SCHEME OF INSTRUCTION & EXAMINATION

B.E III YEAR (REGULAR)

(PRODUCTION ENGINEERING)

SEMESTER - II

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions Periods per Week L/T	D/P	Scheme of Examination Dura-tion in Hrs	Maximum Marks Univ. Exam	Sessi-onals
		THEORY					
1.	MP 351	Turbo Machinery	**4**	**-**	**3**	**75**	**25**
2.	ME 351	Machine Design	**3/1**	**-**	**3**	**75**	**25**
3.	MP 352	Metal Casting & Welding	**4**	**-**	**3**	**75**	**25**
4.	ME 353	CAD/CAM	**4**	**-**	**3**	**75**	**25**
5.	ME 356	Refrigeration & Air-conditioning	**4**	**-**	**3**	**75**	**25**
		PRACTICALS					
1.	MP 381	Fluid Machinery Lab	**-**	**3**	**3**	**50**	**25**
2.	ME 382	CAD/CAM Lab	**-**	**3**	**3**	**50**	**25**
3.	MP 382	Metal Casting & Welding Lab	**-**	**3**	**3**	**50**	**25**
3.	ME 383	Industrial Visit/Study	**-**	**-**	**-**	**-**	**Gr***
.		**TOTAL**	**24**	**6**	**-**	**550**	**200**

*Excellent/Good/Satisfactory/Unsatisfactory

MP 351

TURBO MACHINERY

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examinations	75 Marks
Sessionals	25Marks

Unit –I

Classification of turbo machines based on type of flow. Impulse and reaction principle Energy transfer in turbo machines Applications of aerofoil theory to turbo machinery blades. Losses in turbo machines. Impact of water jets on stationary and moving curved surfaces. Condition for maximum efficiency.

Unit –II

Introduction to axial and centrifugal compressors and pumps. Single and multistage rotary centrifugal compressors. Calculation of blade angles, work done and efficiencies Classification and working of centrifugal pumps, work done and efficiencies. Specific speed of pump. Cavitations and its effect on performance.

Unit – III

Steam Nozzles and Turbines: Flow through nozzles, Critical pressure ration for maximum flow condition. Classification of steam turbines. Methods of compounding Calculation of blade angles, work done and efficiencies. Re heating and re generation.

Unit –IV

Hydraulic Turbines: classification and working principle of hydraulic turbines Pelton, Francis and Kaplan turbines. Specific speed of turbine and its significance Function of draft tube ad types of draft tubes .Calculation of output, blade angles and efficiencies. Performance and characteristics curves.

Unit –V

Gas Turbines: application of open and closed cycle gas turbines. Analysis of Joule/Brayton cyle. Methods of improving cycle efficiency. Velocity triangles and degree of reaction. Calculation of work done and efficiencies.

Suggested Reading:

1 Yahya. S. D. M. Fundamentals of compressible flow, Wiley Eastern Ltd. 1994
2 Jagdish Lal, Hydraulic Machines, Metropolitan Book Co. 1965
3 Yadav, R. Steam and Gas Turbines, Central Book Depot, Allahabad,1984
4 Cohen and Rogers, Gas Theory, ELBS 1994.

ME 351

MACHINE DESIGN

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examinations	75 Marks
Sessionals	25Marks

Unit –I

Mechanical Springs: Introduction, Different types of springs, Materials used for springs. Helical Springs, Wahl factor, calculation of stress, deflection and energy stored in spring. Design for static and fluctuating loads. Leaf Spring: Stress and Deflection. Nipping of leaf springs. Design for static and fluctuating loads.

Unit –II

Gears Introduction to gear drives, different types of gears, materials used for gears, Spur Gear Design: Bean strength of gear tooth – lewis equation, Wear strength of gear tooth, Dynamic loads on gear tooth – Buchingman equation. Basic design of Helical, Bevel and Worm gears.

