

SHAHEED BHAGAT SINGH STATE UNIVERSITY, FEROZEPUR

Study Scheme-Bachelor of Technology 2022 Batch and Onwards

Bachelors of Technology 1st and 2nd Semester

It is an Under Graduate (UG) Programme of 4 years duration (8 semesters)

Eligibility for Admission: As per AICTE norms.

First Semester

Group-A

Contact Hrs. : 31

Course Code	Course Type	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
			L	T	P	Internal	External		
BTAP101C	Basic Science Course	Physics	3	1	0	40	60	100	4
BTAP102C	Basic Science Course	Physics Lab	0	0	2	30	20	50	1
BTAM101C	Basic Science Course	Mathematics-I	3	1	0	40	60	100	4
BTPS101C	Engg Science Course	Programming for Problem Solving	3	0	0	40	60	100	3
BTPS102C	Engg Science Course	Programming for Problem Solving Lab	0	0	4	30	20	50	2
BTME101C	Engg Science Course	Engineering Drawing	1	0	4	60	40	100	3
BTME102C	Engg Science Course	Computer Graphics Lab	0	0	2	30	20	50	1
HVPE101C	Basic Science Course	Human Values and Professional Ethics	2	0	0	40	60	100	2
EVSC101C	Basic Science Course	Environmental Science	2	0	0	Satisfactory/Non Satisfactory			0
	Engg Science Course	Certificate Course-I*	3	0	0	40	60	100	3
Total			17	2	12	350	400	750	23

First Semester

Group-B

Contact Hrs. : 30

Course Code	Course Type	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
			L	T	P	Internal	External		
BTAC101C	Basic Science Course	Chemistry	3	1	0	40	60	100	4
BTAC102C	Basic Science Course	Chemistry Lab	0	0	2	30	20	50	1
BTAM101C	Basic Science Course	Mathematics-I	3	1	0	40	60	100	4
BTEE101C	Engg Science Course	Basics Electrical Engineering	3	1	0	40	60	100	4
BTEE102C	Engg Science Course	Basics Electrical Engineering Lab	0	0	2	30	20	50	1
BTHU101C	Humanities and Social Sciences including Management courses	Communication Skills in English	3	0	0	60	40	100	3
BTHU102C	Humanities and Social Sciences including Management courses	Communication Skills Lab	0	0	2	30	20	50	1
BTMP101C	Engg Science Course	Manufacturing Practice	1	0	4	60	40	100	3
SBS101C	Humanities and Social Sciences including Management courses	Introduction to Shaheed Bhagat Singh and his Co-patriotes	1	0	0	Satisfactory/Non Satisfactory			0
	Engg Science Course	Certificate Course-I*	3	0	0	40	60	100	3
Total			17	3	10	350	400	750	24

Second Semester
Group-A
Contact Hrs. : 30

Course Code	Course Type	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
			L	T	P	Internal	External		
BTAC101C	Basic Science Course	Chemistry	3	1	0	40	60	100	4
BTAC102C	Basic Science Course	Chemistry Lab	0	0	2	30	20	50	1
BTAM201C	Basic Science Course	Mathematics-II	3	1	0	40	60	100	4
BTEE101C	Engg Science Course	Basic Electrical Engineering	3	1	0	40	60	100	4
BTEE102C	Engg Science Course	Basics Electrical Engineering Lab	0	0	2	30	20	50	1
BTHU101C	Humanities and Social Sciences including Management courses	Communication Skills in English	3	0	0	60	40	100	3
BTHU102C	Humanities and Social Sciences including Management courses	Communication Skills Lab	0	0	2	30	20	50	1
BTMP101C	Engg Science Course	Manufacturing Practice	1	0	4	60	40	100	3
SBS101C	Humanities and Social Sciences including Management courses	Introduction to Shaheed Bhagat Singh and his Co-patriotes	1	0	0	Satisfactory/Non Satisfactory			0
	Engg Science Course	Certificate Course-II*	3	0	0	40	60	100	3
Total			17	3	10	350	400	750	24

Second Semester
Group-B
Contact Hrs. : 31

Course Code	Course Type	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
			L	T	P	Internal	External		
BTAP101C	Basic Science Course	Physics	3	1	0	40	60	100	4
BTAP102C	Basic Science Course	Physics Lab	0	0	2	30	20	50	1
BTAM201C	Basic Science Course	Mathematics-II	3	1	0	40	60	100	4
BTPS101C	Engg Science Course	Programming for Problem Solving	3	0	0	40	60	100	3
BTPS102C	Engg Science Course	Programming for Problem Solving Lab	0	0	4	30	20	50	2
BTME101C	Engg Science Course	Engineering Drawing	1	0	4	60	40	100	3
BTME102C	Engg Science Course	Computer Graphics Lab	0	0	2	30	20	50	1
HVPE101C	Basic Science Course	Human Values and Professional Ethics	2	0	0	40	60	100	2
EVSC101C	Basic Science Course	Environmental Sciences	2	0	0	Satisfactory/Non Satisfactory			0
	Engg Science Course	Certificate Course-II*	3	0	0	40	60	100	3
Total			17	2	12	350	400	750	23

