GROUP-A

1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHY0-101	Physics	3	1	0	40	60	100	4
BMAT0-101	Mathematics-I	3	1	0	40	60	100	4
BMEE0-101	Engineering Graphics & Design	1	0	0	40	60	100	1
BELE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHY0-102	Physics Lab.	0	0	2	60	40	100	1
BMEE0-102	Engineering Graphics & Design Lab.	0	0	4	60	40	100	2
BELE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BHUM0-104	Drug Abuse: Problem, Management and Prevention	3	0	0	100	0	100	0
Total		13	3	8	440	360	800	17

Note:

1. **There will be Induction Programme of 3 weeks before start of normal classes.**
2. **Drug Abuse: Problem, Management and Prevention is a non-credit Course; however, it is necessary to secure at least E grade in it.**

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHM0-101	Chemistry-I	3	1	0	40	60	100	4
BMAT0-101	Mathematics-I	3	1	0	40	60	100	4
BHUM0-101	English	2	0	0	40	60	100	2
BCSE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUM0-102	English Lab.	0	0	2	60	40	100	1
BCSE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFP0-101	Manufacturing Practices	1	0	4	60	40	100	3
BHUM0-103	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	
BCHM0-101	Chemistry-I	3	1	0	40	60	100	4
BMAT0-201	Mathematics-II	3	1	0	40	60	100	4
BHUM0-101	English	2	0	0	40	60	100	2
BCSE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUM0-102	English Lab.	0	0	2	60	40	100	1
BCSE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFP0-101	Manufacturing Practices	1	0	4	60	40	100	3
BHUM0-103	Human Values & Professional Ethics	3	0	0	100	0	100	0
Total		15	2	12	500	400	900	20

Note:

1. **There will be Induction Programme of 3 weeks before start of normal classes.**
2. **Human Values & Professional Ethics is a non-credit Course; however, it is necessary to secure at least E grade in it.**

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHY0-101	Physics	3	1	0	40	60	100	4
BMAT0-201	Mathematics-II	3	1	0	40	60	100	4
BMEE0-101	Engineering Graphics & Design	1	0	0	40	60	100	1
BELE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHY0-102	Physics Lab.	0	0	2	60	40	100	1
BMEE0-102	Engineering Graphics & Design Lab.	0	0	4	60	40	100	2
BELE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BHUM0-104	Drug Abuse: Problem, Management and Prevention	3	0	0	100	0	100	0
Total		13	3	8	440	360	800	17

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 (INTRODUCTION TO ELECTROMAGNETIC THEORY)

Subject Code: BPHY0-101 **L T P C** **Duration: 45 Hrs.**

3 1 0 4

PRE-REQUISITE: Mathematics course with vector calculus

UNIT-I

1. **Electrostatics in Vacuum (8 Hrs.)**
   Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Faraday's cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

UNIT-II

2. **Electrostatics in a Linear Dielectric Medium (5 Hrs.)**
   Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.
3. **Magnetostatics (6 Hrs.)**
   Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

UNIT-III

4. **Magnetostatics in a Linear Magnetic Medium (6 Hrs.)**
   Magnetization and associated bound currents; auxiliary magnetic field; Boundary conditions on and. Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.
5. **Faraday's Law (6 Hrs.)**
   Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic breaking and its applications; Differential form of Faraday's law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi-static approximation; energy stored in a magnetic field.
6. **Displacement Current, Magnetic Field due to Time-Dependent Electric Field and Maxwell's Equations (5 Hrs.)**
   Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time dependent electric field; calculating magnetic field due to changing electric fields in quasistatic approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. Qualitative discussion of momentum in electromagnetic fields.

UNIT-IV

7. **Electromagnetic Waves (8 Hrs.)**
   The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of

electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

Recommended Text Books

1. David Griffiths, 'Introduction to Electrodynamics'.

Recommended Reference Books

1. Halliday and Resnick, 'Physics'.
2. W. Saslow, 'Electricity, Magnetism and Light'.

Course Outcomes

To be uploaded

PHYSICS (INTRODUCTION TO MECHANICS)

Subject Code: BPHY0-101 **L T P C** **Duration: 43 Hrs.**
3 1 0 4

UNIT-I

1. Module-1 (9 Hrs.)

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates

UNIT-II

2. Module-2 (8 Hrs.)

Potential energy function; F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite manoeuvres;

UNIT-III

3. Module-3 (6 Hrs.)

Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula. Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

4. Module-4 (6 Hrs.)

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.

