First Semester

Engineering Mathematics I (BSC-111)

Basic Science Course (BSC); 4 Credits (3-1-0)

Objectives:

1. Syllabus of this paper is designed in such a way that it carries fundamental of mathematics i.e. how to prove/disprove a statement in mathematics, some basics of mathematics that are required to everyone who wants to study mathematics. In every branch of engineering we have visualization course in which students have to work in 2d and 3d so they need to basic understanding of geometry. This course contains functions, system of equations that will be taught with the help of geometry so that they can learn how functions behave geometrically. In the last two units it contains Linear Algebra that is essential for every branch of engineering.
2. So the objective of this course is to develop the basics of mathematics, give the flavour of visualization in 2d, 3d with the help of functions and basic of linear algebra. And well trend the students in linear algebra that is essential for every engineer so that they should be able to carry their dream of become a good engineer.

Unit	Contents	No. of Lectures
Unit 1	Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	**06**
Unit 2	Calculus: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and Hospital's rule; Maxima and minima.	**06**
Unit 3	Sequences and series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.	**10**
Unit 4	Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.	**08**
Unit 5	Matrices Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.	**10**
		40

Reference/Text Book:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Programming for Problem Solving (ESC-103)
Engineering Sciences Course (ESC); 4 Credits (3-0-2)

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems

Unit	Contents	No. of Lectures
Unit 1	Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc. Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.	**04**
Unit 2	Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion.	**04**
Unit 3	Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator,	**08**

	goto, Iteration with for, while, do-while loops. I/O: Simple input and output with scanf and printf, formatted I/O.	
Unit 4	Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays. Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings	**06**
Unit 5	Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc.	**04**
Unit 6	Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration Data type Storage Classes: Storage Classes, Automatic Storage Class (auto), Register Storage Class (register), Static Storage Class (static), External Storage Class (extern). Structures, Defining structures and Array of Structures File handling (only if time is available)	**08**
		34

Text Books:

1. Let us C by Yashwant Kanitkar
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
3. B.A. Forouzan and R.F. Gilberg C Programm ing and Data Structures.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice

Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

NPTEL Web Course:

1.nptel.ac.in/courses/106105085/4

2.nptel.ac.in/courses/106105085/2

Physics (BSC-112)
Basic Science Course (BSC); 5 Credits (3-1-2)

Objectives:

1. The aim of the Applied Physics Subject is to provide an adequate exposure and develop insight about the basic principles of physics along with the possible applications. The familiarity with the basic principles of physics would help engineers to understand the tools and techniques used in the industry. The Subject provides the necessary foundations for inculcating innovative approaches. While creating awareness about the vital role played by science and engineering in the development of new technologies, the Subject would provide the necessary exposure to the practical aspects, which is an essential component for learning science.

Unit	Contents	No. of Lectures
Unit 1	Electrostatics in vacuum Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Farady's cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.	**08**
Unit 2	Electrostatics in a linear dielectric medium Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.	**04**
Unit 3	Magnetostatics Bio-Savart law, Divergence and curl of static magnetic	**06**

	field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.	
Unit 4	Magnetostatics in a linear magnetic medium Magnetization and associated bound currents; auxiliary magnetic field ; Boundary conditions on and . Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.	**03**
Unit 5	Module 5: Faraday's law Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic breaking and its applications; Differential form of Faraday's law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi-static approximation; energy stored in a magnetic field. Module 6: Displacement current, Magnetic field due to time-dependent electric field and Maxwell's equations Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time-dependent electric field; calculating magnetic field due to changing electric fields in quasi-static approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. Qualitative discussion of momentum in electromagnetic fields. Module 7: Electromagnetic waves The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting mediumvacuum interface for normal incidence.	**17**
		38

Reference/Text Books:

1. A. P. French [**APF**], Vibrations and Waves, MIT Introductory Physics Series, 1st Ed. (CBS Publisher, 2003).
2. AjoyGhatak [**AG**], Optics, 5th Ed. (Tata McGraw Hill, 2013).
3. D.J. Griffiths [**DG**], Introduction to Electrodynamics, 4th Ed. (PHI Learning Pvt. Ltd., New Delhi, 2013)

4. H. C. Verma, Concepts of Physics, Vol-I & II (BharatiBhawan P & D, New Delhi, 2012).
5. N. Subramanyam, BrijLal, M. N. Avadhanulu, A Textbook of Optics, 24th Revised Edition (S. Chand & Co Ltd., New Delhi, 2010).
6. F. S. Crawford, Waves: Berkeley Physics Subject (Vol-3) (Tata McGraw Hill Education).
7. S. Mani Naidu, Engineering Physics, (Pearson, New Delhi, 2014).
8. E. M. Purcell, Electricity and Magnetism: Berkeley Physics Subject (Volume - 2) (Tata McGraw Hill Education, 2011).
9. Mathew N.O. Sadiku, Principles of Electromagnetics, 4th Ed., International Version (OUP, New Delhi, 2014).

