

B.Tech. VII SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-7301	Heat and Mass Transfer	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	2	4	70	22

Unit I

Basic Concepts: Modes of heat transfer, Fourier's law, Newton's Law, Stefan-Boltzmann's law, concept of thermal resistance and conductance, analogy between flow of heat and electricity, combined heat transfer process.

Conduction Heat Transfer: Fourier heat conduction equation and its form in rectangular, cylindrical and spherical coordinate (3-dimension), concept of thermal diffusivity, linear 1-dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, electrical analogies, critical insulation thickness for pipes, effect of variable thermal conductivity.

Unit II

Extended Surfaces: Heat transfer from a straight fin (plate) and cylindrical pipe for a uniform cross section, error in measurement of temperature in a thermometer well, fin efficiency, fin effectiveness, applications.

Unsteady Heat Conduction: Transient and periodic conduction, heating and cooling of bodies with known temperature distribution, system with infinite thermal conductivity, response of thermocouples.

Unit III

Convection Heat Transfer: Convection: Introduction, types, concept of fluid flow and heat transfer, hydrodynamic and thermal boundary layers, principle of dimensional analysis, Buckingham 'Pie' theorem, application of dimensional analysis to free and forced convection, empirical correlations for laminar and turbulent flow over flat plate and tubular geometry, calculation of convective heat transfer coefficient using data book.

Unit IV

Thermal Radiation: Nature of radiation, emissive power, absorption, transmission, reflection and emission of radiation, Stefan Boltzmann's law, Wien's displacement law, Planck's distribution law, radiation from real surfaces, radiation heat exchange between black and gray bodies, shape factor, radiation shields, electrical network method of solving radiation problems.

Boiling Heat Transfer: Nuclear and film boiling, regimes of boiling, heat transfer in condensation, drop wise and film wise condensation, empirical equations.

Unit V

Heat Exchangers: Types of heat exchanger, overall heat transfer coefficient, fouling factor, log-mean temperature difference (LMTD) method of heat exchanger analysis, effectiveness of heat exchanger, NTU method.

Mass Transfer: Fick's law, equimolar diffusion, diffusion coefficient, analogy with heat transfer, diffusion of vapour in a stationary medium.

Handwritten signatures and initials at the bottom of the page.

✓ EL TV

B.Tech. VII SEMESTER MECHANICAL ENGINEERING

COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)

ME-7341	Refrigeration & Air Conditioning	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	2	4	70	22

Unit I

Introduction: Principles and methods of refrigeration, reversed Carnot cycle, air refrigeration cycles: Bell-Coleman, boot strap, reduced ambient and regenerative cooling cycles, vortex tube refrigeration, thermoelectric refrigeration, adiabatic demagnetization.

Unit II

Vapour Compression System: Vapour compression cycle, deviations from theoretical cycle, sub-cooling and super heating, effects of condenser and evaporator pressures on performance, multiple expansion and compression with flash inter cooling and flash gas removal, cascade system, production of dry ice, air liquefaction system.

Unit III

Refrigerants: Nomenclature, classification, desirable properties, comparative study, leak detection methods, environment friendly refrigerants and refrigerant mixtures, secondary refrigerants.

Vapour Absorption System: $\text{NH}_3\text{-H}_2\text{O}$ system, $\text{LiBr-H}_2\text{O}$ system, maximum COP of two fluid systems, Electrolux and other practical systems.

Steam Jet Refrigeration: Principle and working, merits and demerits, theoretical analysis.

Unit IV

Psychrometry: Calculation of psychrometric properties of air by table and charts, psychrometry of air conditioning processes, sensible heat factor, principle of air conditioning, requirements of comfort air conditioning, human comfort, effective temperature, need for ventilation, infiltration, infiltrated air load, fresh air load, purpose and requirements of industrial air conditioning.

Unit V

Air Conditioning: Heat load estimation and psychrometric analysis, calculation of summer and winter air conditioning load, supply air rate and its condition, apparatus dew point, room sensible heat factor, grand sensible heat factor, effective sensible heat factor, air distribution and ventilation systems.

Refrigeration Equipment and Application: Elementary knowledge of refrigeration and air conditioning equipments, compressors, condensers, evaporators, expansion devices, air washers, cooling towers, cold storage, refrigerators, freezers, ice plant, water coolers.

Recommended Books:

1. Refrigeration and Air conditioning, by Manohar Prasad; New Age International (P) Limited.
2. Refrigeration and Air conditioning by C.P.Arora; TataMcGraw Hill.
3. Refrigeration and Air conditioning by Arora and Domkundwar; Dhanpat Rai and Co (P) Ltd.
4. Refrigeration and Air Conditioning by Jordan and Priester; Prentice Hall of India.
5. Refrigeration and Air Conditioning by R. C. Arora; Prentice Hall of India.



