SEMESTER II
COURSE CONTENTS

Course Code	**BSC 104**				
Category	**Basic Science Course**				
Course Title	**Mathematics – II** **Contents** **Calculus, Ordinary Differential Equations and Complex Variable (Option 1) for All branches excluding CSE** **Probability and Statistics (Option I1) for CSE**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester**
	3	**1**	**0**	**0**	**II**
Pre-requisites	**Elementary Knowledge of calculus, Probability and Statistics**				

MATHEMATICS - II

……

CALCULUS, ORDINARY DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLE (OPTION 1) for All branches excluding CSE 40 Lectures

……

Module 1: **Multivariable Calculus (Integration): 10 Lectures**

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities);Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

Module 2: First order ordinary differential equations: 06 Lectures

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module 3: Ordinary differential equations of higher orders: 08 Lectures

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module 4: Complex Variable - Differentiation: 08 Lectures

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Module 5: Complex Variable - Integration: 08 Lectures

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Textbooks/References:

- G.B. Thomas & R.L. Finney, Calculus & Analytic geometry, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
- S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, PHI, 1995.
- E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
- J. W. Brown & R. V. Churchill, Complex Variables & Appln, Mc-Graw Hill, 2004.
- N.P. Bali and Manish Goyal, Engineering Mathematics, Laxmi Pub, Reprint, 2008.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

COURSE OUTCOME

To familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables.

To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

……

……

PROBABILITY AND STATISTICS (OPTION 2) FOR CSE ONLY 40 Lectures

……

Module 1: Basic Probability: 12 Lectures

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Module 2: Continuous Probability Distributions: 04 Lectures

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Module 3: Bivariate Distributions: 04 Lectures

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

Module 4: Basic Statistics: 08 Lectures

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation

Module 5: Applied Statistics: 08 Lectures

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Module 6: Small samples: 04 Lectures

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Textbooks/References:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

COURSE OUTCOME

- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To introduce effective mathematical tools for the solutions of differential equations that model physical processes.
- To introduce the tools of differentiation and integration of functions of complex variable that is used in various techniques dealing engineering problems.

……

Course Code	**BSC 105**				
Category	**Basic Science Course**				
Course Title	**Course contents in Physics** (i) Introduction to Quantum Mechanics for Engineers – For EEE, CSE (ii) Semiconductor Optoelectronics – For ECE (iii) Mechanics of Solid – For Civil, ME, MEMS (iv) Optics & Fiber Optics – For Chemical Engineering				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester II**
	2	**1**	**0**	**3**	
Pre-requisites	Mathematics course on differential equations and linear algebra Introduction to Electromagnetic Theory Semiconductor Physics				

Physics-II

……

INTRODUCTION TO QUANTUM MECHANICS FOR ENGINEERS For EEE, CSE

38 Lectures

……

Module 1: Wave nature of particles and the Schrodinger equation 8 Lectures

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle

Module 2: Mathematical Preliminaries for quantum mechanics 5 Lectures

Complex numbers, Linear vector spaces, inner product, operators, eigenvalue problems, Hermitian operators.

Module 3: Applying the Schrodinger equation 7 Lectures

Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, square-well potential, linear harmonic oscillator.

Module 4: Bound Quantum States **10 Lectures**

Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials Scattering from a potential barrier and tunneling. Three-dimensional problems: particle in three dimensional box, Angular momentum operator, Rigid Rotor, Hydrogen atom ground-state, orbitals, interaction with magnetic field.

Module 5: Introduction to solids **8 Lectures**

Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands.

Text book:

- Eisberg and Resnick, Introduction to Quantum Physics Publisher New York: Wiley. Collection printdisabled

Reference Books:

- Introduction to Quantum mechanics, Nikhil Ranjan Roy, 2016, Vikash Publishing House Pvt. Ltd.
- Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.
- Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan

COURSE OUTCOMES

Students to learn the basics of Quantum mechanics and its application to bound states.
To understand the wave particle duality.
To familiarize with the molecular bonding, free electron theory and periodic potentials in solids.

