rod to determine thermal conductivity of material
(2) Forced and free convection over circular cylinder
(3) Free convection from extended surfaces
(4) Parallel flow and counter flow heat exchanger effectiveness and heat transfer rate
(5) Calibration of thermocouple
(6) Experimental determination of Stefen-Boltzman constant

References:
(1) Frank P. Incropera and David P. Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley& Sons, 1998.
(2) Venkateshan. S.P., "Heat Transfer", Ane Books, New Delhi, 2004.
(3) Ghoshdastidar, P.S, "Heat Transfer", Oxford, 2004,
(4) Nag, P.K., "Heat Transfer", Tata McGraw Hill, New Delhi, 2002
(5) Holman, J.P., "Heat and Mass Transfer", Tata McGraw Hill, 2000
(6) Ozisik, M.N., "Heat Transfer", McGraw Hill Book Co., 1994.
(7)Kothandaraman, C.P., "Fundamentals of Heat and Mass Transfer", New Age International, New Delhi, 1998.
(8) Yadav, R., "Heat and Mass Transfer", Central Publishing House, 1995.
(9) Fundamentals of Heat and Mass Transfer, Dr. D.S.Kumar

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Syllabus of

Elective-II Operation Management (MEC- 543)

B. Tech. (VI -Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Elective-II Operation Management (MEC543)	60	30	10	-	-	-	3	-	-	3	100

Course objectives:

One of the most critical areas for success in any business enterprise is how Production and Operations are managed. In the Operations Management course an attempt will be made to integrate the courses studied by the students like statistics, economics, finance, organizational behavior and strategy into a consolidated production and operation related decisions.

Unit 1 Basics of Operations Management: Definition, history, industrial and IT revolution (ERP); tangible and service products continuum, employment shift from agriculture, manufacturing to service; customer orientation; basic process formats on product volume-variety graph; criteria of performance, decision area, business strategy, environment scan, SWOT, Porters' five forces, core competency, competitive priorities of cost, quality, time and flexibility, order winners, concept of raw process time, critical WIP, bottle neck throughput and cycle-time with example of Penny-Fab-1,2; Little's law, best and worst case performance, throughput and cycle time formula in practical- worst-case;

Unit 2 Product , Service & Production:- Product Life Cycle and PLC management; design steps, evolution and innovation, traditional v/s concurrent design, simplification and standardization, differentiation/mass customization, modular design, design for mfg and environment (DFM, DFE), technologies used in design. Service characteristics and classification based on people- things v/s direct-indirect service actions, service triangle of customer, provider and system, production strategy of Make To Order-MTO, MTS and ATO (assemble to order); productivity, standard of living and happiness.

Unit 3 Maintenance & Processes: transformation and value addition, selection based on cost, quality and flexibility considerations; reliability, bath-tub curve,MTBF; availability and maintainability, preventive maintenance, TPM; value analysis; replacement models; Quality-definition, Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; product and process specs; the funnel-marble experiment and variance reduction, process capability, six sigma and its implementation by DMAIC, QFD, TQM and ISO-9000.

Unit 4 Inventory , Plant infrastructure & Site selection : Basic layouts, facility layout objectives and factors, problems of inventories flow and operators in process layout and inflexibility in product layout, flexible cellular layout, group technology; capacity and equipment selection, importance of spare capacity to reduce Q-length and cycle time. Impact of organization strategies on choice of region and site, existing or new organization, decision-affecting factors for location, load distance, dimensional and factor analysis methods, Brown-Gibson model, foreign locations, non-profit govt. services (health, school) locations., merits and optimization; subjective relationship ranking method, computer programs CRAFT and 3-d modeling;

Unit 5 Schedule planning(Forecasting) & Improve manufacturing efficiency : corporate and production planning process, aggregate plan, master production schedule and material planning; matching supply to demand fluctuations over time horizon, Forecasting elements, time series, regression, causal and Delphi methods; use of LP in aggregate plan and HMMS model, assembly line balancing, elemental task, station time and cycle time, balance delays; sequencing, Johnson method for n-job 2/3 m/c, NP hard job-shop sequencing, heuristic dispatch rules; synchronous mfg, TOC, drum-buffer-rope and focus on bottleneck as control point; JIT lean mfg, Kanban and CONWIP shop floor controls, Kaizen.

