

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 302E Refrigeration and Air Conditioning

L	T	P/D	Total
3	1	-	4

Theory : 100 marks
Sessional : 50 marks
Duration of Exams. : 03 hours

(A) Refrigeration

Unit1.

Basics of heat pump & refrigerator, Carnot refrigeration and heat pump, units of refrigeration COP of refrigerator and heat pump, Carnot COP, Ice refrigeration, evaporative refrigeration, refrigeration by expansion of air, refrigeration by throttling of gas, vapour refrigeration system, steam jet refrigeration, thermo electric cooling, adiabatic demagnetization. Basic Principal of operation of air refrigeration system, Bell Coleman air refrigerator, advantages of using air refrigeration in air craft, disadvantage of air refrigeration in comparison to other cold producing methods, simple air refrigeration in air craft, simple evaporative type air refrigeration in air craft, necessity of cooling the air craft.

Unit2.

Simple vapour compression refrigeration system, different compression processes (wet Compression, dry or dry and saturated Compression, superheated compression), 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, effects of operating conditions on the performance of the system, advantages of vapour compression system over air refrigeration system. Methods of improving COP, flash chamber, flash inter cooler, optimum inter stage pressure for two stage refrigeration system, single expansion and multi expansion processes, basic introduction of single load and multi load systems, cascade systems. Basic absorption system, COP and maximum COP of the absorption system. Actual NH₃ absorption system, function of various components, Li-Br absorption system, Selection of refrigerant and absorbent pair in vapour absorption system, Electro refrigerator, comparison of compression and absorption refrigeration system, Nomenclature of refrigerants, desirable properties of refrigerants, cold storage and Ice Plants.

(B)Air conditioning

Unit3.

Difference in refrigeration and Air Conditioning, Psychometric properties of moist air (wet bulb, dry bulb, dew point temperature, relative and specific humidity of moist air, temperature of adiabatic saturation), empirical relation to calculate P_v in moist air. Psychometric chart, construction and use, mixing of two air streams, sensible heating and cooling, latent heating and cooling, humidification and dehumidification, cooling with dehumidification, cooling with adiabatic humidification, heating and humidification, By- pass factor of coil, sensible heat factor, ADP of cooling coil, Air washer.

Unit4.

Classification, factors affecting air conditioning systems, comfort air conditioning system, winter air conditioning system, summer Air Conditioning system, year round air conditioning system, unitary air conditioning system, central air conditioning system, Room sensible heat factor, Grand sensible heat factor, effective room sensible heat factor.

Inside design conditions, comfort conditions, components of cooling load, internal heat gains from (occupancy, lighting, appliances, product and processes), system heat gain (supply air duct, A.C. fan, return air duct), External heat gain (heat gain through building, solar heat gain through outside walls and roofs), sol air temperature, solar heat gain through glass areas, heat gain due to ventilation and infiltration.

Transport air conditioning, evaporative condensers, cooling towers, heat pumps.

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 304E Tribology

L	T	P/D	Total
3	1	-	4

Theory : 100 marks
Sessional : 50 marks
Duration of Exams. : 03 hours

Unit1.

Introduction to tribological systems and their characteristic features, Analysis and assessment of surface topography, deterministic and stochastic tribo-models for asperity contacts, techniques of surface examination, technological properties of surfaces. Quantitative laws of sliding friction, causes of friction, adhesion theory, laws of rolling friction, measurement of friction.

Unit2.

,mechanism of wear, types of wear, quantitative laws of wear, measurement of wear, wears resistance materials.

Unit3.

Introduction, dry friction, boundary lubrication, hydrodynamic, hydrostatic and elasto- hydrodynamic lubrication, functions of lubricants, types and properties of lubricants, lubricant additives. Principles, application to rolling contact bearings, cams, gears

Unit4.

Geometry and pressure equation of journal bearing, hydrostatic bearings, thrust bearings, porous bearings and hydrodynamic gas bearings. Journal bearings with specialized applications. General requirements and different types of bearing materials.

B.Tech. (Sixth semester) Mechanical engineering.

FUNDAMENTALS OF MANAGEMENT

HUT-302E

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3 1

Theory : 100 marks
Sessionals : 50 marks
Total : 150 marks
Time : 3 hrs.

UNIT I

Financial Management

Introduction of financial management, objectives of financial decisions, status and duties of financial executives. Financial planning – tools of financial planning. Management of working capital. Capital structure decisions. Features of appropriate capital structure. Sources of finance.

UNIT II

Personal Management

Personal Management – Meaning, nature and importance, functions of personal management – (a) managerial functions and (b) operative functions. Job analysis: meaning and importance, process of job analysis, job description and job specification. Human resource development – meaning and concept.

