# 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 2011)**

**BE (PTDC) First Sem. Branch : Mechanical Engineering**

| Course Code | Subject | Periods | | | EVALUATION SCHEME | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | SESSIONAL EXAM | | | ESE | SUB TOTAL | |
| | | | | | TA | CT | TOTAL | | | |
| MA01 | Engineering Mathematics - I | 3 | 1 | - | 10 | 20 | 30 | 70 | 100 | 4 |
| CS-03 | Basic Computer Programming | 3 | 1 | - | 10 | 20 | 30 | 70 | 100 | 4 |
| ME-06 | Solid Mechanics - I | 3 | 1 | - | 10 | 20 | 30 | 70 | 100 | 4 |
| ME-08 | Thermodynamics | 3 | 1 | - | 10 | 20 | 30 | 70 | 100 | 4 |
| **(PRACTICAL/DRAWING/DESIGN)** | | | | | | | | | | |
| CS-04L | Computer Programming Lab | - | - | 2 | 20 | - | 20 | 30 | 50 | 2 |
| ME-07L | Solid Mechanics -I Lab | - | - | 2 | 20 | - | 20 | 30 | 50 | 2 |
| ME-09L | Thermodynamics Lab | - | - | 2 | 20 | - | 20 | 30 | 50 | 2 |
| ME-59L | Self Study/ Professional Activity | - | - | 2 | 50 | - | 50 | - | 50 | 2 |
| | **Total** | **12** | **4** | **8** | **150** | **80** | **230** | **370** | **600** | **24** |

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 600 Total Periods : 24, Total Credits : 24

# 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 | |
| B.E. Common | **ENGINEERING MATHEMATICS - I** | MA01 | Min "D" | Min "D" | 5.0 |

## ENGINEERING MATHEMATICS-I

**UNIT-I** Expension of function Maclaurin's and Taylor's theorem. Partial differentiation, total differential coefficients, homogeneous function, Euler's theorem, approximation and error. Differentiation under integral sign. Maxima and Minima of two variables. Curve tracing (Cartesian and polar curve), Curvature, Radius of Curvature.

**UNIT-II** Definite integral as limit of a sum, Application summation of series. Double interals, Change of order of integrals. Triple integral, Length of curves, Area Voulme of surfaces using double and triple integrals Beta and Gamma functions.

**UNIT-III** Ordinary differential equation of first order. Linear and higher degree. Linear higher order differential equation with constant coefficients. Homogeneneous linear differential equation. Simultaneous differentia equations.

**UNIT-IV** Rank of Matrix Solution of simultaneous equation by elementary transformation & consistency of equation Eigen values and Eigen vactors, Cayfey Hamilton theorem and its application to find the inverse Diagnolisation of matrices.

**UNIT-V** Boolean algebra Algebra of logic. Principle of Duality Basic theorems, Boolean Expressions and functions. Graph theory.Graph subgraphs, degree and distance Tree,cycles and nNetwork Elementry concept of fuzzy logic.

**Reference Books:-**


1. Higher Engineering Mathematics by B.V. Ramana TMH.
2. Higher Engineering Mathematics- By B.S. Grewal.
3. Engineering Mathematics.By K.A.Laxminarayan. Vikas pub. House Pvt.Ltd.
4. Advance Engineering Mathematics-Erwin Kreyszig.John Willy & sons.
5. Advance Engineering Mathematics-Wylie and Barrett.TMH.
6. Differential Calculus by Gorakh Prasad pothi shala publication.
7. Integral Calculus by Chandrika Prasad pothi shala publication.

