SWAMI VIVEKANAND
SUBHARTI UNIVERSITY, MEERUT

EVALUATION SCHEME

B.TECH-I YEAR

(Computer Science & Engineering)

W.E.F. SESSION 2018-19

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
Subhartipuram, NH-58 Delhi-Haridwar Bypass Road,
Meerut -250005 (UP)
www.subharti.org

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech Ist Year/Ist Semester (Common to all branches)
w.e.f academic Session 2018-19

S. No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	BAS-101/ BAS-102	Physics/ Chemistry	BSC-1/ BSC-2	3	1	0	20	10	30	-	70	-	100	4
2	BAS-103	Mathematics I	BSC-3	3	1	0	20	10	30	-	70	-	100	4
3	BEEE-101/ BCSE-101	Electrical Engg./ Programming For Problem Solving	ESC-1/ ESC-2	3	1	0	20	10	30	-	70	-	100	4
4	BME-151/ BME-152	Engineering Graphics & Design/ Workshop Practices	ESC-3/ ESC-4	1	0	4	-	-	-	15	-	35	50	3
5	BAS-151/ BAS-152	Physics Lab/ Chemistry Lab	BSC-1/ BSC-2	0	0	3	-	-	-	15	-	35	50	1.5
6	BEEE-151/ BCSE-151	Electrical Engineering Lab/ Programming for Problem Solving Lab	ESC-1/ ESC-2	0	0	2	-	-	-	15	-	35	50	1
Total													450	17.5

SUBHARTI INSTITUTE OF TECHNOLOGY AND ENGINEERING
SWAMI VIVEKANAND SUBHARTI UNIVERSITY, MEERUT
STUDY & EVALUATION SCHEME
B.Tech Ist Year/2nd Semester (Common to all branches)
w.e.f academic Session 2018-19

S No.	Course Code	Course Name	Course Type	Periods			CCA				ESE		Total	Credit
				L	T	P	CT	AT	Total	PS	TE	PE		
1	BAS-201/ BAS-202	Physics/ Chemistry	BSC-1/ BSC-2	3	1	0	20	10	30	-	70	-	100	4
2	BAS-203	Mathematics II	BSC-4	3	1	0	20	10	30	-	70	-	100	4
3	BEEE-201/ BCSE-201	Electrical Engg./ Programming For Problem Solving	ESC-1/ ESC-2	3	1	0	20	10	30	-	70	-	100	4
4	BME-251 / BME-252	Engineering Graphics & Design/ Workshop Practices	ESC-3/ ESC-4	1	0	4	-	-	-	15	-	35	50	3
5	BHU- 201	Professional English	HSMC-1	2	0	0	20	10	30	-	70	-	100	2
6	BAS-251/ BAS-252	Physics Lab/ Chemistry Lab	BSC-1/ BSC-2	0	0	3	-	-	-	15	-	35	50	1.5
7	BEEE-251/ BCSE-251	Electrical Engineering Lab/ Programming for Problem Solving Lab	ESC-1/ ESC-2	0	0	2	-	-	-	15	-	35	50	1
8	BHU- 251	English Lab	HSMC-1	0	0	2	-	-	-	15	-	35	50	1
Total													600	20.5

SEMESTER II (header spanning title of the table)

*List of MOOCs (NPTEL) based recommended courses for first year B.Tech. students
1. **Development soft skills and personality**
2. **Enhancing soft skills and personality**

BAS-101/BAS-201	Physics	L	T	P	4 Credits
		3	1	0	

Course Objective:

To equip the student with a strong understanding of the fundamentals of physics so as to enable him/her

to apply it to his/her field of study. This course should enable the student to

1. Explain the behavior of the physical world around him/her.
2. Apply the concepts of physics in his/her field of study .
3. Relate the concepts of physics to the advancement of technology.
 4. Understand and relate the different phenomena in the world.
5. Approach problems, predict their results in advance, and solve them in quantitative and qualitative manner.
6. Gain a broader understanding of other sciences.

Syllabus:

Unit-1 Electrostatics in vacuum (8 lectures)

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.

Unit-2 Electrostatics in a linear dielectric medium (4 lectures)

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.

Magnetostatics(6 lectures)

Bio-Savart law, Divergence and curl of static magnetic 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-3 Magnetostatics in a linear magnetic medium (3 lectures)

Magnetization and associated bound currents; auxiliary magnetic field $\vec{H}$; Boundary conditions on $\vec{B}$ and $\vec{H}$. 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.

Faraday's law (4 lectures)

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.

Unit-4

Displacement current, Magnetic field due to time-dependent electric field and Maxwell's equations (5 lectures)

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.

Unit-5

Electromagnetic waves (8 lectures)

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 medium-vacuum interface for normal incidence.