Learning outcomes:

Upon successful completion of this course, the student will have reliably demonstrated the ability to:

1. Identify and articulate how operations management contributes to the achievement of an organization's strategic objectives.
2. Critically evaluate the operations function in manufacturing and service production settings.
3. Appraise and apply forecasting methods as the basis of management's planning and control activity.
4. Assess and formulate decision making strategies to address operating issues that have short, intermediate or long lead times.
5. Evaluate approaches to problem solving and process improvement in production settings.

References:

1.Gitlow Howard et al; Quality Management; TMH
2. Stevenson W J; Operations Management; TMH
3. Chase Richard B et al; Operations management; SIE-TMH
4. Vollman, Berry et al; Manufacturing planning and control for SCM; TMH.
5. Adam EE and Ebert RJ; Production and Operations Management Concepts…; PHI Learning.
6. Chary SN; Production and Operations Management; TMH
7. Hopp W and Spearman M; Factory Physics; TMH
8. Khanna RB; Production and Operations Management; PHI

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Syllabus of

Elective-II Total Quality Management & Statistical Quality Control (MEC- 541)

B.Tech.(VI -Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Elective-II Total Quality Management & Statistical Quality Control (MEC 541)	60	30	10	-	-	-	3	-	-	3	100

Course objective: 1. To understand the principles of quality and concepts.
2. To learn the Quality assurance models.

UNIT 1. Introduction – Evolution of quality, Definition, Concept and Features of TQM, Eight building blocks of TQM. TQM thinkers and Thought – Juran Trilogy, PDSA cycle, 5S, Kaizen, Crosby's theory on Quality Management, Quality Performance Excellence Award- Deming Application Award, European Quality Award, Malcolm Baldrige National Quality Award.

UNIT 2. TQM tools- Benchmarking: Definition, concepts, benefits, elements, reasons for benchmarking, process of benchmarking, FMEA, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept and need.

UNIT 3. Six Sigma- Features of six sigma, Goals of six sigma, DMAIC, Six Sigma implementation.

UNIT 4. Statistical Process Control- Central Tendency, The seven tools of quality, Normal curve, Control charts, Process Capability.

UNIT 5. Quality Systems- ISO 9000, ISO 9000:2000, ISO 14000, other quality systems.

Outcome: An ability to understand the quality management.
To analyze the different types of models for quality assurance.
To measure various business process reengineering.
To know how to prevent the defects

References:

1. Chary SN; Production and Operations Management; TMH
2. Hopp W and Spearman M; Factory Physics; TMH
3. Gitlow Howard et al; Quality Management; TMH
4. Stevenson W J; Operations Management; TMH

Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Intellectual Property Rights (MEC 542)

B.Tech. (VI -Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Intellectual Property Rights (MEC542)	40	20	10	30	-	-	2	1	2	4	100

Course Objective: To impart knowledge about the elements and techniques involved in Intellectual Property Rights which are very much essential to understand the emerging field of IPR.

Unit-I Introduction: Intellectual property: meaning, nature and significance, Various forms of intellectual properties: copyright, patent, trademark, design, geographical indication, semiconductor and plant variety ,Major international instruments relating to the protection of intellectual properties: the Paris Convention, 1883, the Berne Convention, 1886, the WIPO Convention, 1967, the TRIPs Agreement, 1994 etc.

Unit-II Copyright: meaning ,scope, Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings , Ownership of copyright , Assignment and licence of copyright, Infringement and exceptions of infringement of copyright and remedies against infringment of copyright: civil, criminal and administrative.

Unit-III Trade Marks: meaning, scope , Absolute and relative grounds of refusal , Doctrine of honest concurrent user , Procedure for registration and term of protection , Rights of holder and assignment and licensing of marks , Infringement and remedies , Trademarks registry and appellate board

Unit-IV Patents: meaning, Criteria for patentability and non-patentable inventions , Procedure for registration and term of protection , Grants of patent, rights of patentee and revocation of patent , Compulsory license and government use of patent , Infringement, exceptions to infringement of patent and remedies, Patent office and Appellate Board.

Unit-V other forms of IP: Design: meaning and concept of novel and original ,Procedure for registration, effect of registration and term of protection Geographical Indication (GI). Geographical indication:meaning, and difference between GI and trade marks Procedure for registration, effect of registration and term of protection Plant Variety Protection Plant variety protection: meaning and benefit sharing and farmers' rights.

Course Outcome:

Upon completion of this course, the students can able to learn and understand about the complexity of the IPR related issues and aware about various laws and regulation.