…….

……

SEMICONDUCTOR OPTOELECTRONICS **For ECE**

36 Lectures

……

Module 1: Review of semiconductor physics **10 Lectures**

E-k diagram, Density of states, Occupation probability, Fermi level; p-n junction, Metal-semiconductor junction (Ohmic and Schottky); Carrier transport, generation, and recombination; Semiconductor materials of interest for optoelectronic devices, band gap modification, hetero structures; Light semiconductor interaction: Rates of optical transitions, joint density of states, condition for optical amplification.

Module 2: Semiconductor light emitting diodes (LEDs) **06 Lectures**

Rate equations for carrier density, Radiative and non-radiative recombination mechanisms in semiconductors, LED: device structure, materials, characteristics, and figures of merit.

Module 3: Semiconductor lasers **08 Lectures**

Rate equations for carrier- and photon-density, and their steady state solutions, Laser dynamics, Relaxation oscillations, Input-output characteristics of lasers. Semiconductor laser: structure, materials, device characteristics, and figures of merit.

Module 4: Photo-detectors **06 Lectures**

Types of semiconductor photodetectors -p-n junction, PIN, and Avalanche -- and their structure, materials, working principle, and characteristics, Solar cells.

Module 5: **Low-dimensional optoelectronic devices** **06 Lectures**

Quantum-well, -wire, and -dot based LEDs, lasers, and photo-detectors.

References:

- J. Singh, Semiconductor Optoelectronics: Physics and Tech., McGraw-Hill Inc. (1995).
- B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons,
- S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
- Yariv and P. Yeh, Photonics: Optical Electronics in Mod. Comm, OUP, NY (2007).
- P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
- Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
- Online course: "Optoelectronic Materials & Devices" by Monica Katiyar & Deepak Gupta on NPTEL

COURSE OUTCOME

Students to review the concepts of semiconductor physics.
To learn about the semiconductor LEDs and semiconductor Lasers.
To have the understanding of photo detectors and low dimensional optoelectronic devices.

……

……..…

MECHANICS OF SOLIDS **For Civil, ME, MEMS**

40 Lectures

……

Module 1: Statics **10 Lectures**

Free body diagrams on modelling of typical supports and joints; Condition for equilibrium in three- and two- dimensions; Friction: limiting and non-limiting cases; Force displacement relationship; Geometric compatibility for small deformations.

Module 2: Stress and Strain at a point **6 Lectures**

Concept of stress at a point; Planet stress: transformation of stresses at a point, principal stresses and Mohr's circle; Displacement *field; Concept of strain at a point; Planet strain:* transformation of strain at a point, principal strains and Mohr's circle.

Module 3: Material behavior **7 Lectures**

One- dimensional material behaviour; Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials.

Module 4: Force analysis **8 Lectures**

Force analysis — axial force, shear force, bending moment and twisting moment diagrams of slender members (without using singularity functions);; Moment curvature relationship for pure bending of beams with symmetric cross-section; Bending stress; Shear stress; Cases of combined stresses;

Module 5: Strain energy **9 Lectures**

Concept of strain energy; Yield criteria; De*flection due to bending; Integration of* the moment-curvature relationship for simple boundary conditions; Method of superposition (without using singularity functions); Strain energy and complementary strain energy for simple structural elements (i.e. those under axial load, shear force, bending moment and torsion).

Reference books:

- An Introduction to the Mechanics of Solids, 2nd ed. with SI Units - SH Crandall, NC
- Dahl & TJ Lardner

- Engineering Mechanics: Statics, 7th ed. — JL Meriam
- Engineering Mechanics of Solids — EP Popov

COURSE OUTCOME

To familiarize students of civil and mechanical engineering with the understanding of the elastic and plastic behavior of solids.
To understand the importance of stress and strain at a point on solid.
To be able to do force analysis and understand strain energy of solid.

