GROUP-A
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS3-101	Physics (Waves and Optics and Introduction to Quantum Mechanics)	3	1	0	40	60	100	4
BMATH3-101	Mathematics-I (Calculus and Differential Equations)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS3-102	Physics (Wave, Optics & Quantum Mechanics) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BHUMA0-104	Drug Abuse: Problem, Management and Prevention	3	0	0	100	0	100	0
BCOBE0-101	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
	Total	16	3	10	540	360	900	19

Note:
1. There will be Induction Programme of 3 weeks before start of normal classes.
2. Drug Abuse: Problem, Management and Prevention and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure at least E grade in each of them.

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH3-201	Mathematics-II (Linear Algebra, Transform Calculus and Numerical Methods)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
BHUMA0-103	Human Values & Professional Ethics	3	0	0	100	0	100	0
	Total	15	2	12	500	400	900	20

Note:
1. Human Values & Professional Ethics is a non-credit Course; however, it is necessary to secure at least E grade in it.
2. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will be included in 3rd Semester

GROUP-B
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH3-101	Mathematics-I (Calculus and Differential Equations)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
BHUMA0-103	Human Values & Professional Ethics	3	0	0	100	0	100	0
BCOBE0-101	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
	Total	17	2	12	600	400	1000	20

Note:
1. There will be Induction Programme of 3 weeks before start of normal classes.
2. Human Values & Professional Ethics and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure at least E grade in each of them.

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS3-101	Physics (Waves and Optics and Introduction to Quantum Mechanics)	3	1	0	40	60	100	4
BMATH3-201	Mathematics-II (Linear Algebra, Transform Calculus and Numerical Methods)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS3-102	Physics (Wave, Optics & Quantum Mechanics) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BHUMA0-104	Drug Abuse: Problem, Management and Prevention	3	0	0	100	0	100	0
	Total	14	3	10	440	360	800	19

Note:
1. Drug Abuse: Problem, Management and Prevention is a non-credit Course; however, it is necessary to secure at least E grade in it.
2. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will be included in 3rd Semester

PHYSICS (WAVES AND OPTICS AND INTRODUCTION TO QUANTUM MECHANICS)

Subject Code: BPHYS3-101   **L T P C**   **Duration: 38 Hrs.**
                                                      3 1 0 4

UNIT-I
Electromagnetic Waves and Dielectrics: (10 Hrs.)
Introduction and physical significance of Gradient, Divergence & Curl, Dielectric polarization (qualitative only), Types of polarization, Displacement Current Maxwell's Equations, Equation of EM waves in free space, velocity of EM waves, Poynting vector, Electromagnetic Spectrum (Basic ideas of different region).

Propagation of Light and Geometric Optics: (10 Hrs.)
Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction. Brewster's angle, total internal reflection. Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's ring experiment. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

UNIT-III
Lasers and Applications: (8 Hrs.)
Spontaneous and stimulated emission, stimulated absorption, pumping and population inversion, Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO_2), solid-state lasers (ruby), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, applications of lasers in science, engineering and medicine.

UNIT-IV
Quantum Mechanics: (10 Hrs.)
Introduction to Quantum mechanics, Wave nature of particles, De Broglie's concept, Time-dependent and time-independent Schrodinger equation for wave-function, probability current, Free-particle wave-function and wave-packets, Uncertainty principle, application of uncertainty principle: nonexistence of electron in the nucleus, expectation value. Schrodinger equation for one dimensional problems– particle in a box, linear harmonic oscillator, Concept of scattering from a potential barrier and tunneling.

Recommended Books:
1. David Griffiths, 'Introduction to Electrodynamics'.
2. Gupta & Gaur, 'Engineering Physics', Dhanpat Rai.
3. Malik and Singh, 'Engineering Physics', Tata McGraw Hill.
4. Ian G. Main, 'Oscillations and Waves in Physics'.
5. H.J. Pain, 'The Physics of Vibrations and Waves'.
6. E. Hecht, 'Optics'.
7. Ghatak, 'Optics'.
8. O. Svelto, 'Principles of Lasers'.

