B. Tech. VIth Semester Mechanical Engineering

LECTURE PLAN

REFRIGERATION AND AIR-CONDITIONING

ME-302N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	6th Semester	Basics of heat pump & refrigerator; Carnot's refrigeration and heat pump	Teaching	
Jan.	6th Semester	Units of refrigeration; COP of refrigerator and heat pump	Teaching	
Jan.	6th Semester	Carnot's COP; ICE refrigeration	Teaching	
Jan.	6th Semester	Evaporative refrigeration; refrigeration by expansion of air; refrigeration by throttling of gas	Teaching	
Jan.	6th Semester	Vapour refrigeration system; steam jet refrigeration	Teaching	
Jan.	6th Semester	thermoelectric cooling; adiabatic demagnetization	Teaching	
Jan.	6th Semester	Basic principles of operation of air refrigeration system, Bell-Coleman air refrigerator	Teaching	
Jan.	6th Semester	advantages of using air-refrigeration in aircrafts; disadvantages of air refrigeration in comparison to other cold producing methods	Teaching	
Jan.	6th Semester	simple air refrigeration in air craft	Teaching	
Jan.	6th Semester	simple evaporative type air refrigeration in aircraft; necessity of cooling the aircraft	Teaching	
Jan.	6th	Simple Vapour Compression Refrigeration	Teaching	Assignment

	Semester	System		
Feb.	6th Semester	Different compression processes :wet compression	Teaching	
Feb.	6th Semester	dry or dry and saturated compression, superheated compression	Teaching	
Feb.	6th Semester	Limitations of vapour compression refrigeration system if used on reverse Carnot cycle; representation of theoretical and actual cycle on T-S and P-H charts	Teaching	
Feb.	6th Semester	effects of operating conditions on the performance of the system; advantages of vapour compression system over air refrigeration system	Teaching	
Feb.	6th Semester	Methods of improving COP; flash chamber; flash inter cooler	Teaching	
Feb.	6th Semester	optimum interstate pressure for two stage refrigeration system, single expansion and multi expansion processes	Teaching	
Feb.	6th Semester	basic introduction of single load and multi load systems; Cascade systems.	Teaching	
Feb.	6th Semester	Basic absorption system; COP and Maximum COP of the absorption system; actual NH_3 absorption system; functions of various components; Li-Br absorption system	Teaching	
March	6th Semester	selection of refrigerant and absorbent pair in vapour absorption system; Electro refrigerator; Comparison of Compression and Absorption refrigeration systems;	Teaching	
March	6th Semester	nomenclature of refrigerants; desirable properties of refrigerants; cold storage and ice-plants	Teaching	
March	6th Semester	Difference in refrigeration and air-conditioning	Teaching	Assignment

March	6th Semester	; Psychometric properties of moist air :wet bulb, dry bulb, dew point temperature	Teaching	
March	6th Semester	relative and specific humidity of moist air, temperature of adiabatic-saturation; empirical relation to calculate P_v in moist air	Teaching	
March	6th Semester	Psychometric-chart, construction and use, mixing of two air streams	Teaching	
March	6th Semester	sensible heating and cooling; latent heating and cooling	Teaching	
March	6th Semester	Humidification and dehumidification; cooling with dehumidification; cooling with adiabatic humidification; heating and humidification	Teaching	
March	6th Semester	By-pass factor of coil; sensible heat factor	Teaching	
March	6th Semester	ADP of cooing coil; Air washer	Teaching	
March	6th Semester	Classification; factors affecting air conditioning systems	Teaching	Assignment
April	6th Semester	; comfort air-conditioning system	Teaching	
April	6th Semester	winter air conditioning system; summer air-conditioning system; year round air conditioning. unitary air-conditioning system; central air conditioning system	Teaching	
April	6th Semester	room sensible heat factor; Grand sensible heat factor; effective room sensible heat factor	Teaching	
April	6th Semester	Inside design conditions; comfort conditions; components of cooling loads; internal heat gains from (occupancy, lighting, appliances, product and processes)	Teaching	
April	6th	system heat gain (supply air duct, A.C. fan,	Teaching	