Applied Physics Lab

(Lab is to be conducted in Second Semester)

Credit (0-0-2)

List of Experiments

Any ten experiments, at least four from each group

Group –A

1. Choice of experiments from the following: Experiments on electromagnetic induction and electromagnetic breaking;
2. LC circuit and LCR circuit;
3. Resonance phenomena in LCR circuits;·
4. Magnetic field from Helmholtz coil;·
5. Measurement of Lorentz force in a vacuum tube.·

English (HSMC-111)

Humanities and Social Sciences (HSMC); 4 Credits (3-0-2)

Objectives:

To train students to acquire language skills this will enable them;

1. To acquire effective and appropriate communication skills
2. To understand and acquire the interdependent skills of reading and communication; and
3. To appreciate literature and develop an understanding of how it may contribute to personal growth and advancement

Unit	Contents	No. of Lectures
Unit 1	1. Vocabulary Building 1.1 The concept of Word Formation 1.2 Root words from foreign languages and their use in English 1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. 1.4 Synonyms, antonyms, and standard abbreviations.	**06**
Unit 2	1. Vocabulary Building 1.1 The concept of Word Formation 1.2 Root words from foreign languages and their use in English 1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. 1.4 Synonyms, antonyms, and standard abbreviations.	**08**
Unit 3	. Identifying Common Errors in Writing 3.1 Subject-verb agreement 3.2 Noun-pronoun agreement 3.3 Misplaced modifiers 3.4 Articles 3.5 Prepositions 3.6 Redundancies 3.7 Clichés	**08**
Unit 4	Nature and Style of sensible Writing 4.1 Describing 4.2 Defining 4.3 Classifying 4.4 Providing examples or evidence 4.5 Writing introduction and conclusion	**08**
Unit 5	Writing Practices 5.1 Comprehension 5.2 Précis Writing 5.3 Essay Writing	**10**
Unit 6	Oral Communication (This unit involves interactive practice sessions in Language Lab) Listening ComprehensionPronunciation, Intonation, Stress and Rhythm Common Everyday Situations: Conversations and Dialogues Communication at Workplace Interviews Formal Presentations	**08**
		48

Reference/Text Books:

1. ‘English Grammar & Composition’ by Wren & Martin
2. ‘English Grammar Book’ by J.C. Nesfield

Engineering Graphics (ESC-112)

Engineering Science Course (ESC); 3 Credits (1-0-4)

Objectives:

1. To provide basic understanding of the fundamentals of Engineering Drawing, mainly visualization, graphics theory, standards & conventions of drawing, the tools of drawing and the use of Drawings in engineering applications.

Unit	Contents	No. of Lectures
Unit 1	**Introduction & Importance of Engineering Drawing:** Drawing techniques - manual drawing and computer-aided drawing, Manual drawing instruments and their uses, Conventions - ISO and BIS, Layout of drawing sheets, Border lines, Title block, Folding of drawing sheets. Lines, Lettering and dimensioning.	**06**
Unit 2	**Geometrical Constructions:**Bisecting a line, arc and angle, Dividing straight line in to equal number of parts, Tangents to lines and arcs Construction of pentagon, hexagon and octagon, Inscribing circles inside regular polygons, etc	**04**
Unit 3	**Orthographic Projection:**Orthographic projection, Theories of projection, Multi-view (orthographic) projection; VP; HP, Front view; Top view, Projection on profile planes, Projection of objects placed in all Four quadrants, First and third angle projections.	**08**
Unit 4	**Projection Of Point And Projection Of Straight Line:**Points in 1st, 2nd, 3rd, and 4th quadrants, Line parallel to both the planes, Line perpendicular to one plane and parallel to the other, Line inclined to one plane and parallel to the other plane, Lines inclined to both planes, True lengths and inclinations, Traces of	**12**

	lines.	
Unit 5	**Axinometric Projection:**Dimetric, trimetric and axinometric projection, Terminology, Isometric scale Box method, Coordinate or offset method ,Four center method, Isometric projection of arcs, Construction of isometric projection of different solids, Orthographic Projections; Model Viewing; Co-ordinate Systems; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling	**12**
		42

Reference/Text Books:

1. N. D. Bhatt , Engineering Drawing Plane and Solid Geometry (English) Charotar Publishing House
2. P.S. Gill, Engineering Drawing (geometrical drawing)S.K. Katariya& Sons
3. Dhananjay A Jolhe, Engineering drawing, TMH, 2008.
4. T E French, C J Vierck and R J Foster, Graphic Science and Design, 4th edition, McGraw Hill, 1984.
5. W J Luzadder and J M Duff, Fundamentals of Engineering Drawing, 11th edition, Prentice-Hall of India ,1995
6. K Venugpoal, Engineering Drawing and Graphics, 3nd edition, New Age International, 1998