JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)
Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)
Scheme of Study and Examination (w.e.f. July 2010)

B.E. Second Year   **Branch : Industrial Production**   **Sem :Third**

Course Code	Subject	L	T	P	TA	CT	TOT	ESE	SUB TOTAL	Credits
					SESSIONAL EXAM					
MA-03	Mathematics - III	3	1	-	10	20	30	70	100	4
IP-01	Mechanics of Materials	3	1	-	10	20	30	70	100	4
IP-03	Production Process	3	1	-	10	20	30	70	100	4
IP-04	Thermodynamics	3	1	-	10	20	30	70	100	4
IP-06	Machine Drawing & Design	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
IP-02L	Mechanics of Materials Lab	-	-	2	20	-	20	30	50	2
IP-05L	Thermodynamics Lab	-	-	2	20	-	20	30	50	2
IP-07L	Machine Drawing & Design Practice	-	-	2	20	-	20	30	50	2
CS-40L	Java & MatLab	-	-	2	20	-	20	30	50	2
IP-47L	Self Study/ Professional Activity	-	-	2	50	-	50	-	50	2
IP-48L	Seminar/Group Discussion	-	-	2	50	-	50	-	50	2
	Total	15	5	12	230	100	330	470	800	32

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 800
Total Periods : 32, Total Credits : 32

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	MATHEMATICS- III	MA03	Min "D"	Min "D"	5.0

MATHEMATICS – III

Unit – I : Fourier Series : Conditions for a fourier expansion, having finite number of discontinuities, change of interval and half- rang series.
Laplace transform and inverse Laplace transform of simple functions, their elementary properties and application in solution of ordinary differential equations.

Unit – II : Analytic functions, Harmonic conjugates, Cauchy-Reimann equations, line integral, cauchy's theorem, Cauchy's integral formula, poles, residues, Residues theorem, evaluation of real integral, Bilinear transformation.

Unit – III : Difference operators, errors and approximation, interpolation (Newtons interpolation formulae, Central interpolation formulae, Lagranges interpolation, Newtons divided difference interpolation – formula inverse interpolation.
Numerical differentiation, maxima and minima.

Unit – IV : Numerical integration by using simpson's method, weddels rule, Gauss-Legendre open quadrature formula.
Solution of algebraic and transcendental equations by using Regula-Falsi, Newton-Rephson, iterative, Graffes root squaring method, Bairstow's method.

Unit – V : Solution of simultaneous algebraic equatins by using gauss elimination, Gauss-Jorden, Crout's jacobbi iterative, Gauss-siedal, Relaxation methods.
Solution of ordinary differential equations (Taylor series, Picard's Modified Euller method, Runge-kutta, predictor corrector method.)

References :
1. Laplace transform, by R.V. Churchill
2. Higher Engineering Mathematics by B.V Ramanna, TMH
3. Advanced Engineering Mathematics by Kreysizig E, willey Eastern Limited.
4. Introductory Methods of Numerical Analysis by S.S. Sastry
5. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	MECHANICS OF MATERIALS	IP01	Min "D"	Min "D"	5.0

Unit-I : **Mechanical Properties of Materials:** Ductility, malleability, hardness, toughness, fatigue, creep, behavior of materials under tension, compression, bending, shear, ductile and brittle materials, failure of MS and CI in tension and torsion, ductile and brittle failures.
Stress and strain: stresses in members of a structure, axial loading, normal stress, shear stress, bearing stress, analysis of simple structures, stress on oblique plane under axial loading, stepped rods, members in series and parallel, stress strain diagram, Hooke's law, modulus of elasticity, elastic and plastic behavior of materials, deformation under axial loading, statically indeterminate problems, stress due to temperature, Poisson's ratio, Bulk modulus, shear strain, relation among elastic constants, residual stress, fiber reinforced composite materials.

Unit-II : Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and

its application to two dimensional analysis, Shear force and BM diagram for various types of loading, stresses in thin walled pressure vessel.

Unit-III :**Bending:** pure bending, symmetric member, deformation and stress, bending of composite

sections, eccentric axial loading, beams of unsymmetrical sections, shear stresses in beams, distribution of shear stresses. Deflection of beams, moment area method,

Unit-IV : Torsion in shafts: stresses in a shaft, deformation in circular shaft, angle of twist, stepped hollow,

thin walled-hollow transmission shafts, transmission shaft under combined bending and torsion;
Leaf springs; helical springs, open and closed coil, stress in spring wire, deflection of helical spring, springs in series and parallel.

Unit-V : Theories of failures: maximum normal stress & shear stress theory; maximum normal and shear

strain energy theory; maximum distortion energy theory; application of theories to different materials and loading conditions Columns: stability of structures, Euler's formula for columns with different end conditions, Rankin's formula.