……

……

OPTICS AND FIBER OPTICS **For Chemical Engineering**

36 Lectures

……

Module 1: Interference **07 Lectures**

Introduction to interference and example, Theory of fringes, Analytical treatment of interference, Displacement of fringes, Thin film, Newton's Ring, Wedge shaped film.

Module 2: Diffraction **06 Lectures**

concept of diffraction, Fraunhoffer and Fresnel diffraction, Fraunhoffer diffraction at single slit, double slit, and multiple slits; diffraction grating, characteristics of diffraction grating and its applications, Limit of Resolution, Resolving power of grating.

Module 3: Polarisation **06 Lectures**

Introduction, plane of polarization, plane of vibration, polarisation by reflection: Brewester's Law, polarisation by refraction: Malus' Law, polarisation by double refraction, scattering of light, circular and elliptical polarisation, optical activity.

Module 4: Fibre Optics **07 Lectures**

Introduction, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, application of optical fibres.

Module 5: **Lasers** **10 Lectures**

Introduction to interaction of radiation with matter, Stimulated and spontaneous emission, Einstein's coefficient, principles and working of laser: population inversion, pumping, various modes, threshold population inversion, three level and four level laser, types of laser: solid state, semiconductor, gas; application of lasers.

Reference Books

- Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
- Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
- Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
- Optics, Ajoy Ghatak, 2008, Tata McGraw Hill

COURSE OUTCOMES

To understand the optical phenomenon of interference, diffraction and polarization,
To get familiarize with fiber optics and laser, their basic concept and application in engineering**.**

……

Course Code	**BSC 102**				
Category	**Basic Science Course**				
Course Title	**Chemistry-I** **Contents** (i) Chemistry-I (Concepts in chemistry for engineering) (ii) Chemistry Laboratory				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester I**
	3	**1**	**0**	**4**	
Pre-requisites	**Knowledge of intermediate level chemistry**				

CHEMISTRY-I

……

CONCEPTS IN CHEMISTRY FOR ENGINEERING 42 Lectures

……

Module 1: Atomic and molecular structure 12 lectures

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Module 2: Spectroscopic techniques and applications 8 lectures

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

Module 3: Intermolecular forces and potential energy surfaces 4 lectures

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

Module 4: Use of free energy in chemical equilibria 6 lectures

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Waterchemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

Module 5: Periodic properties and Stereochemistry 8 Lectures

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

Module 6: Organic reactions and synthesis of a drug molecule 4 lectures

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Books:

- University chemistry, by B. H. Mahan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- Engg Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- Physical Chemistry, by P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

COURSE OUTCOMES

The concepts developed in this course will aid in quantification of several concepts in chemistry hat have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

……

CHEMISTRY LABORATORY **Code: BSC 102P**

Choice of 08-10 experiments from the following:

- Determination of surface tension and viscosity
- Thin layer chromatography
- Ion exchange column for removal of hardness of water
- Determination of chloride content of water
- Colligative properties using freezing point depression
- Determination of the rate constant of a reaction
- Determination of cell constant and conductance of solutions
- Potentiometry - determination of redox potentials and emfs
- Synthesis of a polymer/drug
- Saponification/acid value of an oil
- Chemical analysis of a salt
- Lattice structures and packing of spheres
- Models of potential energy surfaces
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids
- Adsorption of acetic acid by charcoal
- Use of the capillary visco meters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

LABORATORY OUTCOMES

- The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

Course Code	ESC 103				
Category	Engineering Science Course				
Course Title	Programming for Problem Solving				
Scheme & Credits	L	T	P	Credit	Semester II
	3	0	0	3	
Pre-requisites	Basic Knowledge of Computer and Mathematics				

PROGRAMMING FOR PROBLEM SOLVING 40 Lectures

Module 1: Introduction to Programming **6 lectures**

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Module 2: Arithmetic expressions and precedence **12 lectures**

Conditional Branching and Loops Writing and evaluation of conditionals and consequent branching**,** Iteration and loops

Module 3: Arrays **3 Lectures**

Arrays (1-D, 2-D), Character arrays and Strings

Module 4: Basic Algorithms, Searching, Basic Sorting Algorithms **4 lectures**

(Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Module 5: Function and Pointers **6 lectures**

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation).