✓ 05L-II

B.Tech. VII SEMESTER MECHANICAL ENGINEERING

COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)

ME-7321	Solar Energy Utilization	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	-	3	70	22

Unit I

Introduction: Characteristics of the Sun, solar radiation, solar constant, basic earth-sun angle and their relationship, solar time, solar radiation measurement, solar radiation on horizontal and inclined surfaces.

Unit II

Liquid Flat Plate Collector: Classification of flat plate collector, testing of collector, design of liquid flat plate collector, heat transfer coefficients, optimization of heat losses, thermal analysis, optimum inclination of flat plate collector, evacuated collector, configuration of flat plate collectors.

Unit III

Solar Air Heater: Introduction, performance analysis of conventional air heater, other type of air heaters, design of solar air heaters.

Solar dryer and still: various types of solar dryer, solar distillation.

Unit IV

Concentrating Collector: Introduction, flat plate collector with plane reflector, cylindrical parabolic collector, paraboloid dish collector, thermal analysis, orientation and sun tracking systems, application of concentrating collector.

Unit V

Financial Evaluation of Solar Energy Systems: Introduction, time value of money, interest, inflation, cash flow diagram, benefit cost analysis, effect of depreciation, cost comparison after taxes.

Recommended Books:

1. Solar Energy: Principles of Thermal Collection and storage by S.P. Sukhatme; Tata McGraw Hill.
2. Solar Energy: Fundamentals, Design, Modeling and Applications by G.N. Tiwari; Narosa Publishers.
3. Solar energy fundamentals and applications by Garg and Prakash; McGraw Hill.
4. Solar Engineering of thermal processes by Duffie and Beckmen; John Wiley and Sons, Inc.



✓

0EL-12

B.Tech. VII SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-7322	Supply Chain Management	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	-	3	70	22

ME-7322	Supply Chain Management	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	-	3	70	22

Unit I

Introduction: Definition and scope of Supply Chain Management (SCM), objectives and functions of SCM, historical development and evolution, types of supply chain (SC): basic, extended and ultimate supply chains, web centric supply chain, flow in supply chain, decision phases in supply chain, process and cycle view of SCM, supply chain orientation and implementation, role of SC manager, current status of SCM in India, its need and future trends.

Unit II

Design and planning of Supply Chain: Competitive and supply chain, strategies achieving strategies fit, efficient and responsive SC, drivers of SC, designing the distribution network, taking uncertainty into account, various decisions at design stage, demand forecasting: basic approach, time series, causal model, trend and seasonality, forecast error and impact on SC. Aggregate planning and planning of supply and demand.

Unit III

Inventory Management: Inventory; its types and need, economies of scale, EOQ model and its variant, quantity discount, probabilistic models, newsboy problem, P,Q and S-s inventory systems, lead-time, reorder point, buffer stock calculation, multi-echelon inventory management, selective inventory control, role of ICT in inventory management, Bullwhip effect: causes and effect, actions needed to control negative impact, managing uncertainty and optimal level of product availability.

Unit IV

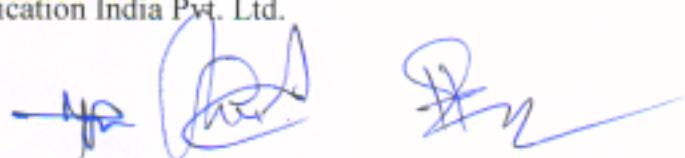
Sourcing, Transporting and Pricing decisions: Role of upstream SC, supplier selection, importance and methods, vendor development, sourcing decisions, make v/s buy, sourcing process, global tendering, vendor rating, transportation model, transshipment model, 3 PL, modern trends, multi-modal transportation, containerization, routing and scheduling in transportation, pricing decisions and revenue management.

Unit V

SCM process and performance management: SC processes like postponement, VMI, CPFR, JIT, cross docking, role of ICT in SCM, CRM and its benefits, E-Business, B-2-B and B-2-C presentations, performance measurement of SC, factors and need for SCPMS, SCOR model, balanced scorecard, difficulties in performance management, bench marking and continuous improvement.

Books Recommended:

1. Supply Chain Management; Janat Shah; Pearson Education India.
2. Supply Chain Management; Chopra and Meindl; Pearson Education.
3. Supply Chain Management by Simchi – Levi; McGraw Hill.
4. Supply Chain Management by Mentzer; Sage Publication India Pvt. Ltd.



OEL-III

B.Tech. VII SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-7331	Vibration and Noise Control	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	-	3	70	22

Unit I

Introduction: Vibration, main causes, advantages and disadvantages, engineering applications of vibrations, elements of a vibratory system, harmonic motion, harmonic analysis and beat phenomena.

Un-damped Free Vibrations: Free vibration of systems without damping, equilibrium and energy method for determining natural frequency, Rayleigh's method, equivalent system.

Damped Free Vibrations: Different types of damping, coefficient of damping, damping ratio, over damped, critically damped and under damped systems, logarithmic decrement, frequency of a damped free vibration, equations of motion – discussion of its solutions.