Unit –III

Bearings: Introduction, materials used for bearings, Classification of bearings, Viscosity of Lubricant, theory of Hydrostatic and Hydrodynamic lubrication. Design of sliding contact bearings. Design of aerostatic bearings and applications.

Unit –IV

Rolling Contact Bearings: Different types of rolling element bearing sand their constructional details, static load carrying capacity, Dynamic load carrying capacity, Load –life relationship, selection of bearing life. Design for cyclic loads and speeds.

I.C Engine Parts: Introduction , Materials used, design of Piston, Connection rod and Crankshaft of I.C. Engine.

Unit –V

Design of curved beams: Introduction, stresses in curved beams, expression for radius of Neutral axis for rectangular, circular, trapezoidal and T- section. Design of Crane hooks., C-clamps and machine frames.

Suggested Reading:

1. V. Bhandari, Machine Design, Tata Mc Graw Hill Publication, 1977
2. P.C.sharma and D.K. Aggarwal, Machine Design, S.K.Kataria & Sons,2003
3. P. Kannaiah, Machine Design sci-Tech Publications, 2003
4. J.E. Shigley, C. R.Mishkey, Mechanical Engineering Design Tata Mc Graw Hill Publications,2003

MP 352

METAL CASTING & WELDING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examinations	75 Marks
Sessionals	25Marks

Unit –I

Moulding sands, patterns, cores and moulding methods, machine moulding-jolt, squeeze. Gating system design, Risers and design, melting practices of Aluminium low carbon steels using furnaces – cupola, induction and direct are furnace.

Unit –II

Special casting process – Die casting, Shell moulding, Co_2 process, investment casting and centrifugal casting. Common defects in casting –causes and remedies. Inspection and testing methods of casting.

Unit –III

Welding process: Solid state welding(Friction, Forge, Explosive and ultrasonic welding), Gas welding, Brazing, Soldering, Arc welding processes –SMAW, SAW,GMAW, GTAW, Atomic hydrogen and plasma arc welding. LBW,EBW, Thermit welding Electro-slag welding

Unit –IV

Resistance welding process and its variation, welding aspects of low carbon steels stainless steels, Aluminium alloys and the welding metallurgy concerning weld ability of those materials.

Unit –V

Weld defects, weld ability test – Cruciform test, ring weld ability test.
Plastics: Thermoplastics, thermosetting plastics and their applications, plastic moulding process.

Suggested Reading:

1.P.N .Rao ,Manufacturing Technology, Tata Mc Graw Hill Publ., 2nd Ed.,1990
2.Amitabh Ghosh & Mallick ,Manufacturing Science ,Assoc.East West Press pvt.Ltd.4th Ed.,1991.
3.Roy A .lindberg,Materials & Process of Manufacturing ,Prentice Hall of India , 5th Ed.1992
4.Parmer ,R.S.,"Welding Engineering and Technology ".Khanna Publishers,1997.

ME 353

CAD/CAM

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examinations	75 Marks
Sessionals	25Marks

Unit –I

CAD Fundamentals: classification and basic elements of CAD workstation hardware. Brief description of graphic input and output device. Hardware integration and networking.
CAD Software: Definitions of system software and application software. OS Kernel and utilities .CAD database and structure.
2-D draughting techniques: Basic geometric elements and their creation, automatic 2-D facilities, transformations and there mathematics.

UNIT-II

Geometric modelling: 3-D wore frame modelling: wire frame entities and their definition .Interpolation and approximation of curves .concept of parametric and non-parametric representation of curves, synthetic curves and curve fitting . Definitions of Bezier,
B-spline and cubic spline curves.
Surface modelling: Definitions of basic surface. Surface of revolution, blends, intersection, analytic and sculptured surfaces.

Solid modelling: Solid entities, Boolean operations, B-rep and C-rep approaches.
Brief description of design applications : Mechanical tolerance, property calculations, finite element analysis design review.