UNIT III

Production Management

Production Management: Definition and objectives
Plant location: ideal plant location. Factors affecting plant location.
Plant layout: ideal plant layout, factors affecting plant layout.
Work measurement: Meaning, objectives and essentials of work measurement.
Production control: Meaning and importance of production control and steps involved in production control.

UNIT IV

Marketing Management

Nature, scope and importance of marketing management. Modern marketing concepts. Role of marketing in economic development. Marketing mix. Marketing information system. Meaning, nature and scope of international marketing.

ME- 306E Mechanical Vibrations

L	T	P/D	Total	Theory	: 100 marks
3	1	-	4	Sessional	: 50 marks
				Duration of Exams.	: 03 hours

Unit1.

Kinematics of simple vibrating motions, simple harmonic motions, vectorial representation of harmonic motion. Degrees of freedom, equations motions, general solution of free vibration, Phase plane method.

Unit2.

Damped free vibrations, undamped and damped forced vibrations, Vibrating isolation, and vibrating instruments.

Undamped free vibration, principal modes, Influence coefficients, coordinates coupling, orthogonality, and Vibration absorbers

Unit3.

Geometric method, Stability of equilibrium points, Method of harmonic balance

Influence coefficients, Dunkerley's equation, Matrix iteration, Holzer method, Rayleigh method, Rayleigh – Ritz method,

Unit4.

Transverse vibration of strings, longitudinal vibration of bars, lateral vibration of beams, torsional vibration of circular shafts, whirling of shafts

Introduction, method of Laplace transformation, and response to an impulsive output, response to step - input, pulse- input, phase plane method

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 308E Computer Aided Design & Manufacturing

L	T	P/D	Total	Theory	: 100 marks
4	1	-	5	Sessional	: 50 marks
				Duration of Exams.	: 03 hours

Unit1.

Introduction to CAD/CAM, Historical developments, Industrial look at CAD/CAM, Introduction to CIM, Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems. Part families, part classification and coding, production flow analysis, Machine cell design, Advantages of GT

Unit2.

Introduction, transformation of points and line, 2-D rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic and perspective projections. Algebraic and geometric forms, tangents and normal, blending functions, reparametrization, straight lines, conics, cubic splines, bezier curves and B-spline curves.

Unit3.

Algebraic and geometric forms, tangents and twist vectors, normal, blending functions, reparametrization, sixteen point form, four curve form, plane surface, ruled surface, surface of revolution, tabulated cylinder, bi-cubic surface, bezier surface, B-spline surfaces.

Solid models and representation scheme, boundary representation, constructive solid geometry, sweep representation, cell decomposition, spatial occupancy enumeration.

Unit4.

Introduction, fixed, programmable and flexible automation, types of NC systems, MCU and other components, NC manual part programming, coordinate systems, G & M codes, Part program for simple parts, computer assisted part programming.

Part families, part classification and coding, production flow analysis, Machine cell design, Advantages of GT

Introduction, FMS components, types of FMS, FMS layouts, planning for FMS, advantages and applications

Introduction, Conventional process planning, types of CAPP, steps in variant process planning, planning for CAPP.

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 310E Machine Design - II

L	T	P/D	Total
2	-	6	8

Theory : 100 marks
Sessional : 50 marks
Duration of Exams. : 04 hours

UNIT I

Classification of gears : Selection of tyres, law of gearing, standard system of gear tooth, various failure modes, interference, undercutting & minimum no. of teeth, force analysis, beam strength of gear tooth, effective load on tooth, estimation of module based on beam strength and wear strength, gear lubrication, materials, design procedure, gear box design.

Terminology, force analysis, virtual no. of teeth, beam strength, effective load, wears strength.

Terminology, force analysis, beam strength & wear strength, effective load on gear tooth.

Terminology, properties, force analysis, friction, material selection.

UNIT II

Design of flat belt & pulleys, design / selection of V belts & Pulleys, design/ selection of wire ropes, design/ selection of chains

Single & multiple plate clutch, cone clutch

External shoe brake, internal shoe brake.

UNIT III

Coil springs, leaf springs

Hydro dynamically lubricated bearings, selection of ball bearings, selection of roller bearings, selection of taper roller bearings,

Mechanism design, design of cam & follower.

UNIT IV

Design of cylinders, design of piston, design of crank shaft, design of connecting rod

Design of crane Hook

Design of flywheels.

Note: Prepare the drawing sheets for above problems based on your calculated dimensions.