UNIT-IV

5. Module-5 (6 Hrs.)

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.

6. Module-6 (8 Hrs.)

Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner: e.g. Rod executing conical motion with center of mass fixed — only need to show that this motion looks two-dimensional but is three-dimensional, and two dimensional formulation fails.

Recommended Reference Books

1. M.K. Harbola, 'Engineering Mechanics', 2nd Edn.

2. M.K. Verma, 'Introduction to Mechanics'.
3. D. Kleppner & R. Kolenkow, 'An Introduction to Mechanics'.
4. J.L. Synge & B.A. Griffiths, 'Principles of Mechanics'.
5. J.P. Den Hartog, 'Mechanics'.
6. J.L. Meriam, 'Engineering Mechanics – Dynamics', 7th Edn.
7. J.P. Den Hartog, 'Mechanical Vibrations'.
8. W.T. Thomson, 'Theory of Vibrations with Applications'.

Course Outcomes

To be uploaded

PHYSICS (INTRODUCTION TO QUANTUM MECHANICS FOR ENGINEERS)

Subject Code: BPHY0-101 **L T P C** **Duration: 44 Hrs.**

3 1 0 4

PRE-REQUISITE: Mathematics course on differential equations and linear algebra

UNIT-I

1. Wave Nature of Particles and the Schrodinger Equation (8 Hrs.)

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

2. Mathematical Preliminaries for Quantum Mechanics (6 Hrs.)

Complex numbers, Linear vector spaces, inner product, operators, eigenvalue problems, Hermitian operators, Hermite polynomials, Legendre's equation, spherical harmonics.

UNIT-II

3. Applying the Schrodinger Equation (17 Hrs.)

Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator. Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials Scattering from a potential barrier and tunneling; related examples like alpha-decay, field-ionization and scanning tunneling microscope
Three-dimensional problems: particle in three dimensional box and related examples, Angular momentum operator, Rigid Rotor, Hydrogen atom ground-state, orbitals, interaction with magnetic field, spin. Numerical solution stationary-state radial Schrodinger equation for spherically symmetric potentials.

UNIT-III

4. Introduction to Molecular Bonding (5 Hrs.)

Particle in double delta-function potential, Molecules (hydrogen molecule, valence bond and molecular orbitals picture), singlet/triplet states, chemical bonding, hybridization.

UNIT-IV

5. Introduction to Solids (8 Hrs.)

Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Numerical solution for energy in one-dimensional periodic lattice by mixing plane waves.

Recommended Text Books

1. Eisberg and Resnick, 'Introduction to Quantum Physics'.

Recommended Reference Books

1. D.J. Griffiths, 'Quantum Mechanics'.

2. Richard Robinett, 'Quantum Mechanics'.
3. Daniel McQuarrie, 'Quantum Chemistry'.

Course Outcomes

To be uploaded

PHYSICS (OSCILLATIONS, WAVES AND OPTICS)

Subject Code: BPHY0-101 **L T P C** **Duration: 44 Hrs.**

3 1 0 4

PRE-REQUISITES: (i) Mathematics course on Differential equations, (ii) Introduction to Electromagnetic theory

UNIT-I

1. Simple Harmonic Motion, Damped and Forced Simple Harmonic Oscillator (9 Hrs.)

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator.

UNIT-II

2. Non-dispersive Transverse and Longitudinal Waves in One Dimension and Introduction to Dispersion (8 Hrs.)

Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their Eigen frequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves. Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.

UNIT-III

3. The 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, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evanescent wave. Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method.

UNIT-IV

4. Wave Optics (7 Hrs.)

Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer. 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.

