WITH EFFECT FROM THE ACADEMIC YEAR 2004-2005

SCHEME OF INSTRUCTION & EXAMINATION

B.E III YEAR (REGULAR)

(PRODUCTION ENGINEERING)

SEMESTER - I

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	Sessionals
		THEORY					
1.	MP 301	Applied Thermodynamics & Heat Transfer	**4**	**-**	**3**	**75**	**25**
2.	ME 302	Dynamics of Machines	**3/1**	**-**	**3**	**75**	**25**
3.	ME 303	Design of Machine Elements	**3/1**	**-**	**3**	**75**	**25**
4.	MP 303	Machine Tool Engineering	**4**	**-**	**3**	**75**	**25**
5.	MP 304	Metal Forming Technology	**4**	**-**	**3**	**75**	**25**
		PRACTICALS					
1.	MP 331	App. Thermo & HT Lab	**-**	**3**	**3**	**50**	**25**
2.	MP 332	Machine Tool Engineering Lab	**-**	**3**	**3**	**50**	**25**
3.	MP333	Metal Forming Technology Lab	**-**	**3**	**3**	**50**	**25**
		TOTAL	**20**	**9**	**-**	**525**	**200**

MP 301

APPLIED THERMODYNAMICS & HEAT TRANSFER

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

Unit – I

Reciprocating air compressors: Single stage and multi stage compression work done, Efficiency of multi stage compression. Effect of clearance volume on work done and efficiency. After cooling and Inter cooling, Uses of compressed air.

Unit – II

Classification and working principles of Internal Combustion engines. Deviation of actual cycles from air standard cycles, Index of compression and expansion for variable specific heats, performance of IC engines, Testing of IC engines, Heat balance sheet.

Unit – III

Fuel system IC engines . Types of carburettors, Injection pump and injectors. Cooling and Lubrication of IC engines. Theories of combustion, Detonation, Knocking. Design consideration of combustion chamber and cylinder head.

Unit – IV

Basic modes of heat transfer, Laws of heat transfer – Fourier, Newton, Stefan- Boltzman General conduction equation in Cartesian, cylindrical co- ordinates. One dimensional steady state conduction through slabs and hollow cylinders with and without heage generation. Effect of variable thermal conductivity in heat transfer of one dimensional steady state conduction of plates and cylinders. Steady state heat transfer through composite slabs and cylinders. Critical radius of insulation.

Unit – V

Convection: Dimensional analysis and its use in free and forced convection Buckingham theorem, Physical significance of different dimensional numbers. Radiation: Definition of absorptivity, reflectivity and transitivity, Concept of black body and emissivity, Kirchoff's law, Lambert's cosine law, Plank, Wien's and Steffan Boltzmann law. Different types of heat exchangers, simple problems on parallel flow and counter flow heat exchanges and condensers.

Suggested Reading:

1. P.L. Ballney, Thermal Engineering, Khanna Publications, 19th Ed., 1993.
2. J.P. Holman, Heat Transfer, McGraw Hill Publications, 1996
3. Ganeshan, V., Internal Combustion Engines, Tata McGraw Hill Publictions, 1994
4. Vasandani, V.P and Kumar, D. S Heat Engineering, Metropoliatan Book Co.1989.

ME 302

DYNAMICS OF MACHINES

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

Unit – I

Static and dynamic force analysis of Planner Mechanisms: Static and Inertia force analysis of four – bar and slider crank mechanisms. Force in uniformly rotating gears, static force analysis of mechanisms with gears. Force analysis of Hooke's joint.

Unit – II

Porter, Proell, Hartnug, and Hartnell type Governors, speed versus lift curves, Power and stability. Fly Wheels. Gyroscopic effects in shafts, Machines and vehicles.

Unit – III

Forces in Bearings due to rotating shaft carrying several masses in several planes Determination of balance masses from the forces on the bearings, Shaking forces in single cylinder engine, partial balancing of reciprocating engine. Balancing of two cylinder locomotive engine. Balancing of multi-cylinder inline engine and radial engine.

Unit –IV

Vibration of single degree freedom system(axsial and torsional), Natural Frequencies, equivalent system of combination of springs, stepped shaft, Gears and rotors, Damped vibrations due to viscous damping, Relative damping. Forced vibrations due to harmonically applied force, Dynamic magnifier, Resonance, Vibration Isolation. Free transverse vibration of beam, Rayleigh's method, derivation of governing differential equation.

Unit – V

Natural frequencies of two-degree freedom system. Nodes in three rotor system. Modes of Vibration, Numerical and Approximate methods in determining natural frequencies, Holzer's method for multi-rotor system. Dunkerley's method.