MATHEMATICS-I (CALCULUS AND DIFFERENTIAL EQUATIONS)

Subject Code: BMATH3-101　　　　**L T P C**　　　　　　**Duration: 47 Hrs.**
　　　　　　　　　　　　　　　　　　3 1 0 4

UNIT –I

Calculus: (7 Hrs.)
Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima. 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.

Sequences and Series: (7 Hrs.)
Convergence of sequence and series, tests for convergence, power series, Taylor's series. Series for exponential, trigonometric and logarithmic functions.

UNIT –II

Multivariable Calculus: Differentiation: (10 Hrs.)
Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence: Geometrical interpretation and basic properties, Directional derivative.

UNIT –III

Multivariable Calculus-Integration: (12 Hrs.)
Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities). Theorems of Green, Gauss and Stokes (statement only), Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT –IV

First Order Ordinary Differential Equations: (5 Hrs.)
Linear and Bernoulli's equations, exact equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary Differential Equations of Higher Order: (6 Hrs.)
Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Frobenius method.

Recommended Books:
1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', Pearson, **2002**.
2. T. Veerarajan, 'Engineering Mathematics', McGraw Hill, New Delhi, **2008**.
3. B.V. Ramana, 'Higher Engineering Mathematics', McGraw Hill, New Delhi, **2010**.
4. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, **2000**.
5. E. Kreyszig, 'Advanced Engineering Mathematics', John Wiley & Sons, **2006**.
6. W.E. Boyce and R.C. DiPrima, 'Elementary Differential Equations and Boundary Value Problems', Wiley India, **2009**.
7. S.L. Ross, 'Differential Equations', Wiley India, **1984**.
8. E.A. Coddington, 'An Introduction to Ordinary Differential Equations', Prentice Hall India, **1995**.
9. E.L. Ince, 'Ordinary Differential Equations', Dover Publications, **1958**.
10. G.F. Simmons and S.G. Krantz, 'Differential Equations', McGraw Hill, **2007.**

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.
The students will learn:

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of power series and Fourier series for learning advanced Engineering Mathematics.
4. To deal with functions of several variables that are essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.

ENGINEERING GRAPHICS & DESIGN

Subject Code: BMECE0-101   **L T P C**   Duration: 30 Hrs.
                                     2 0 0 2

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing - a Visual Science.Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections - Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points- Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines -Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. Projection of Planes- Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

6. Projection of Solids- Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

7. Section of Solids Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Development of Surface Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

9. Isometric Projection Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. Orthographic Projection Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Recommended Text/Reference Books
1. N.D. Bhatt, V.M. Panchal& P.R. Ingle, 'Engineering Drawing', Charotar Publishing House, 2014.
2. M.B. Shah & B.C. Rana, 'Engineering Drawing and Computer Graphics', Pearson Education, 2008.
3. B. Agrawal& C.M. Agrawal, 'Engineering Graphics', TMH Publication, 2012.
4. K.L. Narayana& P. Kannaiah, 'Text book on Engineering Drawing', Scitech Publishers, 2008.

BASIC ELECTRICAL ENGINEERING

Subject Code: BELEE0-101 **L T P C** **Duration: 42 Hrs.**
3 1 0 4

UNIT-1

DC Circuits: (8 Hrs.)
Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation Superposition, Thevenin and Norton Theorems. Step response of RL, RC circuits.

UNIT-2

AC Circuits: (12 Hrs.)
Representation of sinusoidal waveforms, average, 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 series and parallel combinations, series and parallel resonance. Three phase voltage source, phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-3

Transformers: (10 Hrs.)
Magnetic materials, BH characteristics, Single-phase Transformer, no load and full load conditions, phasor diagrams, equivalent circuit, calculation of losses in transformers, regulation and efficiency, Auto-transformers, their applications and comparison with two winding transformers.