References:
1. Beer FP, Johnson ER, Dewolf JT : Mechanics of Materials; TMH
2. Rattan; Strength of materials; TMH
3. Nash William; Schaum's Outline of Strength of Materials; TMH.
4. Negi ; strength of materials; TMH
5. Singh Arbind K; Mechanics of Solids; PHI
6. Strength of Materials, Sadhu Singh,
7. Kamal K and Ghai RC; Advanced Mechanics of Materials; Khanna Pub.

List of experiments (Pl. expand it):
1. Standard tensile test on MS and CI test specimen
2. Direct/ cross Shear test on MS and CI specimen
3. Transverse bending test on wooden beams to obtain modulus of rupture
4. Fatigue test
5. Brinell Hardness tests
6. Vicker hardness test
7. Izod/ Charpy impact test

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	PRODUCTION PROCESSES	IP03	Min "D"	Min "D"	5.0

Unit-I

Melting Practices Cupola, capacity of a cupola, cupola operation, zones of cupola, cupola Efficiency, melting furnaces for non-ferrous metals, classification of crucible furnaces, gating system, pouring basin, sprue, runner, gates, types of gates, riser, gating design, numerical simulation, main consideration in design and position of risers, types of risers, feeder location and shapes use of exothermic materials, use of chills.

Unit-II

Solidification and Special casting process: Solidification of casting, permanent mould Casting, slush casting, die casting, centrifugal casting, investment casting, continuous casting, casting defects and their remedies, cleaning of castings, repair of casting, inspection of casting. Solid modeling of castings.

Unit-III

Metal Forming: Nature of plastic deformation, stress-strain relation in elastic and plastic deformation, concept of flow stress, deformation mechanism, hot and cold working, rolling principal, rolling stand arrangement, roll passes, breakdown passes, roll pass sequence, analysis of rolling.

Unit-IV

Abrasive processes: Grinding wheel, specification, characteristics, abrasive types, grinding operations, cylindrical grinding, surface grinding, centre less grinding, form grinding, internal cylindrical grinding, wheel balancing, dressing and truing, honing, Lapping, super finishing, polishing and buffing.

Unit-V

Forging, Extrusion and other Processes: Forging operations, forging design, drop forging die design, die inserts.

Extrusion- principle, forward and backward extrusion, extrusion analysis, impact extrusion, hydrostatic Extrusion, extruding tubes

Wire drawing- Rod and tube drawing, tube making, swaging, drawing analysis.

References:
1. Rao P.N; Manufacturing Technology-foundry, formin; TMH Publishing House
2. Ravi B; Metal casting- CAD and Analysis; PHI Publishing House
3. Jain P.L; principles of foundry technology; TMH Publishing House
4. Hennie & Roshanthall; Metal casting; Mcgraw Hill New York
5. Chambell J.S; Manufacturing Science; Mcgraw Hill New York

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	THERMODYNAMICS	IP04	Min "D"	Min "D"	5.0

Unit I

Basic concepts: Concept of an ideal gas, gas laws, Avogadro's hypothesis, heat and work transfer. First law of thermodynamics- Statement of first law of thermodynamics, first law applied to closed system, first law applied to a closed system undergoing a cycle, processes analysis of closed system, flow process, flow energy, steady flow process, relations for flow processes, and limitations of first law of thermodynamics.

Unit II

Second law of thermodynamics, heat engine, heat reservoir, refrigerator, heat pump, COP, EPR, available energy, Carnot's theorem, Carnot's cycle, efficiency of Carnot's cycle, statement of second law reversible and irreversible processes, consequence of second law, entropy, entropy change for ideal gas, T-S diagrams, availability and irreversibility. Gibbs and Helmholtz functions.

Unit III

Real gas, deviation with ideal gas, Vander-wall's equation, evaluation of its constants, limitations of the equation. The law of corresponding states compressibility factor, generalized compressibility chart, P-V-T surface of a Real gas, thermodynamics relations, Maxwell relations and their applications.

Unit IV

Pure Substance, phase, phase-transformations, formation of steam, properties of steam, PVT surface, HS, TS, PV, PH, TV diagram, processes of vapor measurement of dryness fraction, use of steam table and Mollier chart.

Unit V

Air standard cycles, Carnot, Otto, Diesel, Dual cycles and there comparison, two stroke and four stroke engines, Brayton cycle, non reactive gas mixture, PVT relationship, mixture of ideal gases, properties of mixture of ideal gases, internal energy, enthalpy and specific heat of gas mixtures, enthalpy of gas- mixtures.

References:
1. P.K.Nag; Engineering Thermodynamics; TMH
2. Van GJ; Thermodynamics; John Wylen
3. Cengel Y; Thermodynamics; TMH
4. Arora CP; Thermodynamics; TMH
5. Engineering Thermodynamics by Omkar Singh New Age International.
6. Engineering Thermodynamics by Ratha Krishanan PHI India Pvt. Ltd.
7. Engineering Thermodynamics by M. Achuthan, PHI India.