Suggested Reading:

1. S.S.Rattan, Thory of Machines, Tata McGraw Hill, 1995
2. John J. Uicker, Jr., Gordon R, Pennok, Joseph E.Shigley, Theory of Machines and Mechanisms, Oxford University Press, 2003.
3. J.S.Rao and Gupta, Theory and Practice of Mechanical Vibrations, Prentice Hall,1984
4. Ghosh and Mallik, Theory of Mechanisms and Machines, Affiliated E-W Press, 1998.

ME 303

DESIGN OF MACHINE ELEMENTS

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

Unit – I

Materials used in machine design and their specifications according to Indian Standards. Important mechanical properties of materials used in design. Codes and standards used in design. Preferred numbers. Value analysis and reliability. Definition of stress and strain. Types of loading. Normal stress, bending stress, Torsional stress, Crushing and bearing stresses. Stresses due to Biaxial and Tri-axial loads. Theories of failure. Introduction to effects of Creep on design life. Factor of safety. Design of components to static loads, Introduction to thermal stresses.

Unit – II

Design of fatigue and impact loads: Fluctuating stresses, fatigue strength and endurance limit. Stress concentration factor and Notch sensitivity. Factors affecting fatigue strength S-N diagram,. Soderberg and Modified Goodman's diagrams for fatigue design. Design of components for fatigue. Cumulative fatigue. Miner's rule. Design of components subjected to impact loading.

Unit – III

Design of keys. Design of shafts: solid, hallow and splined shafts under torsion and bending loads. Design of couplings: Muff, split muff, Flange. Flexible and Marine type couplings.

Unit – IV

Design of Cotter and Knucle joints. Design of belt drive systems, Selection of belts and design of pulleys. Design of chain drives: Power rating of roller chains, Design of sprocket wheels for roller chains.

Unit – V

Design of bolts and nuts, Locking devices, Bolts of uniform strength, Design of gasket jonts, Design of power screws and screw jack. Differential and Compound Screws. Riveted welded joints under direct and eccentric loading.

Suggested Reading:

1. V.Bhandari, Machin Design, Tata McGrawhill Publication,1994
2. P.C. Sharma and D.K. Agarwal, Machine Design, S.K.Kataria & Sons, 2003
3. P.Kannaih, Machine Design sciTech publications,2003
4. J.E. Shigley, C.R Mischke, Nechanical Engineering Design, Tata McGraw Hill Publications, 2003.

MP303

MACHINE TOOL ENGINEERING

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

Unit –I

Outline of cutting forces involved and kinematics schemed for each type of machine tool.

Lathe: Types and constructional features, size of lathe, various operations that can be performed on lathe, Capstan and Turret lathes, Bar work and chuck work and tool holding devices, tool layout for typical jobs on capstan and turret lathes. Automatic and semi automatic Lathes.: Purpose of automats and semi automats, cam drives and their types, single and multi-spindle automats, cycle time calculations, cam design for single components on automatic screw machines. Methods of screw thread production: Taps and dies, chaser, thread rolling and thread cutting machines.

Unit – II

Dirilling Machines: Types and constructional features, purpose and field of application.

Boring Machines Types and constructional features, Milling machines: Classification and types, various operations on milling machines, up and down milling. Types of milling cutters and bars. Dividing head and its applications, single and differential indexing. Gear cutting machine: Methods of gear cutting, Types of classification Gear hobbing and gear shaping machine, Bevel gear cutting.

Unit –III

Shaping, Planning and Slotting machines. Types, Constructional features, types of work done on it. Quick return motion, manipulation of cutting speeds and feeds, work ant tool holding devices, comparison of these machines, grinding machines: Types, Classification. Abrasives and bonds used for grinding wheel, Selection of grinding wheel.

Unit – IV

Orthogonal and oblique cutting: Cutting forces in turning, drilling, milling and grinding. Merchant's analysis, Shear angle, friction angles. Experimental methods for estimation of shear angle, cutting forces and power absorbed during cutting. Chip formation, Shear plane theory and types of chips. Built up edge Phenomena and its effect. Chip breakers. Sources of heat, its distribution and measurement, Different types of cutting fluids.

Unit – V

Tool wear and tool life: Criteria for tool wear, flank and crater wear theories, criteria for tool life in roughing and finishing, measurement of tool wear, Taylor's tool life equation, factors effecting tool life, Machinability. Single pint cutting tool design: Geometry, tool nomenclature, American, DIN, max. rake system. Interrelation between normal rake and orthogonal rake, tool signature, effect of basic tool angles on its performance selection of size and angle of SI tools, form tools. Design features of multipoint cutting tools.