UNIT-4

Electrical Machines: (8 Hrs.)
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Direct-On-Line and Star-Delta starters. Construction and working of single-phase motors (Split phase, shaded pole, capacitor start, capacitor run, capacitor start and run motors).
Electrical Installations: (4 Hrs.)
Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Types of Wiring, Earthing.
Recommended Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', <u>Tata McGraw Hill</u>, **2010**.
2. D.C. Kulshreshtha, 'Basic Electrical Engineering', <u>McGraw Hill</u>, **2009**.
3. L.S. Bobrow, 'Fundamentals of Electrical Engineering', <u>Oxford University Press</u>, **2011**.
4. E. Hughes, 'Electrical and Electronics Technology', <u>Pearson</u>, **2010**.
5. V.D. Toro, 'Electrical Engineering Fundamentals', <u>Prentice Hall, India</u>, **1989**.
6. J.P.S. Dhillon. J.S. Dhillon and D. Singh, 'Principles of Electrical & Electronics Engineering', <u>Kalyani Publishers, New Delhi</u>, **2005**.

Course Outcomes:
1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phase transformers.
3. To study the application and working principles of three phase and single phase induction motors.
4. To introduce to the components of low voltage electrical installations.

PHYSICS (WAVE, OPTICS & QUANTUM MECHANICS) LAB.

Subject Code: BPHYS3-102   **L T P C**
                                      0 0 2 1

Note: Students will have to perform at least 10 experiments from the given topic/list.
Experiments based on Wave, Optics & Quantum Mechanics (Broad Area):
Photoelectric effect experiment.
1. Frank Hertz Experiment.
2. Recording Hydrogen atom spectrum.
3. Diffraction and interference experiments (From ordinary light/laser pointers).
4. Measurements of speed of light on table top using modulation.
5. Minimum deviation from a prism.

Experiments based on the above mentioned topics:
1. To determine the numerical aperture of a given optic fibre and hence to find its acceptance angle.
2. To determine attenuation & propagation losses in optical fibres.
3. To study the laser beam characteristics like; wave length using diffraction grating aperture & divergence.
4. Study of diffraction using laser beam and thus to determine the grating element.
5. To study laser interference using Michelson's Interferometer.
6. To determine the grain size of a material using optical microscope.
7. To find the refractive index of a material/glass using spectrometer.
8. To find the refractive index of a liquid using spectrometer.
9. To find the velocity of ultrasound in liquid.
10. To determine the specific rotation of sugar using Laurent's half-shade polarimeter.
11. To study the characteristic of different p-n junction diode - Ge and Si.
12. To analyze the suitability of a given Zener diode as voltage regulator.
13. To find out the intensity response of a solar cell/Photo diode.
14. To find out the intensity response of a LED.
15. To understand the phenomenon Photoelectric effect as a whole.

Physics Virtual Lab. Experiments:
16. To find the resolving power of the prism.
17. To determine the angle of the given prism.
18. To determine the refractive index of the material of a prism
19. To determine the numerical aperture of a given optic fibre and hence to find its acceptance angle.
20. To calculate the beam divergence and spot size of the given laser beam.
21. To determine the wavelength of a laser using the Michelson interferometer.

22. To set up and observe Newton's rings.
23. To determine the wavelength of the given source.
24. To understand the phenomenon Photoelectric effect as a whole.
25. To draw kinetic energy of photoelectrons as a function of frequency of incident radiation.
26. To determine the Planck's constant from kinetic energy versus frequency graph.
27. To plot a graph connecting photocurrent and applied potential.
28. To determine the stopping potential from the photocurrent versus applied potential graph.
Note: Any other experiment based on the above mentioned broad topics may be included.

ENGINEERING GRAPHICS & DESIGN LAB.

Subject Code: BMECE0-102   **L T P C**   **Duration: 45 Hrs.**
                                       0 0 6* 3

1. **Overview of Computer Graphics**
   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 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];

2. **Customization & 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 tolerance; 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;

3. **Annotations, Layering & other Functions**
   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.