	Semester	return air duct); external heat gain (heat gain through building, solar heat gains through outside walls and roofs)		
April	6th Semester	solar air temperature; solar heat gain through glass areas; heat gain due to ventilation and infiltration	Teaching	
April	6th Semester	Transport air conditioning; evaporative condensers,	Teaching	
May	6th Semester	cooling towers; heat pumps.	Teaching	Assignment

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LECTURE PLAN

Tribology & Mechanical Vibration

ME-304N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	6th Semester	Elements of a vibratory system, S.H.M., degrees of freedom, Types of vibrations	Teaching	
Jan.	6th Semester	Work done by a harmonic force, Beats	Teaching	
Jan.	6th Semester	Natural frequency by equilibrium and energy methods, equivalent spring, linear and torsional systems, compound pendulum	Teaching	
Jan.	6th Semester	Natural frequency by equilibrium and energy methods, equivalent spring, linear and torsional systems, compound pendulum	Teaching	
Jan.	6th Semester	Bifilar suspensions	Teaching	
Jan.	6th Semester	Trifilar suspensions	Teaching	
Jan.	6th Semester	Different types of damping	Teaching	
Jan.	6th Semester	Differential equations of damped free vibrations, initial conditions,	Teaching	
Jan.	6th Semester	Logarithmic decrement	Teaching	
Jan.	6th Semester	Vibrational energy and logarithmic decrement.	Teaching	
Jan.	6th Semester	Sources of excitation**,** equations of motion with harmonic force	Teaching	Assignment
Feb.	6th Semester	response of rotating and reciprocating unbalanced system	Teaching	
Feb.	6th Semester	Support motion	Teaching	
Feb.	6th Semester	Vibration Isolation	Teaching	

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Feb.	6th Semester	Force and Motion transmissibility	Teaching	
Feb.	6th Semester	Principle modes of vibrations	Teaching	
Feb.	6th Semester	Influence co-efficient	Teaching	
Feb.	6th Semester	Matrix method	Teaching	
Feb.	6th Semester	Orthogonality principle	Teaching	Assignment
March	6th Semester	Dunkerleys equation	Teaching	
March	6th Semester	Matrix iteration method	Teaching	
March	6th Semester	Holzer Method	Teaching	
March	6th Semester	Rayleigh Method	Teaching	
March	6th Semester	Rayleigh-Ritz methods	Teaching	
March	6th Semester	Stodola method	Teaching	
March	6th Semester	Hamilton principle	Teaching	
March	6th Semester	Transverse vibrations of strings	Teaching	
March	6th Semester	Longitudinal Vibrations of bars	Teaching	
March	6th Semester	Lateral vibration of beams	Teaching	
March	6th Semester	Torsional vibration of circular shafts.	Teaching	Assignment
April	6th Semester	Introduction to Tribology, Tribology in design, Tribology in industry, economic aspects of Tribology	Teaching	
April	6th Semester	Basic modes of lubrication, properties of lubricants - physical and chemical, types of additives	Teaching	

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April	6th Semester	extreme pressure lubricants, recycling of used oils and oil conservation	Teaching	
April	6th Semester	Introduction, laws of friction, kinds of friction, causes of friction, friction measurement	Teaching	
April	6th Semester	Theories of friction, effect of surface preparation. Introduction to Wear, Types of wear	Teaching	
April	6th Semester	Various factors affecting wear, measurement of wear	Teaching	
April	6th Semester	Wear between solids and liquids, theories of wear	Teaching	Assignment