UNIT-III
Numerical Control of Machine tools: Features and elements of NC .Positional, paraxial and contouring types. Definitions of axes, punched type, formats of tape preparation. Definitions of interpolation ,post processor ,preparatory and miscellaneous functions ,canned cycles ,tool length and cutter radius compensation. Manual and computer aided post programming (APT) for simple components .Programming with MACROS.

UNIT-IV
Computer Numeric Control: Development in MCU technology .Machining centres. CNC and adaptive control systems .Typical configurations and relative features.
Industrial Robots: Classification based on manipulator configurations, relative characteristics on-line programming methods, controls, drives and applications.

UNIT-V
C.I.M : Group Technology ,part classification and coding systems of G.T. layout.
CAPP: Typical approaches and their relative features. Basic concepts of FMS, Experts systems ,Artificial Intelligence .Application of computer in management, in process measurement ,quality control ,inspection and testing CAD/CAM integration.

Suggested Reading:

1. Ibrahim Zeid. CAD/CAM, Theory and Practice ,McGraw Hill Inc. New York, 1991
2. Grover ,MP and Zimmers E.W.,CAD/CAM, Prentice Hall of India ,1989.
3. P.N.Rao N.K. Tiwari T.K. Kundra .Computer Aided Manufacturing, Tata McGraw Hill ,New Delhi,1993
4. Yoram Koren,Computer Control of Manufacturing systems, McGraw Hill Int. New York, 1994

ME 356

REFRIGERATION & AIR CONDITIONING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examinations	75 Marks
Sessionals	25Marks

UNIT-I
Introduction to Refrigeration: Definition of refrigeration and air conditioning, necessity of refrigeration and its application. Methods of refrigeration, unit of refrigeration and COP. Reversed Carnot cycle-limitations, effect of operating temperatures.
Properties of Refrigerants: Survey, designation, Desirable properties of Refrigerants, Thermodynamics, chemical and physical properties. Classification of refrigerants- Halo-Carbon, Inorganic, Hydrocorbon and azetropes .Secondary refrigerants –Brines .Alternative Refrigerants, substiture for CFC refrigerants .Global warming, Green house effect and future of Refrigerants.

Air Refrigeration system: Analysis of Bell Coleman cycle/reserved Brayton cycle, open and dense air system. Application to aircraft refrigeration – simple cooling system. Bootstrap simple evaporative system, regenerative cooling system and reduced ambient cooling system.

Unit – II

Introduction to vapour compression refrigeration system: Working principle and essential component of a simple vapour compression refrigerator – compressor, condenser, evaporator and expansion devices. Analysis of the cycle COP – Representation on T – S P – H Charts.

Dry and wet compression, effect of operating conditions like – evaporating pressure, condenser pressure, liquid sub cooling and vapour super heating – performance of the system.

Low temperature refrigeration system (with single load system) – compound compression with water inter cooler and flash inter cooler with single expansion valve. Cascade refrigeration system – analysis advantages.

Unit – III

Vapour absorption Refrigeration system: Simple absorption system, COP, Practical Ammonia refrigeration absorption system, Lithium Bromide system, Electrolux refrigerator – Salient features, common refrigerant absorbents properties. Comparison with vapour compression system.

Stema Jet Refrigeration System: Principle of working, Analysis of the system, limitations and applications.

Non – Conventional Refrigeration system: Principle and operation of (i) Thermoelectric refrigeration system – seebeck effect, Peltier effect, Thomson effect analysis.(ii) Pulse tube refrigeration system(iii) Vortex tube.

Unit – IV

Introduction to Air Conditioning: Requirements of comfort air conditioning, Thermodynamics of human body, body temperature, metabolism, body defense and human tolerance, effect of heat on performance, ASHRE comfort chart, effective temperature.

Pyschometry: Psychometric properties, Psychometric chart and its construction and representation of Psychometric process on chart – heating & cooling with humidification and dehumidification and adiabatic de humidification, adiabatic chemical dehumidification and mixing process.