.* Lab work will be performed in two parts:
   - **(i)**   **Computer Lab (2 hours)** Computer Graphics, CAD Drawing etc.
   - **(ii)**   **Drawing Hall (04 hours)**   Manual practice on drawing sheets of theory content the relevant theory part of Engineering Graphics & Design may also be covered in Lab work.

BASIC ELECTRICAL ENGINEERING LAB.

Subject Code: BELEE0-102　　　**L T P C**
　　　　　　　　　　　　　　　　0 0 2 1

EXPERIMENTS/DEMONSTRATIONS

1. To study basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. real-life resistors, capacitors and inductors.
2. To verify Ohm's law.
3. To verify Kirchhoff's voltage and current laws.
4. To verify Superposition Theorem.
5. To verify Thevenin Theorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
8. To study resonance phenomenon in R-L-C series circuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculate the efficiency.
10. Demonstration of cut-out sections of machines: Induction machine (squirrel cage rotor and slip ring arrangement) and single-phase induction machines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connections of three phase induction motor.
12. To connect, start and reverse the direction of rotation of single-phase induction motor.
13. To demonstrate working of DOL starter for three-phase induction motor.
14. To demonstrate working of star-delta starter for three-phase induction motor.
15. To demonstrate the components of LT switchgear.

Laboratory Outcomes:
1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical induction motors.

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BHUMA0-104　　　**L T P C**　　　　　**Duration: 30 Hrs.**
　　　　　　　　　　　　　　　　3 0 0 0

UNIT-I

Meaning of Drug Abuse:
Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II

Consequences of Drug Abuse:
Individual: Education, Employment, Income.
Family: Violence.
Society: Crime.
Nation: Law and Order problem.

UNIT-III

Prevention of Drug Abuse:

Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny.

School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV

Treatment and Control of Drug Abuse:

Medical Management: Medication for treatment and to reduce withdrawal effects.

Psychological Management: Counselling, Behavioural and Cognitive therapy.

Social Management: Family, Group therapy and Environmental intervention.

Treatment: Medical, Psychological and Social Management.

Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, **2003**.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, **2004.**
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills, **1981**.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi, **1985**.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books, **1982**.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications, Jaipur, **1997.**
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, **2003 & 2004**.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi, **2013**.
9. Bhim Sain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi, **1991**.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar, **2009**.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra, Delhi, **2000**.
12. S. Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention and Cessation', Cambridge University Press, **2008**.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, **2017**.
14. 'World Drug Report', United Nations Office of Drug and Crime, **2016**.
15. 'World Drug Report', United Nations Office of Drug and Crime, **2017**.

CHEMISTRY-I		

Subject Code: BCHEM0-101   **L T P C**   **Duration: 42 Hrs.**
                                                3 1 0 4

Course Objectives

1. To understand the atomic and & molecular nature of various molecules
2. To understand the band structures
3. To elaborate the applications of spectroscopic techniques
4. To understand the thermodynamic functions and their applications
5. To rationalize periodic properties
6. To understand the concepts of stereochemistry and preparation of organic molecules

UNIT-I

1. Atomic and Molecular Structure: (12 Hrs.)

Bohr Theory of Hydrogen atom, Spectrum of H atom, Sommerfeld extension of Bohr Theory, Particle and wave nature of electron, De-Broglie equation, Aufbau principle, Compton effect, Schrodinger wave equation, Laplacian and Hamiltonian operator, Linear Combination of atomic orbitals. Molecular orbitals of diatomic molecules and Energy level diagrams of homonuclear and heteronuclear 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-II

2. Spectroscopic Techniques and Applications: (8 Hrs.)

Principles and selection rules of Electronic spectroscopy and Fluorescence spectroscopy along with their applications. Principles and selection rules of Vibrational and rotational spectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonance imaging.

