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
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
BMNCC0-010	Universal Human values - I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		15	3	10	540	360	900	19

Note:

1. **There will be Induction Programme of 3 weeks before start of normalclasses.**
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.**

*** As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org**

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
Total		12	2	12	400	400	800	20

Note:

1. **Marks of 4 Week Manufacturing Practices Training during Summer Vacation will be included in 3rdSemester**

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
BMNCC0-010	Universal Human values - I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		14	2	12	500	400	900	20

Note:

1. There will be Induction Programme of 3 weeks before start of normalclasses.
2. Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure at least E grade in each of them.

* As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org

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
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
Total		13	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 init.
2. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will be included in 3rdSemester

PHYSICS (WAVES AND OPTICS AND INTRODUCTION TO QUANTUM MECHANICS)

SubjectCode:BPHYS3-101 **L T PC** **Duration: 38Hrs.**
3 1 0 4

UNIT-I

Electromagnetic Waves and Dielectrics: (10 Hrs.)
Introductionandphysicalsignificanceof Gradient, Divergence & Curl, Dielectricpolarization (qualitativeonly), Typesofpolarization, DisplacementCurrent Maxwell's Equations, Equation ofEMwavesinfreespace, velocityofEMwaves, Poyntingvector, ElectromagneticSpectrum (Basic ideas of differentregion).

Propagation of Light and Geometric Optics: (10 Hrs.)
Fermat'sprincipleofstationarytimeanditsapplicationse.g.inexplainingmirageeffect, laws of reflection and refraction. Brewster's angle, total internal reflection. Huygens' principle, superpositionofwavesandinterferenceoflightbywave-frontsplittingandamplitudesplitting; 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 resolvingpower.

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 toElectrodynamics'.
2. Gupta & Gaur, 'Engineering Physics', DhanpatRai.
3. Malik and Singh, 'Engineering Physics', Tata McGrawHill.
4. Ian G. Main, 'Oscillations and Waves inPhysics'.
5. H.J. Pain, 'The Physics of Vibrations andWaves'.
6. E. Hecht,'Optics'.
7. Ghatak,'Optics'.
8. O. Svelto, 'Principles ofLasers'.

MATHEMATICS-I (CALCULUS AND DIFFERENTIAL EQUATIONS)

SubjectCode:BMATH3-101 **L T PC** **Duration: 47Hrs.**
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.)
Convergenceofsequenceandseries,testsforconvergence,powerseries,Taylor'sseries.Series for exponential, trigonometric and logarithmicfunctions.

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,'AnIntroductiontoOrdinaryDifferentialEquations',PrenticeHallIndia, **1995**.
9. E.L. Ince, 'Ordinary Differential Equations', Dover Publications,**1958**.
10. G.F. Simmons and S.G. Krantz, 'Differential Equations', McGraw Hill, **2007.**

CourseOutcomes:
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 ofBeta and Gammafunctions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineeringproblems.
3. The tool of power series and Fourier series for learning advancedEngineering Mathematics.
4. To deal with functions of several variables that are essential in most branchesof engineering.
5. The essential tool of matrices and linear algebra in a comprehensivemanner.

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

SubjectCode:BELEE0-101 **L T PC** **Duration: 42Hrs.**

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 currentandvoltagelaws,analysisofsimplecircuitswithdcexcitationSuperposition,Thevenin and Norton Theorems. Step response of RL, RCcircuits.

UNIT-2

AC Circuits: (12 Hrs.)

Representation of sinusoidal waveforms, average, peak and rms values, phasorrepresentation, 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,phasordiagrams,equivalentcircuit,calculationoflossesintransformers,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(Splitphase,shadedpole,capacitorstart,capacitorrun,capacitorstartandrunmotors).

Electrical Installations: (4Hrs.)

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

Course Outcomes:

1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phasetransformers.
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 electricalinstallations.

PHYSICS (WAVE, OPTICS & QUANTUM MECHANICS) LAB.