Course Outcomes: Upon completion of the course, the student will be able to:
 1. recognize and present real life examples of the aforementioned concept and interrelate some of them.   2. describe the link between physics and the technology.
3. identify technological applications of some of the aforementioned concepts.
4. describe how he/she can harness the benefits of some of the aforementioned concepts to his /her area of specialization.
 5. understand the professional and ethical responsibilities of the subject.
6. communicate effectively while speaking, employing graphics and writing.

Reference books:
   (i)   Engineering Mechanics, 2nd ed. — MK Harbola
   (ii)   Introduction to Mechanics — MK Verma
   (iii)   An Introduction to Mechanics — D Kleppner & R Kolenkow
   (iv)   Principles of Mechanics — JL Synge & BA Gri *ths*
   (v)   Mechanics — JP Den Hartog
   (vi)   Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
   (vii)   Mechanical Vibrations — JP Den Hartog

(viii) Theory of Vibrations with Applications — WT Thomson

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

(x) Engineering Mechanics: Statics, 7th ed. — JL Meriam

(xi) Engineering Mechanics of Solids — EP Popov

BAS-151/BAS-251	**Physics Lab**	0L:0T:3P	1.5 credits

List of Experiments

1. To determine the wavelength of sodium light by Newton's ring experiment.

2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.

3.To determine the specific rotation of cane sugar solution using polarimeter

4.To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses.

5.To measure attenuation in an optical fiber.

6.To determine the wavelength of He-Ne laser light using single slit diffraction.

7.To study the polarization of light using He-Ne laser light.

8.To determine the wavelength of sodium light with the help of Fresnel's bi-prism.

9. To determine the coefficient of viscosity of given liquid.

10. To determine the value of acceleration due to gravity(g) using compound pendulum.

BAS-102/BAS-202		L	T	P	4 Credits
	Chemistry	**3**	**1**	**0**	

Course Objectives :To impart the knowledge of applications of chemical sciences in the field of engineering and technology.

Syllabus:

Unit 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.

Unit 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.

Unit-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.

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. Water chemistry. Corrosion.

Use of free energy considerations in metallurgy through Ellingham diagrams

Unit-4 Periodic properties (4 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

Unit-5 Stereochemistry (4 lectures)

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

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.

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that 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.

Suggested Text Books

(i) University chemistry, by B. H. Mahan

(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane (iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell

(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.
Krishnan

(vi) 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

BAS-152/BAS-252	Chemistry Lab	0L	0T	3P	1.5 Credits

Chemistry Laboratory
Choice of 10-12 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 viscosimeters 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

BAS-103	Mathematics-I	L	T	P	4 Credits
		3	1	0	

Objectives: By the end of the first year, all students will be expected to be able to recognise, even in unfamiliar circumstances, and then use the following: • applied mathematics and classical physics (mechanics & heat); • mass and energy balances; • description of fluid motion; • dynamics of steady fluid motion; • one-phase flow in pipes; • basic definitions of T, Q, W, U, H & S; • first & second laws of thermodynamics: • heat & mass transfer rate equations; • heat & mass transfer coefficients; • 1-D heat & mass transfer problems; • heat exchangers

UNIT-1: Calculus: (6 lectures)

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.

UNIT- 2: Calculus: (6 lectures)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

UNIT- 3: Sequences and series: (10 lectures)

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.

UNIT- 4: Multivariable Calculus (Differentiation): (8 lectures)

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.

UNIT- 5: Matrices (10 lectures)

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.

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines

Suggested Text/Reference Books

(i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

(ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(iii) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

(iv) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

(v) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

(vi) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

(vii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

	Basic Electrical Engineering	**L**	**T**	**P**	**3 Credits**
BEEE-101/BEEE-201		**3**	**0**	**0**	

Objectives: The expected student learning outcomes of this goal are to graduate engineers who have: a) the ability to apply science, engineering science, and mathematics to solve engineering

problems. b) the ability to put their engineering and design skills into practice. c) the ability to use industrial-quality laboratory equipment and engineering software for analysis, testing, design, and communication. d) the ability to design systems, components, and processes that satisfy predetermined constraints. e) the ability to put engineering problems, put them in solvable form, and develop and evaluate alternative solutions

Detailed contents :

UNIT 1 : DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT 2: AC Circuits (8 hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

UNIT 3: Transformers (6 hours)

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT 4: Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT 5: Power Converters (6 hours)

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Course Outcomes

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations

Suggested Text / Reference Books

(i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
(iii) L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
(iv) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
(v) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

BEEE-151/BEEE-251	Electrical Engg Lab	0L:0T:2P	1credits

(ii) Basic Electrical Engineering Laboratory

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments –

voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.

- Transformers: Observation of the no-load current waveform on an oscilloscope (non- sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.

  Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (fieldwinging - slip ring arrangement) and single-phase induction machine.

- Torque Speed Characteristic of separately excited dc motor.

- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed.

- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.

- Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Laboratory Outcomes
- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters

	Programming for Problem Solving	L	T	P	4 Credits
BCSE-101/BCSE-201		3	1	0	

Objectives: Students will try to learn: 1 The concept of various components. 2 The concepts that underpin the disciplines of analog and digital electronic logic circuits. 3 Various Number system and Boolean algebra. 4 Design and implementation of combinational circuits.

Unit 1 Introduction to Programming **(4 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/Pseudocode 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.

*Unit 2:*Arithmetic expressions and precedence. Conditional Branching and Loop.Writing and evaluation of conditionals and consequent branching. Iteration and loops.

*Unit 3*Arrays **(6 lectures)**

Arrays (1-D, 2-D), Character arrays and Strings.Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

*Unit 4*Recursion **(4 -5 lectures)**

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

*Unit 5*Structure **(4 lectures)**

Structures, Defining structures and Array of Structure.Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation.File handling (only if time is available, otherwise should be done as part of the lab)

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

Suggested Text Books

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

Suggested Reference Books

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

BCSE-151/BCSE-251	Programming for Problem Solving Lab	0L	0T	2P	1 Credit

Laboratory - Programming for Problem Solving[L : 0; T:0 ; P : 4 (2credits)]
[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

	Engineering Graphics & Design	L	T	P	3 Credits
BME-151/BME-251		1	0	4	

Traditional Engineering Graphics:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)

(Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory)

UNIT 1: Introduction to Engineering Drawingcovering,

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

UNIT 2: Orthographic Projections covering,

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

UNIT 3: Projections of Regular Solids covering,

those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 4:Sections and Sectional Views of Right Angular Solids covering,

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 5: Isometric Projections covering,

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT 6: Overview of Computer Graphicscovering,

listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

UNIT 7: Customisation& CAD Drawing

consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically;

Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

UNIT 8: Annotations, layering & other functionscovering

applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

UNIT 9: Demonstration of a simple team design project *that illustrates*

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

-   t
  o prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
-   t
  o prepare you to communicate effectively
-   t
  o prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Suggested Text/Reference Books:

(ii) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

(iii) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

(iv) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

(v) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

(vi) (Corresponding set of) CAD Software Theory and User Manuals

	Workshop Practices	L	T	P	3 Credits
BME-152/BME-252		1	0	4	

Detailed contents

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)**

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.

(ii) Workshop Practice:(60 hours)[L : 0; T:0 ; P : 4 (2 credits)]

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.

	Mathematics -II	L	T	P	4 Credits
BAS-203		3	1	0	

UNIT 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.

UNIT 2: First order ordinary differential equations: (6 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.

UNIT 3: Ordinary differential equations of higher orders: (8 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.

UNIT 4: Complex Variable – Differentiation: (8 lectures)

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm)

UNIT 5: Complex Variable – Integration: (8 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.

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:
- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Suggested Text/Reference Books

(ii) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

(iii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(iv) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.

(v) S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

(vi) E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

(vii) E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

(viii) J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc- Graw Hill, 2004.

(ix) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

(x) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

	Professional English	L	T	P	2 Credits
BHU-201		2	0	0	

Detailed contents
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.

2. Basic Writing Skills
2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

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

4. Nature and Style of sensible Writing

4.1 Describing

4.2 Defining

4.3 Classifying

4.4 Providing examples or evidence

Writing introduction and conclusion

5. Writing Practices

5.1 Comprehension

5.2 Précis Writing

5.3 Essay Writing

6. Oral Communication

(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

Course Outcome

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

Suggested Readings:

(i) *Practical English Usage.* Michael Swan. OUP. 1995.

(ii) *Remedial English Grammar.* F.T. Wood.

Macmillan.2007 (iii)*On Writing Well.* William

Zinsser. Harper Resource Book. 2001

(iv) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(v) *Communication Skills.* Sanjay Kumar and PushpLata. Oxford University Press. 2011.

(vi) *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

| BHU-251 | English Lab | 0L:0T:2P | 1 CREDITS |

List of Experiments

1. Introduction to Phonetics- Speech Sounds- Vowels and Consonants.

2. Articles, Prepositions, Word Formation-Prefixes & suffixes, Synonyms & Antonyms.

3. Descriptions- Narrations- Giving directions and guidelines Sequence of Tenses, Question Tags and One Word Substitutes.

4. Extempore- Public Speaking Active and Passive Voice, Common Errors in English, Idioms and Phrases.

5. Information Transfer- Oral Presentation Skills Reading Comprehension and Job Application with

Resume Preparation