3. Intermolecular Forces and Potential Energy Surfaces: (4 Hrs.)

Ideal gas equation, Ionic, dipolar and van Der Waals interactions. Real gas equation. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, and HCN

UNIT-III

4. Use of Free Energy in Chemical Equilibria: (6 Hrs.)

Ideal Solution, Non Ideal Solutions, Thermodynamic functions: energy, entropy and free energy. Numerical problems based on entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Thermodynamic properties of ideal solutions. Introduction to Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

5. Periodic Properties: (4 Hrs.)

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 principle

UNIT-IV

6. Stereochemistry: (4 Hrs.)

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

7. Organic Reactions and Synthesis of a Drug Molecule: (4 Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule – β lactum, Paracetamol, Chloroquine and Aspirin

Recommended Books:

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

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:

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

MATHEMATICS-II

Subject Code: BMATH3-201	L T P C	Duration: 46 Hrs.
	3 1 0 4	

UNIT–I

Linear Algebra: (10 Hrs.)

Algebra of 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, Orthogonal transformation and quadratic to canonical forms.

UNIT–II

Numerical Methods-I: (12 Hrs.)

Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae. Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

UNIT–III

Numerical Methods-II: (12 Hrs.)

Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

UNIT–IV

Transform Calculus: (12 Hrs.)

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method.

Recommended Books:

1. D. Poole, 'Linear Algebra: A Modern Introduction', Brooks/Cole, **2005**.
2. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, **2010**.
3. V. Krishnamurthy, V.P. Mainra and J.L. Arora, 'An Introduction to Linear Algebra', Affiliated East-West Press, **2005**.

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:

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

ENGLISH

Subject Code: BHUMA0-101	L T P C	Duration: 25 Hrs.
	2 0 0 2	

UNIT-I

1. Vocabulary Building:
   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.

UNIT-II

2. Basic Writing Skills:
   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

UNIT-III

3. Identifying Common Errors in Writing:
   Subject-verb agreement
   Noun-pronoun agreement
   Misplaced modifiers
   Articles
   Prepositions
   Redundancies
   Clichés

UNIT-IV

4. Nature and Style of Sensible Writing:
   Describing
   Defining
   Classifying
   Providing examples or evidence
   Writing introduction and conclusion

5. Writing Practices:
   Comprehension
   Précis Writing

Essay Writing

Recommended Books:
1. Michael Swan, 'Practical English Usage', OUP, **1995**.
2. F.T. Wood, 'Remedial English Grammar', Macmillan, **2007.**
3. William Zinsser, 'On Writing Well', Harper Resource Book, **2001.**
4. Liz Hamp-Lyons and Ben Heasly, 'Study Writing', Cambridge University Press, **2006**.
5. Sanjay Kumar and Pushp Lata, 'Communication Skills', Oxford University Press, **2011**.
6. 'Exercises in Spoken English', Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

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

PROGRAMMING FOR PROBLEM SOLVING

Subject Code: BCSCE0-101   **L T P C**   **Duration: 41 Hrs.**
                                                          3 0 0 3

UNIT-I

1. Introduction to Programming: (6 Hrs.)
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.

2. Arithmetic Expressions and Precedence: (12 Hrs.)
Conditional Branching and Loops. Writing and evaluation of conditionals and consequent branching. Iteration and loops.

UNIT-II

3. Arrays: (5 Hrs.)
Arrays (1-D, 2-D), Character arrays and Strings

4. Basic Algorithms: (5 Hrs.)
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-III

5. Function: (4 Hrs.)
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

6. Recursion: (4 Hrs.)
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-IV

7. Structure: (3 Hrs.)
Structures, Defining structures and Array of Structures

8. Pointers: (2 Hrs.)
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

9. File Handling: (only if time is available, otherwise should be done as part of the lab)

Recommended Text Books:
1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGraw Hill.

2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGraw Hill.

Recommended Reference Books:

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

Course Outcomes:

The student will learn

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

CHEMISTRY-I LAB.

Subject Code: BCHEM0-101   **L T P C**
                                                                    0 0 2 1

Course Objectives:

1. To learn the preparation and standardization of solutions
2. To learn the estimation of various physical properties of given liquid samples
3. To estimate various crucial parameters for water sample
4. To learn the preparation of various molecules and detection of functional groups.