5. Lasers (10 Hrs.)

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, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

Recommended Reference Books

1. Ian G. Main, 'Oscillations and Waves in Physics'.
2. H.J. Pain, 'The Physics of Vibrations and Waves'.
3. E. Hecht, 'Optics'.

4. A. Ghatak, 'Optics'.
5. O. Svelto, 'Principles of Lasers'.

Course Outcomes

To be uploaded

MATHEMATICS-I

Subject Code: BMAT0-101 **L T P C** **Duration: 40 Hrs.**

3 1 0 4

UNIT-I

1. Calculus (6 Hrs.)

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

2. Calculus (6 Hrs.)

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

UNIT-II

3. Sequences and Series: (10 Hrs.)

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT-III

4. Multivariable Calculus (Differentiation) (8 Hrs.)

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

UNIT-IV

5. Matrices (10 Hrs.)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Recommended Text/Reference Books

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn., John Wiley & Sons, **2006**.
3. T. Veerarajan, 'Engineering Mathematics for First Year', Tata McGraw Hill, New Delhi, **2008**.
4. B.V. Ramana, 'Higher Engineering Mathematics', 11th Reprint, Tata McGraw Hill, New Delhi, **2010**.
5. D. Poole, 'Linear Algebra: A Modern Introduction', 2nd Edn., Brooks/Cole, **2005**.
6. N.P. Bali and Manish Goyal, 'A Text Book of Engineering Mathematics', Laxmi Publications, Reprint, **2008**.
7. B.S. Grewal, 'Higher Engineering Mathematics', 36th Edn., Khanna Publishers, **2010**.

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: BMEE0-101 **L T P C** **Duration: 12 Hrs.**
1 0 0 1

1. Traditional Engineering Graphics
Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing. Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.
2. Computer Graphics
Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM) (Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory)

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.**
5. (Corresponding set of) CAD Software Theory and User Manuals.

Course Outcomes
All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:
1. To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. To prepare you to communicate effectively.
3. To prepare you to use the techniques, skills, and modern engineering tools necessary for

engineering practice

The student will learn:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modelling
5. Exposure to computer-aided geometric design
6. Exposure to creating working drawings
7. Exposure to engineering communication

BASIC ELECTRICAL ENGINEERING

Subject Code: BELE0-101 **L T P C** **Duration: 42 Hrs.**
3 1 0 4

UNIT-I

1. DC Circuits (8 Hrs.)

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

UNIT-II

2. AC Circuits (8 Hrs.)

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

UNIT-III

3. Transformers (6 Hrs.)

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

4. Electrical Machines (8 Hrs.)

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

UNIT-IV

5. Power Converters (6 Hrs.)

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

6. Electrical Installations (6 Hrs.)

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Recommended Text/Reference 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**.

Course Outcomes

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

PHYSICS (INTRODUCTION TO ELECTROMAGNETIC THEORY) LAB.

Subject Code: BPHY0-102 **L T P C**
0 0 3 1.5

EXPERIMENTS

Choice of experiments from the following

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

Laboratory Outcomes

To be uploaded

PHYSICS (INTRODUCTION TO MECHANICS) LAB.

Subject Code: BPHY0-102 **L T P C**
0 0 3 1.5

EXPERIMENTS

Choice of 3-4 experiments from the following

1. Coupled oscillators;
2. Experiments on an air-track;
3. Experiment on moment of inertia measurement,
4. Experiments with gyroscope;
5. Resonance phenomena in mechanical oscillators.

Laboratory Outcomes

To be uploaded

PHYSICS (INTRODUCTION TO QUANTUM MECHANICS FOR ENGINEERS) LAB.

Subject Code: BPHY0-102 **L T P C**
0 0 3 1.5

EXPERIMENTS

Choice of experiments

To be uploaded

Laboratory Outcomes:

To be uploaded

PHYSICS (INTRODUCTION TO OSCILLATIONS, WAVES AND OPTICS) LAB.

Subject Code: BPHY0-102 **L T P C**
0 0 3 1.5

EXPERIMENTS

Choice of experiments
To be uploaded
Laboratory Outcomes:
To be uploaded

ENGINEERING GRAPHICS & DESIGN LAB.