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LECTURE PLAN

OPERATION RESEARCH

ME-306N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	6th Semester	**Introduction:** Definition and Development of Operations Research .	Teaching	
Jan.	6th Semester	Necessity and scope of OR in Industry, Operations Research in Decision making	Teaching	
Jan.	6th Semester	Models in OR, Fields of application, Difficulties and Limitation of OR.	Teaching	
Jan.	6th Semester	**General Linear Programming Problems**: Introduction,	Teaching	
Jan.	6th Semester	Maximization and minimization of function with or without Constraints	Teaching	
Jan.	6th Semester	Formulation of a linear programming problem, Graphical method and Simplex method	Teaching	
Jan.	6th Semester	Big M method, Degeneracy, Application of linear Programming (LPP) in Mechanical Engineering	Teaching	
Jan.	6th Semester	**The Transportation Problems:** Mathematical formulation,	Teaching	Assignment
Jan.	6th Semester	Stepping stone method	Teaching	
Jan.	6th Semester	Modified Distribution Method, Vogels Approximation Method	Teaching	
Jan.	6th Semester	Solution of balanced and unbalanced transportation problems and case of degeneracy,	Teaching	
Feb.	6th	Assignment problems, Least time transportation	Teaching	Assignment

	Semester	problem		
Feb.	6th Semester	**Network Analysis:** CPM/PERT, Network Representation, Techniques for drawing network,	Teaching	
Feb.	6th Semester	Numbering of events L: Fulkersen Rule, PERT calculations - Forward path,.	Teaching	
Feb.	6th Semester	back-ward path, Slack, probability, comparison with PERT, Critical path,	Teaching	
Feb.	6th Semester	Float, Project cost, Crashing the network,	Teaching	
Feb.	6th Semester	updating (PERT and CPM)	Teaching	Assignment
Feb.	6th Semester	**Simulation**: Basic concept of simulation, Applications of simulation, Merits and demerits of simulation,	Teaching	
Feb.	6th Semester	Monte Carlo simulation, Simulation of Inventory system, Simulation of Queuing system.	Teaching	
March	6th Semester	**Waiting Line Theory**: Basic queuing process, Basic structure of queuing models,	Teaching	
March	6th Semester	some commonly known queuing situations, Kendall's notation, Solution to M/M/1: ∞ /FCFS models.	Teaching	
March	6th Semester	**Decision Theory:** Steps in decision theory approach, Decision Machinery environment,	Teaching	
March	6th Semester	Decision machining under certainty and uncertainty, Decision machining under condition of risk,	Teaching	
March	6th Semester	Decision trees, Minimum enchained criteria,	Teaching	
March	6th Semester	Advantages and limitations of decision tree solutions,	Teaching	
March	6th	Post Optimality.	Teaching	Assignment

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	Semester			
March	6th Semester	**Queuing Theory**: Introduction, Applications of queuing Theory	Teaching	
March	6th Semester	Waiting time and idle time costs, Single channel queuing theory	Teaching	
March	6th Semester	multi-channel queuing theory with Poisson arrivals	Teaching	
March	6th Semester	Exponential services, Numerical on single channel and multi channel queuing theory.	Teaching	
April	6th Semester	**Game Theory**: Theory of games	Teaching	
April	6th Semester	competitive games, Rules and Terminology in game Theory	Teaching	
April	6th Semester	Rules for game theory- saddle point, dominance, Mixed strategy (2 x2 games)	Teaching	
April	6th Semester	Mixed strategy (2 x n games or m x 2 games)	Teaching	
April	6th Semester	Mixed strategy (3 x3 games)	Teaching	
April	6th Semester	Two person zero sum games,	Teaching	
April	6th Semester	N-person zero sum games	Teaching	Assignment