# 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 | |
| B.E. Common | **BASIC COMPUTER PROGRAMMING** | CS03 | Min "D" | Min "D" | 5.0 |

## BASIC COMPUTER PROGRAMMING

**UNIT - I**

Computer Hardware - Block diagram of computer Hardware, Software and Firmware Interaction of Hardware and Software, Understanding the Boot Process, General function of CPU, ALU, Control unit and memory. The Motherboard. BIOS, Multimedia Devices and Mass Storage

**UNIT- II**

History of C , Characteristics of C, C Program Structure , Constants, Data types, Variables, Keywords ,Console Input/Output Statements, Compilation and Execution Operators. Arithmetic, Unary Assignment, Relational & Logical Conditional Branching & Looping Statements - if Statement ,switch Statement ,Looping Concepts , for ,while , do-while loop Jump Statements. Arrays-Array Concepts, Rules & Restrictions, Single & Multi-Dimensional arrays

**UNIT - III**

Functions- Types of Functions, Functions and Arrays, Function Prototyping Scope of Variables Built-in Functions, Strings- String Functions, String Manipulation Structures-Defining New Data types, Unions ,Type Casting, Enumerated Data types ,Static Variables ,Type Definition.

**UNIT – IV**

Pointers-Pointer Concepts, Pointers and Functions, Pointers and Arrays, Array of Pointers Static Initialization, Pointers and Structures, Illegal indirection Dynamic Memory Allocation and Data Structures-malloc(),sizeof() and free() calloc() and realloc()

**UNIT - V**

C++ Characteristics Object-Oriented Terminology. Differences between Object-Oriented programming and Procedure oriented programming Object, Class, Encapsulation, Inheritance, Polymorphism, Object-Oriented Paradigm Abstract Data Types. Member Functions Class structure, Class scope, this pointer. Friend function.

**Reference Books:**


1. C Programming Language by Karnighan & Ritchie, TMH Pub.
2. Complete Reference in C, by Herbert Schield TMH Pub.
3. Mastering Turbo C by Kelly & Bootle – BPB Pub.
4. Practical C Programming by Steve Oualline, O'Reilly. Shroff Pub. & Distributors Pvt. Ltd.
5. Let us 'C' by Yashwant Kanetkar, BPB Publication
6. C Language Programming by Byron Gottfried – TMH Pub.
7. Programming in ANSI C by Balaguruswamy, TMH Pub.
8. Pointers in C by Yashwant Kanetkar
9. The Complete PC Upgrade &Maintenance Guide by Mark Minasi - BPB Pub

# 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 | |
| | **SOLID MECHANICS-I** | ME06 | Min "D" | Min "D" | 5.0 |

## SOLID MECHANICS -I

**UNIT – I :**
Tension and Compression within Elastic Limit, The Tensile Test Diagram, Working Stress. Stress and strain Produced in a Bar by its own weight, statically Indeterminate problems in Tension and Compression, Assembly and Thermal Stresses, Extension of a Circular Ring.
Analysis of Stress and strain, stress on inclined planes for simple tension and compression Mohr' Circle, Tension or compression in two perpendicular directions. Mohr's circle for combined stresses, principal stresses, lateral contraction, strain in the case of tension or compression in two perpendicular directions. Pure shear, modulus shear, working stresses in shear.

**UNIT – II :**
Stresses in laterally loaded symmetrical beams. Pure bending various shapes of cross sections of beams. Laterally loaded symmetrical beams. Shearing stresses in bending. Distribution of shearing stresses in circular cross section shearing stresses in I beams principal, stresses in bending, stresses in built up beams. Pure bending of beams in a plane which is not a plane of symmetry, bending of beams having two planes of symmetry, Bending of beam in a principal plane which is not a plane of symmetry.

**UNIT – III :**
Defection of laterally loaded symmetrical beams, Differential equation of the deflection curve. Deflection of simply supported beams. Cantilever beams, overhanging beams, Determination of deflections by Area-moment method. Method of superposition, Macaulay method, conjugate beam method, effect of shearing force on the defection of beams.
Strain energy in tension, compression, shear and impact, strain energy due to principal stresses strain energy due to principal stresses. Strain energy in bending, Castiglino's theorem, Maxwell's reciprocal theorem.

**UNIT – IV :**
Shaft, Torsion of circular solid and hollow shafts. Combined bending and Torsion of solid and hollow circular shafts, Theory of columns and struts, Bending by tension or compression, eccentric loading, eccentric compression of slender symmetrical column, critical load, limitation of Euler's method, Rankine-Gordon Formula Johnson's parabolic formula, Perry-Robertson formula straight line formula.