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layer chromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorine in water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of a reaction
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials and emfs
10. Synthesis of a polymer
11. Saponification /acid value of an oil
12. Detection and confirmation of organic functional groups.
13. Models of spatial orientation
14. To test the validity of Lambert Beer law/ Determination of λ_{max} / Determination of unknown concentration of a solution.
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Synthesis of a drug – Acetaminophen, Aspirin

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:
1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

ENGLISH LAB.

Subject Code: BHUMA0-102   **L T P C**
                                   0 0 2 1

Oral Communication

(This unit involves interactive practice sessions in Language Lab.)
1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

PROGRAMMING FOR PROBLEM SOLVING LAB.

Subject Code: BCSCE0-102   **L T P C**
                                   0 0 4 2

NOTE: 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:

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program
7. To be able to declare pointers of different types and use them in defining self-referential structures.
8. To be able to create, read and write to and from simple text files.

MANUFACTURING PRACTICES (THEORY & LAB.)

Subject Code: BMFPR0-101   **L T P C**   **Duration: 80 Hrs.**
                              1 0 4 3

Lectures & Videos: (10 Hrs.)
1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing Methods.
2. CNC machining, Additive manufacturing.
3. Fitting operations & power tools.
4. Sheet Metal Operations.
5. Electrical & Electronics.
6. Carpentry.
7. Plastic moulding (injection moulding, blow moulding, extrusion moulding), glass cutting.
8. Metal casting.
9. Welding (arc welding & gas welding), brazing.

Recommended Books:
1. S.K. Hajra Choudhury, A.K. Hajra Choudhury and S.K. Nirjhar Roy, 'Elements of Workshop Technology', Vol.-I, **2008** and Vol.-II **2010**, Media Promoters and Publishers Pvt. Ltd., Mumbai.
2. S. Kalpakjian, Steven S. Schmid, 'Manufacturing Engineering and Technology', 4th Edn., Pearson Education India Edn., **2002**.
3. Gowri P. Hariharan and A. Suresh Babu, 'Manufacturing Technology – I', Pearson, **2008**.
4. Roy A. Lindberg, 'Processes and Materials of Manufacture', 4th Edn., Prentice Hall India, **1998**.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw Hill House, **2017**.

Course Outcomes:
1. 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: (70 Hrs.)
1. Machine shop (**10 Hrs.**)
2. Fitting shop (**8 Hrs.**)
3. Carpentry (**6 Hrs.**)
4. Electrical & Electronics (**8 Hrs.**)
5. Welding shop (**8 Hrs. (Arc welding 4 Hrs. + Gas welding 4 Hrs.**)
6. Casting (**8 Hrs.**)
7. Sheet Metal Operations (**10 Hrs.**)
8. Smithy (**6 Hrs.**)

9. Plastic moulding & Glass Cutting **(6 Hrs.)**

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

Laboratory Outcomes:

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

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: BHUMA0-103   **L T P C**   **Duration: 20 Hrs.**
                                3 0 0 0

UNIT-I (8 Hrs.)

Meaning of values, Values as social fact, Universal values – equality, justice, freedom/ liberty, inclusion. Distinction between social and culture values and values associated with crafts and occupations. Work and leisure as values – Marx and Veblen

UNIT-II (9 Hrs.)

Values, morality, ethics and their relation with Religion, values as mechanisms of control and coercion. Functional Theory of Values of Talcott Parsons, Theory of Basic Values of Shalom Schwartz, Theory of Protestant Ethic and Capitalism of Max Weber, Bhagwat Gita and Theory of Karma-Dharma, Sikhism and theory of work, dignity of labour, meditation and sharing.

UNIT-III (7 Hrs.)

Meaning and types of Professional Ethics, Goals of professional work and their problems, Normative and evaluative elements in professional work, Duties and obligations, Professional rights, Virtues in professional life (honesty, trustworthiness, transparency, competence, integrity and exemplary conduct), Engineering ethics and service ideals.