References:

1. The Copyright Act, 1957
2. The Patent Act, 1970
3. The Trade Marks Act, 1999
4. The Geographical Indication of Goods Act, 1999
5. The Designs Act, 2000
6. The Protection of Plant Varieties and Farmers' Rights Act, 2001

Books

(1). W.R.Cornish and D. Llewelyn, Intellectual Property: Patents, Copyrights, Trade Marks and Allied Rights, Sweet & Maxwell.

(2). Lionel Bently and Brad Sherman, Intellectual Property Law, Oxford University Press

(3). P. Narayanan, Intellectual Property Law, Eastern Law House

(4). B.L. Wadehra, Law Relating to Intellectual Property, Universal Law Publishing Co. 5. V.K. Ahuja, Law Relating to Intellectual Property Rights, LexisNexis

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Mandsaur University, Mandsaur(M.P.)

Department of Mechanical Engineering

Syllabus of

Internal Combustion Engines (MEC- 550)

B.Tech.(VI-Semester) (CBCS Scheme)(04YDC)

W.e.f. (session2018-19)

Subject Name & Code	Maximum Marks Allotted						Hours/ Week			Credits	Total Marks
	Theory			Practical							
	End Sem Test (EST)	Mid Sem Test (MST)	Continuous Evaluation	End sem	Mid Sem	Continuous Evaluation	L	T	P		
Internal Combustion Engines (MEC550)	40	20	10	30	-	-	2	1	2	4	100

Course objective: This course is an introduction to the operation, performance & emissions of the internal combustion engines. The students will learn applications of the thermodynamic cycles related to the IC engines, combustion process in SI & CI engines, effect of design & operating parameters on the performance of engines.

Unit-I

Internal Combustion Engine: S.I. and C.I. engines of two and four stroke cycles, determination of engine dimensions, speed, fuel consumption, output, mean effective pressure, efficiency, factors effecting volumetric efficiency, heat balance, performance characteristics of SI and CI engines, cylinder arrangement, firing order, power balance for multi-cylinder engines, valve timing.

Unit-II

Combustion in SI engines: Flame development and propagation, ignition lag, effect of air density, temperature, engine speed, turbulence and ignition timings, physical and chemical aspects of detonation, effect of engine and fuel variables on knocking tendency, knock rating of volatile fuels, octane number, H.U.C.R., action of dopes, pre-ignition, its causes and remedy, salient features of various type combustion chambers, valve timing and firing order.

Unit-III

Combustion in C.I. Engines: various stages of combustion, delay period, diesel knock, cetane number, knock inhibitors, salient features of various types of combustion chambers, fuel, ignition, cooling, exhaust and lubrication systems; Simple problems on fuel injection, various types of engines, their classification and salient features. Rotary I. C. engines, their principles of working.

Unit-IV

I.C. Engine System: Fuels, ignition systems, cooling, exhaust/scavenging and lubrication system. Fuel metering in SI engine: Fuel injection in SI engine (MPFI & TBI), Theory of carburetion, simple problems on carburetion. Fuel metering in CI engines: Fuel injection in CI engine.

Fuels: Conventional fuels and alternate fuels, engine exhaust emission, carbon monoxide, un-burnt hydro carbon, oxides of nitrogen, smoke, density, measurement and control, hydrogen as alternate fuel.

Unit-V

Supercharging: Effect of attitude on mixture strength and output of S.I. engines, low and high pressure super charging, exhaust, gas turbo-charging, supercharging of two stroke engines.

Course Outcomes:

The students will be able to

- Apply and analyze various thermodynamic cycles related to internal combustion engines and analyze combustion processes in engines.
- Specify and interpret engine design parameters as well as performance data for a variety of internal combustion engine systems.
- Explain pollutant formation, its effect on environment and control.

Lab Experiments:

1. To draw the Valve timing diagram for four stroke diesel engine.
2. To find the indicated power (IP) on multi-cylinder petrol engine by Morse test.
3. Study of Battery Ignition system and Electronic Ignition System.
4. To prepare heat balance sheet.
5. Study of fuel injection system in diesel engine.
6. Study of different types of Carburetors.
7. Study of lubricating system in CI Engines.

Reference

1. Ganeshan V; Internal Combusion engines; TMH
2. Mathur ML & Sharma RP; A. Course in IC engines; DhanpatRai
3. Gupta HN; Fundamentals of IC Engines; PHI
4. DomKundwar; Internal Combustion Engines ; Dhanpat Rai Publications
5. Taylor GF; Internal Combustion Engines Theory & Practice; MIT Press

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