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

Note: Students will have to perform at least 10 experiments from the giventopic/list.

Experiments based on Wave, Optics & Quantum Mechanics (Broad Area): Photoelectric effect experiment.

1. Frank HertzExperiment.
2. Recording Hydrogen atomspectrum.
3. Diffraction and interference experiments (From ordinary light/laserpointers).
4. Measurements of speed of light on table top usingmodulation.
5. Minimum deviation from aprism.

Experiments based on the above mentioned topics:

1. To determine the numerical aperture of a given optic fibre and hence to findits acceptanceangle.
2. To determine attenuation & propagation losses in opticalfibres.
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 gratingelement.
5. To study laser interference using Michelson'sInterferometer.
6. To determine the grain size of a material using opticalmicroscope.
7. To find the refractive index of a material/glass usingspectrometer.
8. To find the refractive index of a liquid usingspectrometer.
9. To find the velocity of ultrasound inliquid.
10. To determine the specific rotation of sugar using Laurent's half-shadepolarimeter.
11. To study the characteristic of different p-n junction diode - Ge andSi.
12. To analyze the suitability of a given Zener diode as voltageregulator.
13. To find out the intensity response of a solar cell/Photodiode.
14. To find out the intensity response of aLED.
15. To understand the phenomenon Photoelectric effect as awhole.

Physics Virtual Lab. Experiments:

16. To find the resolving power of theprism.
17. To determine the angle of the givenprism.
18. To determine the refractive index of the material of aprism
19. To determine the numerical aperture of a given optic fibre and hence to findits acceptanceangle.
20. To calculate the beam divergence and spot size of the given laserbeam.
21. To determine the wavelength of a laser using the Michelsoninterferometer.

22. To set up and observe Newton'srings.
23. To determine the wavelength of the givensource.
24. To understand the phenomenon Photoelectric effect as awhole.
25. To draw kinetic energy of photoelectrons as a function of frequency of incidentradiation.
26. To determine the Planck's constant from kinetic energy versus frequencygraph.
27. To plot a graph connecting photocurrent and appliedpotential.
28. To determine the stopping potential from the photocurrent versus applied potentialgraph.

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.

SubjectCode: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 andinductors.
2. To verify Ohm'slaw.
3. To verify Kirchhoff's voltage and currentlaws.
4. To verify SuperpositionTheorem.
5. To verify TheveninTheorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current andvoltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and verification. Observation of phase differences between current andvoltage.
8. To study resonance phenomenon in R-L-C seriescircuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculate theefficiency.
10. Demonstrationofcut-outsectionsofmachines:Inductionmachine(squirrelcagerotorand slip ring arrangement) and single-phase inductionmachines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connections of three phase inductionmotor.
12. To connect, start and reverse the direction of rotation of single-phase inductionmotor.
13. To demonstrate working of DOL starter for three-phase inductionmotor.
14. To demonstrate working of star-delta starter for three-phase inductionmotor.
15. To demonstrate the components of LT switchgear.

Laboratory Outcomes:

1. Get an exposure to common electrical components and theirratings.
2. Make electrical connections by wires of appropriateratings.
3. Understand the usage of common electrical measuringinstruments.
4. Understand the basic characteristics of transformers and electrical inductionmotors.

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BMNCC0-004 **L T PC** **Duration: 30Hrs.**
2 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. BhimSain, '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 andCessation', 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 PC** **3 1 0 4** **Duration: 42Hrs.**

Course Objectives

1. To understand the atomic and & molecular nature of variousmolecules
2. To understand the bandstructures
3. To elaborate the applications of spectroscopictechniques
4. To understand the thermodynamic functions and theirapplications
5. To rationalize periodicproperties
6. To understand the concepts of stereochemistry and preparation of organicmolecules

UNIT-I

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

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 homonuclearandheteronucleardiatomics.Pi-molecularorbitalsofbutadieneandbenzeneand 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 bandstructures.