**UNIT – V :**
Thin pressure vessels, thin cylinder under internal pressure, thin spherical shell under internal pressure, cylindrical shell with hemispherical ends, Volumetric Strain, Tube under combined loading wire, winding of thin cylinders, Rotational stresses in thin cylinders.
Rotating Disc of uniform thickness, solid disc, disc with central hole, disc of uniform strength, Temperature stresses in uniform disc.

**References :**


1. Mechanics of Materials – James M. Gere
2. Introduction to Solid Mechanics – Irving H. Shames
3. Engineering Mechanics of Solids – Egor P. Popov
4. Strength of Materials – G.H. Ryder
5. Mechanics of Material Vol I & II – E.J Hearn
6. Strength of Materials Vol I & II – S. Timoshenko

# 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** | ME08 | Min "D" | Min "D" | 5.0 |

## THERMODYNAMICS

**UNIT – I** : Basic concepts : Concept of an ideal gas, Gas laws, Avogadro's hypothesis, Heat and work transfer . First law of thermodynamics. 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, 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. Gibons 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. Engineering Thermodynamics by P.K.Nag; TMH Pub
2. Thermodynamics by Van GJ; John Wylie Pub.
3. Thermodynamics by Cengel Y; TMH Pub.
4. Thermodynamics by Arora CP; TMH Pub.
5. Thermal Engineering by R.Yadav
6. Engineering Thermodynamics by Omkar Singh New Age International.
7. Engineering Thermodynamics by Ratha Krishanan PHI India Pvt. Ltd.
8. Engineering Thermodynamics by M.Archuthan, 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 | |
| B.E. | **COMPUTER PROGRAMMING LAB** | CS04L | | | |

## COMPUTER PROGRAMMING LAB
## (Suggested Exercise)

1. Write a program in C to CALCULATE Cos(X)=1-X^2/2!+X^4/4!-……..
2. Write a program in C to convert sentence lower case to upper case
3. Write a program in C for COUNTING THE NUMBER OF OCCURRENCE OF CHARACTER IN A STRING.
4. Write a program in C to SUM OF POSITIVE AND NEGATIVE ELEMENTS IN AN ARRAY
5. Write a program in C to reverse a string.
6. Write a program in C to calculate the string length
7. Write a program in C to count vowels
8. Write a program in C to calculate x power n
9. Write a program in C fir swapping 2 numbers (using2 variables)
10. Write a program in C to SWAP FIRST AND SECOND WORDS in a sentence.
11. Write a program in C to CHANGE THE CASE OF FIRST LETTER
12. Write a program in C for GENERATION OF ARMSTRONG NUMBERS.
13. Write a program in C for GENERATION OF FIBONACCI SERIES
14. Write a program in C to SUM OF DIGITS OF NUMBER
15. Write a program in C to FIND THE OF NCR A NUMBER.

# 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 | |
| | **SOLID MECHANICS LAB - I** | ME07L | Min "D" | Min "D" | 5.0 |

## SOLID MECHANICS LAB-I
## (Suggested Exercise)

1. Study of UTM machine.
2. Estimation of proof stress for ductile and wood by four point method
3. Tensile Test on Brittle and ductile material.
4. Shear Test
5. Torsion Test
6. Impact Test
   (a) Charpy Test
   (b) Izod Test
7. Hardness Test
   (a) Brinell Hardness
   (b) Vickers Hardness
   (c) Rockwell Hardness
8. Study of failures in ductile material and brittle materials.
9. Study of cement testing machine
10. Compression test on cement stock
11. Compression test on wood (Along the grain & across the grain)

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

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|---|---|---|---|---|---|
| | | | T | P | |
| | **THERMODYNAMICS LAB** | ME09L | Min "D" | Min "D" | 5.0 |

## THERMODYNAMICS LAB
## (Suggested Exercise)

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 vapour compression refrigeration system and to plot on T-s, p-H diagrams
5. To plot specific fuel consumption versus RPRR 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 | |
| | **SELF STUDY/ PROFESSIONAL ACTIVITY** | ME59L | 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.