Note:

- 1) Environmental Sciences and Introduction to Shaheed Bhagat Singh and his Co-patriotes will be offered as mandatory Non-Credit course and will have internal evaluation only with maximum marks 40.
- 2) There will be an induction training program of 3 weeks before start of normal classes.
- 3) The marks of 4 week Workshop Training of 2 credits during summer vacations after 2nd semester will be included in 3rd semester. The Workshop Training has 60marks internal and 40marks external.
- 4) A student needs to clear certificate course 1 and 2 (of 6credits) in order to be eligible for obtaining Certificate Course in any branch of Engineering after successful completion if 1st year.

*** Certificate Course-I (for B.Tech, 1st Semester)**

Course Code	Department	Course Name
BTCH101C	Chemical Engineering	Chemical Engineering Fundamentals - I
BTCE101C	Civil Engineering	Introduction to Civil Engineering
BTCS101C	Computer Science & Engineering	Computer Basics and Office Automation
BTEC101C	Electronics and Communication Engineering	Basics of Telecommunication
BTEE103C	Electrical Engineering	Electrical Workshop Practice-I
BTME103C	Mechanical Engineering	Gas Welding & Allied Processes

*** Certificate Course-II (for B.Tech, 2nd Semester)**

Course Code	Department	Course Name
BTCH201C	Chemical Engineering	Chemical Engineering Fundamentals - II
BTCE201C	Civil Engineering	Building Materials
BTCS201C	Computer Science & Engineering	Advance Office Automation and Uses of Internet
BTEC201C	Electronics and Communication Engineering	Basics of Computer Networking
BTEE201C	Electrical Engineering	Electrical Workshop Practice-II
BTME201C	Mechanical Engineering	Fundamentals of Arc Welding

BTAP101C: Physics

Semester	I/II					
Course code	BTAP-101C					
Category	Basic Sciences Courses					
Course title	Physics					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	1	0	40	60	4

DETAILED CONTENTS

Chapter-1. **Waves & Oscillations (06 Lectures):** Harmonic Oscillator: free, damped and forced oscillators; Impedance matching and resonance; Concept of stress and strain at a point

Chapter-2. **Electromagnetic Theory (05 Lectures):** Maxwell's Equations; Statement of Gauss's and Stoke's Theorems; Electromagnetic wave equation in vacuum, their transverse nature and polarization; Introduction to Poynting vector

Chapter-3. **Laser & Fibre Optics (10 Lectures):** Spontaneous and Stimulated Emissions; Einstein's theory and A and B coefficients; Population Inversion; Components of a Laser System; Ruby, He-Ne, Co₂ and Semiconductor Lasers; applications of lasers in science, engineering, and medicine. Introduction to Fibre Optics; Acceptance angle and Numerical Aperture; Step Index and Graded Index Optical Fibres; Definition and Significance of Normalized Frequency; Modes Of Propagation; Single mode and Multimode optical fibres; Loss in optical fibres (qualitative); Fibre Connectors, Splicers, Couplers; applications of Optical Fibres.

Chapter-4. **Quantum Mechanics (07 Lectures):** Introduction; Wave-Particle Duality; Matter Waves; Group and Phase velocities(qualitative); Statement of Uncertainty Principle; Wave Function, Born Probability Interpretation, Significance and Normalization of Wave Function; Time Dependent and time independent Schrodinger Wave Equations; Eigen Functions and Eigen Values; Particle in a box(One dimension only)

Chapter-5. **Physics of Materials (10 Lectures):** Electronic Materials: Dielectrics and Ferroelectrics; Magnetic Materials: dia, para, ferro and ferromagnetic, Basics of Domain theory, Ferrites, B-H Curve, Magnetic anisotropy and Magnetostriction; Superconductivity; Meissner Effect, Type I and Type II Superconductors, London Equations, Qualitative idea of BCS theory, Applications Of Superconductivity; Nanomaterials; Introduction, Surface to volume ratio, Qualitative Idea Of 1D, 2D, 3D nanomaterials, Properties of nanomaterials, applications of Nanomaterials