UNIT-II

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

PrinciplesandselectionrulesofElectronicspectroscopyandFluorescencespectroscopyalong withtheirapplications.PrinciplesandselectionrulesofVibrationalandrotationalspectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonanceimaging.

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

Idealgasequation,Ionic,dipolarandvanDerWaalsinteractions.Realgasequation.Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, andHCN

UNIT-III

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

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: (4Hrs.)

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, 'UniversityChemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles andApplications'.
3. C.N. Banwell, 'Fundamentals of MolecularSpectroscopy'.
4. B.L.Tembe,KamaluddinandM.S.Krishnan,'EngineeringChemistry(NPTELWeb-book).
5. P.W. Atkins, 'PhysicalChemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5thEdn., 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 studentto:

1. Analyzemicroscopicchemistryintermsofatomicandmolecularorbitalsandintermolecular forces.
2. Rationalize bulk properties and processes using thermodynamicconsiderations.
3. Distinguishtherangesoftheelectromagneticspectrumusedforexcitingdifferentmolecular energy levels in various spectroscopictechniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states andelectronegativity.
5. List major chemical reactions that are used in the synthesis ofmolecules.

MATHEMATICS-II

SubjectCode:BMATH3-201 **L T PC** **Duration: 46Hrs.**

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 methodandRegula-Falsimethod.Finitedifferences,InterpolationusingNewton'sforwardand backwarddifferenceformulae.Centraldifferenceinterpolation:Gauss'sforwardandbackward formulae. Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8rules.

UNIT–III

Numerical Methods-II: (12Hrs.)

Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge Kuttamethodoffourthorderforsolvingfirstandsecondorderequations.Milne'sandAdam'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.)

LaplaceTransform,PropertiesofLaplaceTransform,Laplacetransformofperiodicfunctions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transformmethod.

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 theirusage.
2. The effective mathematical tools for the solutions of differential equations that model physicalprocesses.
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 PC** **Duration: 25Hrs.**

2 0 0 2

UNIT-I

1. Vocabulary Building:

The concept of Word Formation

Root words from foreign languages and their use inEnglish

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 insentences

Importance of properpunctuation

Creatingcoherence

Organizing principles of paragraphs indocuments

Techniques for writingprecisely

UNIT-III

3. Identifying Common Errors inWriting:

Subject-verbagreement

Noun-pronounagreement

Misplacedmodifiers

Articles

Prepositions

Redundancies

Clichés

UNIT-IV

4. Nature and Style of SensibleWriting:

Describing

Defining

Classifying

Providing examples orevidence

Writing introduction andconclusion

5. WritingPractices:

Comprehension

PrécisWriting

EssayWriting

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 UniversityPress.

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 PC** **Duration: 41Hrs.**

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: (12Hrs.)

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: (4Hrs.)

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

6. Recursion: (4Hrs.)

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: (2Hrs.)

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 thelab)

Recommended Text Books:

1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGrawHill.

2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGrawHill.

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 logicalproblems.
2. To translate the algorithms to programs (in Clanguage).
3. To test and execute the programs and correct syntax and logicalerrors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquerapproach.
6. To use arrays, pointers and structures to formulate algorithms andprograms.
7. To apply programming to solve matrix addition and multiplication problemsand searching and sortingproblems.
8. To apply programming to solve simple numerical method problems, namelyrot finding of function, differentiation of function and simpleintegration.

CHEMISTRY-I LAB.

SubjectCode:BCHEM0-101 **L T P C**

0 0 2 1

Course Objectives:

1. To learn the preparation and standardization ofsolutions
2. To learn the estimation of various physical properties of given liquidsamples
3. To estimate various crucial parameters for watersample
4. To learn the preparation of various molecules and detection of functionalgroups.