UNIT-IV (6 Hrs.)

Technology for and against mankind and environment- fulfilment of human needs, and industrial disasters: case studies – Bhopal Gas Tragedy, Chernobyl and Fukushima Disasters; Equality at work place: gender discrimination and caste/class-based exclusions.

Recommended Books:

1. Schwartz, H. Shalom, 'An Overview of the Schwartz Theory of Basic Values'. Online Readings in Psychology and Culture. **2** (1). doi:10.9707/2307-0919.1116, **2012**.
2. John Berry, Janek, Pandey; Poortinga, Ype 'Handbook of Cross-cultural Psychology', 2nd Edn.. Boston, MA: Allyn and Bacon. p. 77. ISBN 9780205160747, **1997**.
3. Timo Airaksinen, 'The Philosophy of Professional Ethics', University of Helsinki, Finland.
4. Manju Jitendra Jain, 'Yes, It's Possible', Kalpana Publications, Mumbai, **2011**.

INTRODUCTION TO ELECTRICAL ENGINEERING

Subject Code: BCOBE0-101   **L T P C**   **Duration: 24 Hrs.**
                                2 0 0 0

Learning Objectives:

1. To make the students aware about the **major study areas** of Electrical Engineering.
2. To make them familiar with **the main subjects** under these study areas.

3. To provide some insight to the **contents of these subjects** by introductory topics.

UNIT I (03 Hours)

Preface to Basics of Electrical Engineering & Measurement

Electrical Engineering Fundamentals: Basics of electrical elements, circuit laws and network theorems, time & frequency domain analysis, network synthesis and filters synthesis

Electrical Measurements & Instrumentation: Introduction to various indicating and integrating instruments, analog and digital instruments, measurement of electrical quantities: R, L, C using bridges different types of transducers, display devices and recorders, their classification and application, introduction to telemetry and SCADA.

UNIT II (03 Hours)

Preface to Electronics Engineering

Analog Electronics: Diodes, bipolar junction transistor (BJT), field effect transistor (FET), MOSFET, rectifiers, op amp, oscillators.

Digital Electronics: Number System: binary, decimal, octal, hexadecimal and their inter conversions: binary to decimal, decimal to binary, octal, hexadecimal, binary addition, subtraction, multiplication & division. Logic gates & truth tables, encoder, decoder, multiplexer, demultiplexer, D/A & A/D converter. Flip flops & semiconductor memories.

Power Electronics: Introduction to Thyristors, DIAC, TRIAC, SCR and their switching characteristics, controlled rectifiers, half wave, full wave & bridge converter, dual converters, inverters, choppers, cycloconverters.

UNIT III (03 Hours)

Preface to Electrical Machines

Transformers: Introduction to transformer, working principle, construction of single phase transformer, three phase transformer, auto transformer, winding connections, cooling techniques.

DC Machines: DC machine construction and working principle, motor and generator working, types, characteristics, speed control of dc motor, losses and applications.

Induction Motors: Introduction to working principle and construction of induction motors, various sizes and their applications.

Synchronous Machines: Working principle and parts of synchronous machine, application of synchronous alternator in power plants.

UNIT-IV (05 Hours)

Preface to Control Systems

Linear Control Systems: control requirements and examples of industrial control problems, study of open loop and closed loop feedback control systems and their characteristics, study of frequency –response analysis.

Non-Linear Digital Control Systems: Brief discussion about state variable representation of systems by various methods, solution of state variable model. Controllability and observability. Introduction to sampled data system and describing function analyses. Z-transform.

Computer Architecture: Introduction to computer architecture, processor and control unit, computer applications.

Microprocessor & Micro-Controllers: Introduction to microprocessors and their applications, classification of instructions, interfacing a microprocessor. Micro-Controller and its comparison with microprocessor, microcontroller applications.

Programmable Logic Controllers (PLC): Introduction to PLC, Operation of PLC, programming languages, ladder logic, basic elements used such as timers, counters etc.