Unit – V

Cooling load calculations in air conditioning: Concept of by-pass factor, sensible heat factor, ADP RSHF GSHF, Different cooling and heating loads – heat by conduction, convection and radiation from walls and roofs, direct heat load, heat from occupants, lighting, equipment and product load, processes heat load, infiltration air load, fresh air load and miscellaneous heat loads. – Problems.

Design of air conditioning systems – all fresh air, re–circulated air with by–passed air.

Designing for summer, winter and year around air conditioning processes. Energy conservation in air conditioning building.

Case study of one building with all load calculations.

Air conditioning systems. – Types of Air Conditioning systems, components of A/C equipment – humidifier, de humidifier, filters, grills, fans blowers. Duct layout. Refrigeration and air conditioning applications in (i) food reservation (ii) transport air conditioning and (iii) industrial application.

Suggested Reading:

1. S.C.Arora and S.Domkundwar, A course in refregeration and air conditioning - Dhanpat Rai and Sons, 1996
2. V.K.Jain – Refrigeratin and Air Conditioning – Tata Mc Graw Hill,1989.
3. C.P Arora – Refrigeration and Air Conditioning - Tata Mc Graw Hill,1989.
4. Stocker W.S., "Refirgertion and Air Conditioning", Mc Graw Hill,1958.

MP 381

FLUID MACHINERY LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examinations	50Marks
Sessionals	25Marks

1. Performance characteristics of centrifugal pump.
2. Performance characteristics of Pelton wheel.
3. Performance characteristics of Francis turbine.
4. Performance characteristics of reciprocating pump.
5. Performance characteristics of Kaplan turbine.
6. Performance characteristics of Jet pump.
7. Performance characteristics of axial flow fan.
8. Performance characteristics of centrifugal blower.
9. Determination of COP of vapour compression refrigeration system.
10. Determination of COP of air –conditioning system.

MP 382

CAD/CAM LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examinations	50Marks
Sessionals	25Marks

1. Practice in the use of some of the packages like : Pro-E/I-DEAS/Solid works/MDT/Inventor/CATIA etc., for geometric modeling of simple parts(sketching)

2. Part modeling and assembly of simple parts using any of the above packages.
3. Static structural Analysis using 2D truss/beam/etc., for different types of loads using ANSYS/NASTRAN/ADINA etc.,
4. Dynamic Structural Analysis: modal and harmonic analysis
5. Steady State heat transfer and transient heat transfer analysis.
6. Analysis of typical components like connecting rod, pressure vessel, chimney etc..
7. Facing and turning, step turning, taper tuning, contouring on CNC lathe.
8. Pocketing and contouring on CNC milling machine.
9. Simulation and development of NC code using any CAM software.
10. Programming for integration of various CNC machines, robots and material handling systems.

MP 382

METAL CASTING & WELDING LAB

Instruction	3Periods per week
Duration of University Examination	3 Hours
University Examinations	50Marks
Sessionals	25Marks

Foundry:

1. Study of Foundry equipment and sand reclamation.
2. Testing of greensand properties.
3. Greensand mould making process with complete, sprues, gates and risers designs
4. Melting and casting of Aluminium metal.
5. Making of a shell using shell moulding machine.
6. Study of defects in castings.

Welding:

7. Making of lap joint by resistance welding process and its strength evaluation
8. Study of different types flames in gas welding process.
9. Study of bead geometry in arc welding process

10. Determination of weld characteristics using DC and AC power sources.

11. Study of butt joint strength evaluation by GMAW process.

12. Welding of Aluminium with GTAW process.

MP 383

INDUSTRIAL VISIT/STUDY

A minimum of two industrial visits will be arranged by the department and students have to attend the visits and prepare a detailed report of their visits to the industries and submit to the department. The department evaluates their reports by a committee consisting of Head of the Department and two more members from the Senior Faculty and assigns the Grade*.

* Excellent/ Good/ Satisfactory/ Unsatisfactory