Reference and Text Books:

1. Design of Machine Elements
- By Bhandari, Tata McGraw-Hill
2. Machine Design
- By Maleev and Hartmann, CBS Public.
3. Machine Design
- By Sharma and Aggarwal, Kaston Public.
4. PSG Design data book
- By PSG Publication, Coimbtore
5. Machine Design – An Integrated Approach
-By Robert L. Norton, Prentice-Hall Inc.
6. Fundamentals of Machine Component Design
-By R.C. Juvinall, John Wiley & Sons

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 312E Refrigeration and Air Conditioning (Pract.)

L	T	P/D	Total	Practical	: 25 marks
-	-	2	2	Sessional	: 25 marks
					Duration of Exams. : 03 hours

List of Experiments

1. Study & performance of basic vapour Compression refrigeration cycle.
2. To find COP of water cooler.
3. To study the walk in cooler.
4. To Study & perform experiment on vapour absorption apparatus.
5. Perform the experiment & calculate various. Performance parameters on a blower apparatus.
6. To find the performance parameters of cooling tower.
7. To study various components in a room air conditioner.

8. To find RH of atmosphere air by using Sling Psychrometer and psychrometric Chart.
9. To find performance of a refrigeration test rig system by using different expansion devices
10. To study different control devices of a refrigeration system.
11. To Study various compressors.
12. To find the performance parameters of Ice plant.

Note: The students must perform at least eight experiments.

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 314E Tribology and Mechanical Vibrations (Pract.)

L	T	P/D	Total		
-	-	2	2	Practical	: 25 marks
				Sessional	: 50 marks
				Duration of Exams.	: 03 hours

List of Experiments

1. To study undamped free vibrations of equivalent spring mass system & determine the natural frequency of vibrations.
2. To study the free vibrations of the system for different damper settings. Draw the decay curve and determine the log decrement and damping factor. Find also the natural frequency.
3. To study the torsional vibrations of a single rotor shaft system and to determine the natural frequency.
4. To determine the radius of gyration of given bar by using Bifilar suspension.
5. To verify the Dunker ley's rule.

6. To study the forced vibrations of the system with damping. Plot magnification factor vs. frequency and phase angle vs. frequency curves. Also determine the damping factor.
7. To study the pressure distribution of a journal bearing using a journal bearing apparatus.
8. To determine the rate of wear of a metallic plate from the plot of displacement vs. time curve by using friction and wear monitor apparatus.
9. To determine abrasion index of a material with the help of a dry abrasion test rig.
10. To evaluate the load wear index and the weld point of a lubricant with the help of a four-ball extreme pressure tester.
11. To determine the two frequencies of the torsional spring type double pendulum and compare them with theoretical values.
12. To determine the radius of gyration of a compound pendulum.
13. To determine the radius of gyration of disc using trifilar suspension.

Note: The students must perform at least eight experiments.

B.Tech. (Sixth Semester) Mechanical Engineering

ME- 316E Computer Aided Drafting & Manufacturing (Practical)

L	T	P/D	Total		Practical	: 25 marks
-	-	2	2		Sessional	: 50 marks
					Duration of Exams.	: 03 hours

Note: Practical will base on course No. ME 308E
B.Tech. (Fourth Semester) Mechanical Engineering

MET-210 Production Technology - II

L	T	P/D	Total
3	1	-	4

Theory : 75 marks
Sessional: 25 marks
Duration of Exams.: 03 hours

Unit1.

1. Kinematics of Machine Tools:

Drives in machine tools for rotational movement, stepped and step less drives, mechanical and hydraulic drives, Individual and group drives, selection of extreme values of spindle speed on a lathe, principle of stepped regulation, layout of spindle speeds: A.P., G.P. and Logarithmic progression, kinematics' advantages of G. P. for gear box design, selection of common ratio, Number of steps in a given speed range, design of all geared head stock.

Unit2.

2. Manufacturing Methods:

Characteristics of turret lathes, turret-indexing mechanism, tooling equipment for turrets, tool layout for turrets. Classification of gear production methods, gear generation, gear hobbing gear shaping, gear finishing methods: shaving, burnishing grinding, lapping, honing.

Unit3

3. Unconventional Machining Processes:

Need for unconventional processes, Ultrasonic machining, electrochemical machining, electrochemical grinding, electric discharge machining, electron beam machining, plasma arc machining, laser beam machining their process parameters, principle of metal removal, applications advantages and limitations.

Introduction, classifications of presses and dies, hear action in die cutting operations, center of pressure, mathematical calculation of center of pressure, clearances, cutting forces, punch dimensioning.

Unit4.

4. Machine Tools Vibration and Dynamometry:

Introduction, effects of vibration no-machine tools, cutting conditions, work piece and tools life, sources of vibration, machine tool chatter. Need for measuring forces, basic requirements of measuring techniques, design requirements of dynamometers, 3-divisional turning dynamometer and its calibration, drill dynamometers.