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Lecture Plan

Computer Aided Design and Manufacturing

ME-308N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	6th Semester	Introduction to CAD/CAM, Historical Development	Teaching	
Jan.	6th Semester	Industrial look at CAD/CAM Application of CA/CAM, Display devices, Input/ Output Devices, CPU	Teaching	
Jan.	6th Semester	Introduction to CIM, Definition, Nature of Elements of CIM	Teaching	
Jan.	6th Semester	CIM Wheel, Introduction to computer aided quality control	Teaching	
Jan.	6th Semester	Contact and Non Conduct Inspection Method	Teaching	
Jan.	6th Semester	Wireframe modeling	Teaching	
Jan.	6th Semester	Representation of curves, Parametric and non-parametric curves	Teaching	
Jan.	6th Semester	Straight lines, Hermite cubic splines	Teaching	
Jan.	6th Semester	B splines curves	Teaching	
Jan.	6th Semester	Plane surface, ruled surface	Teaching	
Jan.	6th Semester	Surface of revolution, bi-cubic surface	Teaching	Assignment
Feb.	6th Semester	Bezier surface, B spline surface	Teaching	
Feb.	6th Semester	Solid modeling, boundary representation	Teaching	
Feb.	6th Semester	Sweeping, parametric solid modeling	Teaching	

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Feb.	6th Semester	Introduction, Transformation of points & line	Teaching	
Feb.	6th Semester	2-D translation, rotation	Teaching	
Feb.	6th Semester	Reflection, Scaling	Teaching	
Feb.	6th Semester	Shearing and combined transformation	Teaching	
Feb.	6th Semester	Homogeneous coordinates, Orthographic Projections	Teaching	Assignment
March	6th Semester	Perspective Projections	Teaching	
March	6th Semester	Group technology	Teaching	
March	6th Semester	Part families	Teaching	
March	6th Semester	Part classification and coding, optiz method	Teaching	
March	6th Semester	Product flow analysis,	Teaching	
March	6th Semester	Machine cell Design, Advantages of GT	Teaching	
March	6th Semester	Numerical control, Types of NC systems	Teaching	
March	6th Semester	MCU & other components	Teaching	
March	6th Semester	Co-ordinate system	Teaching	
March	6th Semester	NC manual part programming	Teaching	
March	6th Semester	G & M codes	Teaching	Assignment
April	6th Semester	Part program for simple parts,	Teaching	
April	6th	Computer assisted part programming	Teaching	

	Semester			
April	6th Semester	Introduction, FMS component	Teaching	
April	6th Semester	Types of FMS, FMS layout	Teaching	
April	6th Semester	planning for FMS, advantage and applications	Teaching	
April	6th Semester	Introduction, conventional process planning, Steps in variant process planning	Teaching	
April	6th Semester	Types of CAPP, planning for CAPP	Teaching	Assignment

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Lecture Plan

Machine Design-II

ME-310N

Month	Class	Topic/Chapter Covered	Academic Activity	Test/Assignment
Jan.	6th Semester	Gears-types and application and gear terminology	Teaching	
Jan.	6th Semester	Law of gearing-conjugate action and interference in gears	Teaching	
Jan.	6th Semester	Gear tooth profiles, involute profile -basics, Influence of number of teeth and pressure angle	Teaching	
Jan.	6th Semester	Analysis of forces on spur, and helical gears and Lewis equation for design	Teaching	
Jan.	6th Semester	Dynamic loading and wear-Buckingham equations for design	Teaching	
Jan.	6th Semester	Force analysis on bevel and worm gears	Teaching	
Jan.	6th Semester	Design approach for bevel gears- equivalent tooth	Teaching	
Jan.	6th Semester	Design of fixed ratio gear box- general design procedure	Teaching	
Jan.	6th Semester	Design of Flat Belt Drive and type of Flat belt drive	Teaching	
Jan.	6th Semester	Design of Cast iron flat belt pulley	Teaching	
Jan.	6th Semester	Design of V-Belt Drive and Types of V-belts and pulleys	Teaching	Assignment
Feb.	6th Semester	Design of Rope Drive and selection of wire rope.	Teaching	
Feb.	6th Semester	Design of chain drive and selection of chains.	Teaching	
Feb.	6th Semester	Type of clutches and design of single plate clutch.	Teaching	
Feb.	6th	Design of multiple disc clutch.	Teaching	