Chapter-6. **Semiconductors (07 Lectures):** Intrinsic and Extrinsic Semiconductors: Dependence of Fermi Level on carrier concentration and temperature (equilibrium carrier statistics); Carrier generation and recombination; Carrier transport: diffusion and drift, p-n junction; Introduction to LED and Solar Cell

SUGGESTED READING/BOOKS

- 1) Engineering Mechanics, 2nd Edition by MK Harbola

- 2) Introduction to Mechanics by MK Verma
- 3) Theory Of Vibrations with Applications by WT Thomson
- 4) Mechanical Vibrations by JP Den Hartog
- 5) An Introduction to the Mechanics of Solids, 2nd edition with SI units by SH Crandall, NC Dhall and TJ Lardner
- 6) Engineering Mechanics of Solids by EP Popov
- 7) Quantum Mechanics by D.J. Griffiths, Pearson Education, 2008
- 8) Quantum Mechanics by Richard Robinett, OUP Oxford, 2006
- 9) Introduction to Electrodynamics by DJ Griffiths
- 10) Optics by A. Ghatak, McGraw Hill Education, 2012
- 11) An Introduction to Fibre Optic System by John Power
- 12) Principles Of Lasers by O. Svelto, Springer Science & Business Media, 2010
- 13) Semiconductor Devices: Physics & Technology by SM Sze
- 14) Integrated Circuits by Milman and Helkias
- 15) Solid State Electronic Devices by BG Streetman, Prentice Hall Of India, 1995
- 16) Physics of Scientists & Engineers (Vol. I and II), Serway & Jewett, 6th edition, Cengage Learning
- 17) Physics by Halliday and Resnick
- 18) Online Courses on NPTEL.

BTAP102C: Physics Lab

Semester	I/II					
Course code	BTAP102C					
Category	Basic Sciences Courses					
Course title	Physics Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	2	30	20	1

DETAILED CONTENTS:

Physics Laboratory

Students are required to perform at least ten experiments out of the following including virtual lab.

1. Basic knowledge of least count and error analysis of Vernier Caliper and Screw Gauge.
2. To determine the frequency of AC mains by electrically maintained tuning fork.
3. To determine the moment of inertia of a flywheel.
4. To study the variation of magnetic field along the axis of a current carrying coil.
5. To determine the polarizability of a dielectric material.
6. To determine the refractive index of the material of prism.
7. To determine the specific rotation of sugar using Laurent's half shade polarimeter.
8. To determine the angular divergence of Laser.
9. To determine the number of lines per cm on a plane grating using Laser.
10. To determine the numerical aperture of an optical fibre.
11. To study the loss of optical signal in optical fibres.
12. To determine the band gap of a semiconductor material.
13. To study the characteristics of p-n junction diode (forward bias and reverse bias).
14. To study Zener diode as a voltage regulator.
15. To study the intensity response of a solar cell.

Virtual lab:

1. To verify that energy conservation and momentum conservation can be used with a ballistic pendulum to determine the initial velocity of a projectile, its momentum and kinetic energy.
2. To determine the wavelength of a laser using Michelson interferometer.
3. To find out the horizontal component of earth's magnetic field.
4. To determine the resistivity of semiconductors by four probe method.
5. To determine the Planck's constant from kinetic energy versus frequency graph.

Suggested readings/Books:

1. Practical Physics, C.L Arora, S Chand & Co.
2. Practical physics, R.S Sirohi, Wiley Eastern.
3. <http://vlab.amrita.edu/index.php> sub =1

BTAM101C: Mathematics-I

Semester	I					
Course code	BTAM101C					
Category	Basic Science Course					
Course title	Mathematics-I					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	1	0	40	60	4

Course Outcomes:

On successful completion of the course, students would learn:

- 1) To apply differential concept in practical problems of engineering.
- 2) To apply Rolle's Theorem for analysis and application to Engineering problems.
- 3) To apply tool of sequence and series for learning convergence of infinite series.
- 4) To learn the uses of multivariable functions that is essential in most branches of engineering.
- 5) The essential tool of matrices and linear algebra in a comprehensive manner.

DETAILED CONTENTS

Calculus: (6 lectures)

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.

Calculus: (6 lectures)

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

Sequences and series: (10 lectures)

Convergence of sequence and series, tests for convergence, Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

Multivariable Calculus (Differentiation): (8 lectures)

Limits, continuity and partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

Matrices (10 lectures)

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

Suggested Text/Reference Books:

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

BTPS101C: Programming for Problem Solving

Semester	I/II					
Course code	BTPS101C					
Category	Engineering Science Course					
Course title	Programming for Problem Solving					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	3

Course Outcomes:

On successful completion of the course, students would learn:

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

DETAILED CONTENTS

Unit 1

INTRODUCTION TO PROGRAMMING (4 LECTURES)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) – (1 lecture).