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension andviscosity
3. Thin layerchromatography
4. Determination of total Alkalinity/ Acidity of a watersample.
5. Determination of residual chlorine in watersample
6. Estimation of total, temporary and permanent hardness ofwater
7. Determination of the rate constant of areaction
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials andemfs
10. Synthesis of apolymer
11. Saponification /acid value of anoil
12. Detection and confirmation of organic functionalgroups.
13. Models of spatialorientation
14. TotestthevalidityofLambertBeerlaw/Determinationofλ_{max}/Determinationofunknown concentration of asolution.
15. Determination of the partition coefficient of a substance between twoimmiscible liquids
16. Adsorption of acetic acid bycharcoal
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.

SubjectCode: 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 runtime
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 PC** **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), glasscutting.
8. Metalcasting.
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', 4thEdn., 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', 4thEdn., Prentice HallIndia, **1998**.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw HillHouse, **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 **(10Hrs.)**
2. Fitting shop **(8Hrs.)**
3. Carpentry **(6Hrs.)**
4. Electrical & Electronics **(8 Hrs.)**
5. Welding shop **(8 Hrs. (Arc welding 4 Hrs. + Gas welding 4Hrs.)**
6. Casting **(8Hrs.)**
7. Sheet Metal Operations **(10 Hrs.)**
8. Smithy **(6Hrs.)**

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

INTRODUCTION TO BIOMEDICAL ENGG/ BIOMEDICAL INSTRUMENTATION

Subject Code: BMNCC0-022 **L T PC** **Duration: 30 Hrs.**
2 0 0 0

Course Objectives:

The students will be able to learn:
1. To provide basic knowledge of human anatomy and physiology.
2. Introduce the student with the introductory concepts of Bio signals, Biosensors, transducers and Bio-instrumentation.
3. To familiarize the student with modern imaging systems.

Course Outcomes:
After completion of the course the student shall demonstrate an ablility to:

1. Understand human anatomy and physiology system.
2. Gain basic knowledge of Bio-signals, Bio-sensors & Bio-transducers and Bio-instrumentation in healthcare.
3. Understand basic concepts of different modern imaging systems and patient safety issues.

UNIT-I (7 Hrs)

Human Anatomy and Physiology Basic elements of human body–cardio vascular system, respiratory system, circulatory system, nervous system, digestive, nervous, immune, and reproductive systems, Basics of cell and molecular biology.

UNIT-II (8 Hrs)

Bio Signals: Origin, nature, and types of Bio signals: ECG, EMG, EEG. Principles of measuring blood pressure, temperature, volume & flow in arteries, veins and tissues, respiration and cardiac rate.

Bio Sensors and Transducers: Principles of sensing physiological parameters, types of transducers and their characteristics, Pressure transducers, Photoelectric transducers, optical fibre sensors, Biosensors, smart sensors.

UNIT-III (7 Hrs)

Biomedical Instrumentation: Role of technology in modern healthcare, classification of biomedical instruments, performance parameters of instruments, constraints in design of medical instrumentation system.

UNIT-IV (8 Hrs)

Modern Imaging Systems: Introductory concepts of X-ray Imaging, Nuclear Medical

Imaging, Magnetic Resonance Imaging, Ultrasonic Imaging and Thermal Imaging systems.

Patient Safety issues: Electric shock hazards, leakage currents, safety codes for electromedical equipment, electrical safety analyzer, testing of biomedical equipment.

Text/Reference Books:

1. R. S. Khandpur, Handbook of Biomedical Instrumentation, Tata Mc Graw Hill.
2. J. G. Webster, Medical Instrumentation, Application and Design, John Wiley and Sons.
3. L. Cromwell, F. J. Weibell and L. A. Pfeiffer, Biomedical Instrumentation Measurements, Pearson education, Delhi, 1990.
4. Marvin D. Weisis, Biomedical Instrumentation, Chilton Book Company, 1973.
5. J. J. Carr and J. M. Brown, Introduction to Biomedical Equipment Technology, Pearson Education.
6. Harry E. Thomas, Handbook of Biomedical Instrumentation and Measurement, Reston Publishing Company, 1974.
7. M. Singh, Introduction to Biomedical Instrumentation, PHI Learning, Pvt. Ltd., 2nd edition, 2014.