Subject Code: BMEE0-102 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

1. Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;
2. Orthographic Projections
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;
3. Projections of Regular Solids
those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.
4. Sections and Sectional Views of Right Angular Solids
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)
5. Isometric Projections
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;
6. 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 and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];
7. 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;
8. 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; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi-view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi views of dwelling;

***9.* Demonstration of a Simple Team Design Project**

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

BASIC ELECTRICAL ENGINEERING LAB.

Subject Code: BELE0-102 **L T P C**
0 0 2 1

EXPERIMENTS/DEMONSTRATIONS

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).
6. Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
7. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
8. Torque Speed Characteristic of separately excited dc motor.
9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super synchronous speed.
10. Synchronous Machine operating as a generator: stand-alone operation with a load.
11. Control of voltage through field excitation.
12. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the

use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Laboratory Outcomes

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 machines.
5. Get an exposure to the working of power electronic converters.

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BHUM0-104 **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: BCHM0-101 **L T P C** **Duration: 42 Hrs.**
3 1 0 4

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 andaromaticity. Crystal field theory and the energy level diagrams for transition metal ions andtheir 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 metalcompounds.

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 Text 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: BMAT0-201 **L T P C** **Duration: 40 Hrs.**
3 1 0 4

UNIT-I

1. Multivariable Calculus (Integration) (10 Hrs.)

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

surface integrals, Theorems of Green, Gauss and Stokes.

UNIT-II

2. First Order Ordinary Differential Equations (6 Hrs.)

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

3. Ordinary Differential Equations of Higher Orders (8 Hrs.)

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

UNIT-III

4. Complex Variable – Differentiation (8 Hrs.)

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

UNIT-IV

5. Complex Variable – Integration (8 Hrs.)

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

Recommended Text/Reference Books

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn., John Wiley & Sons, **2006**.
3. W.E. Boyce and R.C. DiPrima, 'Elementary Differential Equations and Boundary Value Problems', 9th Edn., Wiley India, **2009**.
4. S.L. Ross, 'Differential Equations', 3rd Edn., Wiley India, **1984**.
5. E.A. Coddington, 'An Introduction to Ordinary Differential Equations', Prentice Hall India, **1995**.
6. E.L. Ince, 'Ordinary Differential Equations', Dover Publications, **1958**.
7. J.W. Brown and R.V. Churchill, 'Complex Variables and Applications', 7th Edn., McGraw Hill, **2004**.
8. N.P. Bali and Manish Goyal, 'A Text Book of Engineering Mathematics', Laxmi Publications, Reprint, **2008**.
9. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, 36th Edn., **2010**.

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: BHUM0-101 **L T P C** **Duration: 25 Hrs.**
2 0 0 2

UNIT-I

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

UNIT-II

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

UNIT-III

3. Identifying Common Errors in Writing
3.1 Subject-verb agreement
3.2 Noun-pronoun agreement
3.3 Misplaced modifiers
3.4 Articles
3.5 Prepositions
3.6 Redundancies
3.7 Clichés

UNIT-IV

4. Nature and Style of sensible Writing
4.1 Describing
4.2 Defining
4.3 Classifying
4.4 Providing examples or evidence
4.5 Writing introduction and conclusion

5. Writing Practices
5.1 Comprehension
5.2 Précis Writing
5.3 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: BCSE0-101 **L T P C** **Duration: 51 Hrs.**
3 0 4 5

UNIT-I

1. Introduction to Programming (8 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 (15 Hrs.)
Conditional Branching and Loops. Writing and evaluation of conditionals and consequent branching. Iteration and loops.

3. Arrays (6 Hrs.)
Arrays (1-D, 2-D), Character arrays and Strings

4. Basic Algorithms (6 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)

5. Function (5 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 (5 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.

7. Structure (4 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: BCHM0-101 **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: BHUM0-102 **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: BCSE0-102 **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: BMFP0-101 **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 Text/Reference 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: BHUM0-103 **L T P C** **Duration: 30 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 Hours)

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 Hours)

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 Hours)

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.