Module 6: Recursion and Structure **9 lectures**

Recursion, as a different way of solving problems. Example programs, such as Finding, Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Structures, Defining structures and Array of Structures

Suggested Text Books

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

COURSE OUTCOMES

The student will learn

To formulate simple algorithms for arithmetic and logical problems.

To translate the algorithms to programs (in C language).

To test and execute the programs and correct syntax and logical errors.

To implement conditional branching, iteration and recursion.

To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

To use arrays, pointers and structures to formulate algorithms and programs.

To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

……

……

LABORATORY - PROGRAMMING FOR PROBLEM SOLVING Code: ESC103P

……

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations

LABORATORY OUTCOMES

To formulate the algorithms for simple problems.

To translate given algorithms to a working and correct program.

To be able to correct syntax errors as reported by the compilers.

To be able to identify and correct logical errors encountered at run time.

To be able to write iterative as well as recursive programs.

To be able to represent data in arrays, strings and structures and manipulate them through a program.

To be able to declare pointers of different types and use them in defining self referential structures.

To be able to create, read and write to and from simple text files.

……

Course Code	ESC 104				
Category	Engineering Science Course				
Course Title	**Workshop/Manufacturing Practices (Theory & Lab)**				
Scheme & Credits	L	T	P	Credit	Semester II
	1	0	4	3	
Pre-requisites	Basic Knowledge of Physics, Chemistry and Mathematics				

WORKSHOP/MANUFACTURING PRACTICES 10 Lectures

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods **(3 lectures)**
2. CNC machining, Additive manufacturing **(1 lecture)**
3. Fitting operations & power tools **(1 lecture)**
4. Electrical & Electronics **(1 lecture)**
5. Carpentry **(1 lecture)**
6. Plastic Moulding, glass cutting **(1 lecture)**
7. Metal casting **(1 lecture)**
8. Welding (arc welding & gas welding), brazing **(1 lecture)**

Suggested Text/Reference Books:

- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan & A. Suresh Babu, "Mfg. Tech- I" Pearson Education, 2008.
- Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, PHl, 1998.
- Rao P.N., "Manufacturing Technology", Vol. I & Vol. II, Tata McGrawHill House, 2017.

COURSE OUTCOMES

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

WORKSHOP PRACTICE **60 Lectures**

1. Machine shop **(10 hours)**
2. Fitting shop **(8 hours)**
3. Carpentry **(6 hours)**
4. Electrical & Electronics **(8 hours)**
5. Welding shop **(8 hours (Arc welding 4 hrs + gas welding 4 hrs))**
6. Casting **(8 hours)**
7. Smithy **(6 hours)**
8. Plastic Moulding & Glass Cutting **(6 hours**)

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

LABORATORY OUTCOMES

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Code	HSMC 101				
Category	Humanities and Social Sciences including Management Courses				
Course Title	English				
Scheme & Credits	L	T	P	Credit	Semester II
	2	0	2	3	
Pre-requisites	Basic Knowledge of English grammar and composition				

ENGLISH 38 Lectures

Module 1: Vocabulary Building **6 lecture**

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms and standard abbreviations.

Module 2: Basic Writing Skills **6 lectures**

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely.

Module 3: Identifying Common Errors in Writing **7 lectures**

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés.

Module 4: Nature and Style of sensible Writing **6 lectures**

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

Module 5: Writing Practices **6 lectures**

Comprehension, Précis Writing, Essay Writing,

Module 6: Oral Communication **7 lectures**

(This unit involves interactive practice sessions in Language Lab)

Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday, Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations.

Suggested Readings:

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

……