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	Semester			
Feb.	6th Semester	Type of brakes and Design of single shoe brake	Teaching	
Feb.	6th Semester	Design of Double Shoe Brake	Teaching	
Feb.	6th Semester	Helical Springs, Stresses and Deflections	Teaching	
Feb.	6th Semester	Design Principles of Helical Springs	Teaching	Assignment
March	6th Semester	Stresses and Deflections, Design principles of leaf Springs	Teaching	
March	6th Semester	Types of Sliding contact Bearings and introduction to Hydrodynamic Lubricated Bearings	Teaching	
March	6th Semester	Design of Journal Bearing	Teaching	
March	6th Semester	Types of Rolling contact bearings and introduction to ball Bearings & Roller bearings	Teaching	
March	6th Semester	Design & Selection of Rolling contact bearings.	Teaching	
March	6th Semester	Design of cam & Follower	Teaching	
March	6th Semester	Design of Cylinder	Teaching	
March	6th Semester	Design of Piston	Teaching	
March	6th Semester	Design of Piston	Teaching	
March	6th Semester	Design of Crank Shaft (Case-I)	Teaching	
March	6th Semester	Design of Crank Shaft (Case-II)	Teaching	Assignment
April	6th Semester	Design of Connecting rod	Teaching	
April	6th Semester	Design of Connecting rod	Teaching	
April	6th	Design of Crane Hook	Teaching	

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	Semester			
April	6th Semester	Fly wheel basic concepts -design requirements	Teaching	
April	6th Semester	Fly wheel basic concepts -design requirements	Teaching	
April	6th Semester	Moment diagram and energy estimations	Teaching	
April	6th Semester	Moment diagram and energy estimations	Teaching	Assignment

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	Topic/Chapter Covered
1.	Elements of a vibratory system, S.H.M., degrees of freedom, Types of vibrations
2.	Work done by a harmonic force, Beats
3.	Natural frequency by equilibrium and energy methods,
4.	equivalent spring, linear and torsional systems, compound pendulum
5.	Natural frequency by equilibrium and energy methods, equivalent spring, linear and torsional systems, compound pendulum
6.	Bifilar suspensions
7.	Trifilar suspensions
8.	Different types of damping
9.	Differential equations of damped free vibrations, initial conditions,
10.	Differential equations of damped free vibrations, initial conditions,
11.	Logarithmic decrement
12.	Vibrational energy and logarithmic decrement.
13.	Sources of excitation**,** equations of motion with harmonic force
14.	Sources of excitation**,** equations of motion with harmonic force
15.	Response of rotating and reciprocating unbalanced system
16.	Response of rotating and reciprocating unbalanced system
17.	Support motion
18.	Vibration Isolation
19.	Vibration Isolation
20.	Force and Motion transmissibility
21.	Force and Motion transmissibility
22.	Principle modes of vibrations
23.	Influence co-efficient
24.	Matrix method
25.	Orthogonality principle
26.	Orthogonality principle
27.	Dunkerleys equation

28.	Matrix iteration method
29.	Holzer Method
30.	Rayleigh Method
31.	Rayleigh-Ritz methods
32.	Stodola method
33.	Hamilton principle
34.	Transverse vibrations of strings
35.	Longitudinal Vibrations of bars
36.	Lateral vibration of beams
37.	Torsional vibration of circular shafts.
38.	Torsional vibration of circular shafts.
39.	Introduction to Tribology, Tribology in design, Tribology in industry, economic aspects of Tribology
40.	Basic modes of lubrication, properties of lubricants - physical and chemical, types of additives
41.	Extreme pressure lubricants, recycling of used oils and oil conservation
42.	Introduction, laws of friction, kinds of friction, causes of friction
43.	friction measurement
44.	Theories of friction, effect of surface preparation
45.	Introduction to Wear, Types of wear
46.	Various factors affecting wear, measurement of wear
47.	Measurement of wear
48.	Wear between solids and liquids
49.	Theories of wear