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	MACHINE DRAWING & DESIGN	IP06	Min "D"	Min "D"	5.0

MACHINE DRAWING & DESIGN

UNIT I:

Drawing conventions, drawing and dimensioning IS codes, sectional views and sectioning, surface finish and tolerances, representation of machine parts such as external and internal threads, slotted heads, square ends, and flat radial ribs, slotted shaft, splined shafts, bearings, springs, gears. Rivet heads and riveted joints, types of welded joints and representation.

UNIT II

Assembly Machine Drawing: Basic concept, plotting technique, assembly and blow up of parts, bill of materials, product data. Cotter and knuckle joints, pedestal and footstep bearings, crosshead, stuffing box, IC engines parts- piston and connecting rods, lath machine parts.

UNIT III

CAD software for 2D and 3D modeling, basic design concepts, design process, stages/phases in design, flowchart, problem formulation, design considerations (strength, manufacturing, maintenance, energy, environment, economics and safety), design for recycle and reuse, design and safety factors for steady and variable loads, impact and fatigue considerations, reliability and optimization, standardization in design.

UNIT IV

Design of components subject to static loads: Riveted joints, welded joints, threaded joints, pin, knuckle, and cotter joints.

References:
1. Bhat, ND; Machine Drawing; Charotar
2. Singh A; Machine Drawing; TMH
3. Narayana and Reddy; Machine Drawing; New age, Delhi.
4. Agarwal and agrawal; Engineering Drawing; TMH
5. Shigley JE et al; Mechanical Engineering Design, TMH
6. Kulkarni SG; Machine Design; TMH
7. Mubeen and Mubeen; Machine Design.
8. Luzzader WJ, Duff JM; Fundamental of Engg Drawing and Interactive Graphics; PHI.

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	MECHANICS OF MATERIALS LAB	IP02L	Min "D"	Min "D"	5.0

LIST OF EXPERIMENTS (EXPANDABLE)

1. Standard tensile test on MS and CI test specimen
2. Direct/ cross Shear test on MS and CI specimen
3. Transverse bending test on wooden beams to obtain modulus of rupture
4. Fatigue test
5. Brinell Hardness tests
6. Vicker hardness test
7. Izod/ Charpy impact test

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	THERMODYNAMICS LAB	IP05L	Min "D"	Min "D"	5.0

List of Experiments (Expandable):

1. To find mechanical equivalent of heat using Joules apparatus
2. To study working of impulse and reaction steam turbine by models.\
3. To study working of Gas turbines by models and to identify various processes of Brayton Cycle.
4. To calculate COP of vapor compression refrigeration system and to plot on T-s, p-H diagrams.
5. To plot specific fuel consumption versus rpm diagrams for diesel and petrol engines

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	MACHINE DRAWING & DESIGN PRACTICE	IP07L	Min "D"	Min "D"	5.0

List of Experiments:

1. Introduction to Compute Aided Drafting software for 2D and 3D Modeling

2. Computer Aided Drafting of simple machine parts

3. 3D Modeling of simple solid shapes

4. Design and drawing of parts contained in the syllabus

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	JAVA & MATLAB	CS40L	Min "D"	Min "D"	5.0

JAVA & MATLAB

(A) JAVA

Introduction

- Creation of Java, importance of Java to internet, Java buzzwords
- JVM –The heart of Java, Java's Magic Byte code

Language Fundamentals

The Java Environment:, Installing Java.**,** Java Program Development**,** Java Source File Structure**,** Compilation

- Executions.

Basic Language Elements:

- Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data types, Operators, Assignments.
- Console Input and output in java, Branch control and loop control statements

Object Oriented Programming: Class Fundamentals.**,** Object & Object reference, Creating and Operating Objects.

- Constructor & initialization code block., Use of Modifiers with Classes & Methods.

Extending Classes and Inheritance: Use and Benefits of Inheritance in OOP**,** Types of Inheritance in Java

- Inheriting Data Members and Methods, Interfaces.

Exception Handling: The Idea behind Exception**,** Exceptions & Errors**,** Types of Exception

- Use of try, catch, finally, throw, throws in Exception Handling.

Thread : Understanding Threads**,** Needs of Multi-Threaded Programming.**,** Thread Life-Cycle

(B) MATLAB

Introduction to Matlab : Menus and the toolbar , Computing with Matlab , Script files and the Editor Debugger

- o Programming in Matlab

Arrays : Arrays , Multidimensional Arrays , Element by Element Operations , Cell Arrays , Structure Arrays

Functions & Files : Elementary Mathematical Functions , User Defined Functions ,Advanced Function Programming

- Working with Data Files

Programming Techniques : Relational Operators and Logical Variables , Logical Operators and Functions

- Conditional Statements , Loops ,The Switch Structure

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	SELF STUDY/ PROFESSIONAL ACTIVITY	IP47L	Min "D"	Min "D"	5.0

Objective of Self Study : is to induce the student to explore and read technical aspects of his area of interest/ hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

COURSE CONTENT & GRADE   (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	**P**	
	SEMINAR/GROUP DISCUSSION	IP48L	Min "D"	Min "D"	5.0

Objectives of Group Discussion & Seminar is to improve the Mass Communication and Convincing/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.