Unit II

Forced Vibration: Single degree of freedom system, forced damped vibrations with harmonic excitation, forced vibration due to rotating and reciprocating unbalance, forced vibrations due to excitation of support, force and motion transmissibility, vibration isolation, commercial isolators.

Whirling of Shafts: Whirling motion and critical speed, critical speed of a vertical light flexible shaft with single rotor with and without damping, secondary critical speed.

Unit III

System with Two-Degree of Freedom: Un-damped free vibration of two degree of freedom system, principal modes of vibrations, torsional systems, forced un-damped vibrations with harmonic excitations, coordinate coupling, un-damped dynamic vibration absorber, centrifugal absorber, friction damper.

Unit IV

Noise Control: Noise and its causes, sound pressure / intensity / power level and their inter-relation, decibel scale, loudness and equal loudness contours, effect of machine / process noise on operators, employees and local residents, standards of noise level and exposure limits, methods of industrial noise control.

UNIT V

Vibration and Noise Measurement: Principle of frequency, amplitude, velocity and acceleration measuring instruments, frequency response plots, phase shift plots, analysis of vibration records. Sound spectra and octave band analysis, background noise, weighted networks, measurement of noise.

Recommended Books:

1. Mechanical Vibrations by Singiresu Rao; Pearson Education.
2. Theory of Vibration with Applications by W.T. Thomson; Pearson Education.
3. Mechanical Vibration by S. Graham Kell; Schaum Outline Series, Tata McGraw Hill.
4. Mechanical Vibration by G.K. Grover; Nemchand and Bros.
5. Mechanical Vibrations and Noise Engineering by A.G. Ambekar; Prentice-Hall of India.

✓

B.Tech. VII SEMESTER MECHANICAL ENGINEERING

COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)

ME-7332	Automobile Engineering	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	-	-	3	70	22

Unit - I:

Chassis & Body Engg: Types, Technical details of commercial vehicles, types of chassis, lay out, types of frames, testing of frames for bending & torsion on unutilized body frame, vehicle body and their construction, driver's visibility and methods for improvement, safety aspects of vehicles, vehicle aerodynamics, optimization of body shape, driver's cab design, body materials, location of engine, front wheel and rear wheel drive, four wheel drive.

Unit - II

Steering System: front axle beam, stub axle, front wheel assembly, principles of types of wheel alignment, front wheel geometry viz. camber, Kingpin inclination, castor, toe-in and toe-out, condition for true rolling motion, centre point steering, directional stability of vehicles, steering gear, power steering, slip angle, cornering power, over steer & under steer, gyroscopic effect on steering gears.

Unit - III

Transmission System: Function and types of clutches, single plate, multi-plate clutch, roller & spring clutch, clutch lining and bonding, double declutching, types of gear Boxes, synchroniser, gear materials, determination of gear ratio for vehicles, gear box performance at different vehicle speed, automatic transmission, torque converters, fluid coupling, principle of hydrostatic drive, propeller shaft, constant velocity universal joints, differential gear box, rear axle construction.

Unit - IV

Suspension system: Basic suspension movements, Independent front & rear suspension, shock absorber, type of springs: leaf spring, coil spring, air spring, torsion bar, location of shackles, power calculations, resistance to vehicle motion during acceleration and braking, power & torque curve, torque & mechanical efficiency at different vehicle speeds, weight transfer, braking systems, disc theory, mechanical, hydraulic & pneumatic power brake systems, performance, self-energisation, airbleeding of hydraulic brakes, types of wheels and tyres, tyre specifications, construction and material properties of tyres & tubes.

Unit - V

Electrical and Control Systems: storage battery, construction and operation of lead acid battery, testing of battery, principle of operation of starting mechanism, different drive systems, starter relay switch, regulator electric fuel gauge, fuel pump, horn, wiper, Lighting system, head light dazzling, signaling devices, battery operated vehicles, choppers, importance of maintenance, scheduled and unscheduled maintenance, wheel alignment, trouble Shooting probable causes & remedies of various systems, microprocessor based control system for automobile, intelligent automobile control systems.

Emission standards and pollution control: Indian standards for Automotive vehicles-Bharat I, and II, Euro-I and Euro-II norms, Fuel quality standards, Environmental management systems for automotive vehicles, Catalytic converters, Fuel additives, Modern trends in automotive engine efficiency and emission control.

References:

1. Crouse , Automotive Mechanics TMH.
2. Srinivasan S; Automotive engines; TMH
3. Gupta HN; Internal Combustion Engines; PHI;
4. Joseph Heitner, Automotive Mechanics, Principles and Practices, CBS Pub.
5. Kripal Singh, Automotive Engineering Khanna Pub.
6. Newton & Steeds , Automotive Engineering
7. Emission standards from BIS and Euro -I and Euro-III BE VII Semeste

(B.O.S Member)

(B.O.S Member)

(B.O.S Chairman)