UNIT V (04 Hours)

Preface to Generation and Utilization of Electricity

Generation of Electrical Power: Fundamentals of power generation, load factor, demand factor, capacity factor, utilization factor, base and peak load pants, operating and fixed cost of

power plant, tariff and power factor improvement, economical operation of steam plant, hydro thermal coordination.

Power Plant Engineering: Introduction to various power plants: steam power plant, hydro power plants, nuclear power plants, gas and diesel power plants, pollution control methods.

Distribution of Electrical Power: DC 2-wire and 3-wire systems, AC single phase, three phase and 4- wire systems, primary and secondary distribution systems.

Transmission of Electrical Power: Line parameters; calculation of inductance and capacitance of single and double circuit transmission lines, ABCD constants, short, medium and long lines. Line performance: regulation and efficiency of short, medium and long lines, classification of cables based upon voltage and dielectric material, insulation resistance.

Switchgear and Protection: Introduction to circuit breaker, protective relays, bus bar protection, transformer protection, generator protection, bus bar protection.

Utilization of Electrical Energy: Introduction to electrical drives & mechanical drives, various types of traction system, methods of electric heating & welding, production of light by different methods, terms used, laws of illumination, refrigeration and air conditioning, laws of electrolysis.

UNIT VI (02 Hours)

Preface to Miscellaneous Topics

Fundamentals of High Voltage Engineering: Insulating materials for high voltage, conduction and breakdown in gases, liquids and solid dielectrics, generation and measurement of high voltages and currents.

Power Transmission using High Voltages: Extra High Voltage (EHVAC) Transmission, High Voltage Direct Current (HVDC) Transmission.

Electro Magnetic Field Theory: Review of vector analysis, electrostatics, steady magnetic field, Maxwell's equations and Poynting vector, electromagnetic waves.

Non-Conventional Energy Sources: Limitation of conventional energy sources, need and growth of alternative energy source, application of direct energy conservation. Geothermal system, hydro-electric plants, wind power, tidal energy, Bio-mass energy.

| INTRODUCTION TO ELECTRONICS & COMMUNICATION ENGINEERING |

Subject Code: BCOBE0-101   **L T P C**   **Duration: 30 Hrs.**
                                        2 0 0 0

Course Objectives:

1. To make the students aware about the major study areas of Electrical Engineering.
2. To make them familiar with the main subjects under these study areas.
3. To make the students aware about the major advantages of Electronics & Communication Engineering.
4. To provide some insight to the various professional opportunities/ Recruiters and higher education opportunities.

Course Outcomes:

1. Students shall be able to know about various diversified fields which they can take up as their career.
2. Students shall be able to appreciate the role of Electronics and Communication in Day to Day life.
3. Students shall be able to appreciate the role of an Electronics Engineer towards Nation Building.

Unit-I (7 Hrs)

Preface to Basics of Electronics and Communication Engineering

Electronics and Communication Engineering Fundamentals: Introduction and familiarization with various electronic/electrical components- Resistors, Capacitors, Inductors and Transformers, diodes, LEDs, , ICs, bread boards, CRO, Function Generator, Power Supply, Multi-Meter, IC Tester, soldering techniques.

UNIT-II (8 Hrs)

Introduction to Analog Electronics: Introduction to an Electronic system, Various components of electronic system, introduction to semiconductors and their classifications, junction diodes, bipolar junction transistor, field effect transistor their operation and application as switch and amplifier

Unit-III (8 Hrs)

Introduction to Digital Electronics, Difference between analog and digital signals and systems, various logic gates, introductory concept of combinational and sequential circuits, microprocessors and microcontrollers.

Unit-IV (7 Hrs)

Introduction to Electronics Communication: Wired and wire-less electronic communication, need for wireless communication, electromagnetic model for communication, EM spectrum, various forms of communication like optical fibre/mobile/satellite/microwave and radar communication, conceptual knowledge of 2G, 3G, 4G and 5G communication.