Suggested Reading:

1 Right Baker. Modern WorkShop Technology vol.2.
2 Hazara Choudary, Workshop Technology, vol 2 Media Pub. New Delhi.
3 M.C. Shaw. Metal Cutting Princples, Clarendon Press Oxford,1984
4 B.S.Raghu Vanshi, Work shop Technology, vol 2 Dhanpat Rai, & Co. New Delhi.1998

MP304

METAL FORMING TECHNOLOGY

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

Unit –I

Theory of plastic deformation: Crysto plasticity and thermo plasticity, work hardening of metals, plasticity cycle. Advantages and disadvantages of cold working and hot working, Stress stain relations, Yielding under uni-axial, bi-axial and tri-axial states of stress. Plane stress and plane strain conditions, examples.

Unit –II

Sheet metal working: Classification of presses, specifications and their applications. Sheet metal working operations-shearing, welding, bending, drawing and sequencing operations, estimation of loads and energy required for these operations, Simple and Compound , progressive and combinational tools.

Unit –III

Drawing and Extrusion: Loads required for drawing and extrusion. Homogenous deformation. Maximum reduction in drawing and drawing and extrusion, effect of friction, Die angles, Deformation speeds, die, materials and lubrication in these operations. Hydrostatic extrusion.

Unit –IV

Forgoing: Methods of heating and furnaces. Open and closed die forgoing. Hammers, presses and fogoing machines, their principles of operation and applications, Examples of the design of the forging dies for drop forging, Machine forging and press forging

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Unit –V

Rolling: Principle of metal rolling, Classification and description of rolling equipment and rolling mills. Roll load, torque and mill power following homogenous deformation technique. Rolling procedure for typical shapes.

Suggested Reading:

1. Serope Kalpakjian, Mechanical Processing of Materials, Van Nostrant Co.1967

2. Kamensochikov, Foging Practice, Mir Publications.
3. Jain, R.K.Gupta s.C. Production Technology, Khanna Publications, 1995
4. Roy, A. Lindberg, Materials and Procsses of Manufacture, Prentice Hall of India 1995

MP 331

APPLIED THERMODYNAMICS & HEAT TRANSFER LAB

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

Applied thermodynamics:

1 To determine valve/port timing diagram of diesel/petrol engine.

2 To determine the performance characteristics of multi cylinder petrol engine.

3 To determine the performance characteristics of Diesel engine.

4 Determination of volumetric efficiency and isothermal efficiency reciprocating compressor.

5 To conduct Morse test on Multi cylinder Petrol engine.

Heat Transfer:

1 To determine the thermal conductivity of metal bar.

2 Determination of convective heat transfer coefficient.

3 To determine the heat transfer coefficient in parallel and counter flow heat exchanger

4 To determine the Emissivity of given plate.

5 To determine the value of Stefan Boltzman constant

6 To determine the thermal conductivity of composite wall.

MP 332

MACHINE TOOL ENGINEERING LAB

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

1. Study of various machine tools, their working principles and main operational characteristics.
2. Turning and facing, step-turning operations on lathe machine.
3. Taper turning knurling operations.
4. Thread cutting operations.
5. Measurement of cutting forces during machining on lathe machine, milling machine, grinding machine and drilling machine,.
6. Measurement of tool-chip interface temperatures using thermocouple method.
7. Cutting gear teeth using (a) simple indexing (b) compound indexing and (c) Differential indexing.
8. Machining of slots, groves and flat shapes using slotting and shaping machines
9. Grinding of tool angles using tool and cutter grinder.
10. Conducting tool life tests and finding the index of equation for HSS and Carbide tools.
11. Finding shear angle experimentally in any machining operations.
12. Grinding of flat surfaces using surface grinding machine and measurement of its surface finish using Talysurf.
13. Practice of PCD drilling, counter sinking and tapping.
14. Exposure to operations like Trepanning, Lapping, Honing, Broaching and Buffing.

MP333

METAL FORMING TECHNOLOGY LAB

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

1. Evaluation of True stress – strain characteristics of ferrous and non-ferrous test specimens in a tensile elongation test.

2. Studying the normal anisotropy characteristics of materials.

3. Evaluation of formability of sheet specimens in Erichsen Cupping test.

4. Study of simple dies and performing blanking and piercing operations using mechanical/fly presses and measurement of forces in the operation and comparing with the theoretical loads.

5. Study of compound die and production of a typical component on the same.

6. Study of progressive die and production of a typical component on the same.

7. Study of combination die and production of a cup on the same

8. Drawing operation to produce cup in a hydraulic press and measurement of load during the operation and comparing with the theoretical loads.

9. Demonstration of wire drawing operation.

10. Demonstration of extrusion of lead material.

11. Forging practice.

12. Sheet metal dies operations for bending.

13. Computer simulation of typical forming operations.