Idea of Algorithm:

Steps to solve logical and numerical problems. Representation of Algorithm:

Flowchart/Pseudocode with examples. (1 lecture)

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 lectures)

Unit 2

Arithmetic expressions and precedence (2 lectures)

Conditional Branching and Loops (6 lectures)

Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops (3 lectures)

Unit 3

Arrays (6 lectures)

Arrays (1-D, 2-D), Character arrays and Strings

Unit 4

Basic Algorithms (6 lectures)

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 5

Function (5 lectures) /Procedure

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

Unit 6

Recursion (4 -5 lectures)

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 7

Structure (4 lectures)

Structures, Defining structures and Array of Structures

Unit 8

Pointers (2 lectures)

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Unit 9

File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

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

Suggested Reference Books

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

BTPS102C: Programming for Problem Solving Lab

Semester	I/II					
Course code	BTPS102C					
Category	Engineering Science Course					
Course title	Programming for Problem Solving Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	4	30	20	2

DETAILED CONTENTS

[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 and 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.

BTME101C Engineering Drawing

Semester	I / II					
Course code	BTME 101 C					
Category	Engineering Science Courses					
Course title	Engineering Drawing					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	1	0	4	60	40	03

COURSE OVERVIEW:

One of the best ways to communicate one's ideas is through some form of picture or drawing. This is especially true for the engineers. Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

COURSE OBJECTIVES:

1. To understand the basic principles of engineering drawing
2. To have the knowledge of generating the pictorial views
3. To understand the development of surfaces
4. Use CAD tools for making drawings of machine components and assemblies.
5. To have the knowledge of interpretation of dimensions of different quadrant projections.

COURSE OUTCOMES:

On completion of this course students will be able to:

1. Prepare and understand drawings.
2. Use the principles of orthographic projections.
3. By studying about projections of solids, students will be able to visualize three dimensional objects and that will enable them to design new products.
4. Design and fabricate surfaces of different shapes.
5. Represent the objects in three dimensional appearances.

DETAILED CONTENTS

UNIT – I

INTRODUCTION TO ENGINEERING DRAWING: Principles of engineering drawing / engineering graphics / technical drawing and their significance – Drawing Instruments: their Standard and uses – symbols and conventions in drawing practice – lettering & numbering – BIS conventions. Types of lines and their uses, Drawing Sheets: sizes and layout, Grades of pencils used, Dimensioning: definition, types

and methods of dimensioning, concept of scales in drawing, types of scales, construction of plane and diagonal scales.

UNIT – II

ORTHOGRAPHIC PROJECTIONS: Relevance of projection, Types of projections, Principles of orthographic projections in reference to quadrants – conventions – first and third angle projections, illustration through simple problems of projection; Projections of points in quadrants. Projections and trace of a line with different possible orientations in a quadrant. Methods to find true length and inclination of a line with principal planes.

UNIT – III

PROJECTIONS OF PLANES AND SOLIDS: Concept of plane and lamina, Projections of a lamina when; parallel to any reference plane, perpendicular to any reference plane, inclined to reference plane. Traces of planes. Definition of solid, types of solids – conventions-different possible orientations of solid in a quadrant. Projections of solid when; axis parallel to reference plane, perpendicular to reference plane, inclined to one and parallel to other reference plane, parallel to both horizontal and vertical planes.

SECTION OF SOLIDS: Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

UNIT – IV

DEVELOPMENT OF SURFACE: Purpose of development, Parallel line and radial line method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

UNIT – V

ISOMETRIC PROJECTIONS: Principles of Isometric Projections-Isometric Scale- Isometric Views or drawing- Conventions. Isometric drawing / projections of solids such as cube, prisms, pyramids, cylinder, and cone.

SUGGESTED READING/BOOKS

TEXT BOOKS:

1. Engineering Drawing- Basant Agarwal, TMH
2. D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi.
3. P.S Gill, “Engineering Drawing”, S K Kataria and sons, 18th edition, 2017 reprint
4. Jolhe, Dhananjay (2006), Engineering Drawing: With an Introduction to CAD, Tata Mc Graw Hill, India.

REFERENCE BOOKS:

- 1) N. D. Bhat (2006), Engineering Drawing, Charotar Publications, New Delhi.

- 2) Venugopal (2010), Engineering Drawing and Graphics, 2nd edition, New Age Publications, New Delhi. Johle (2009), Engineering Drawing, Tata Mc Graw Hill, New Delhi, India.
- 3) Trymbaka Murthy (2007), Computer Aided Engineering Drawing, I.K. International Publishers, New Delhi.
- 4) R.B. Choudary (2005), Engineering graphics with Auto CAD, Anuradha Publishers, New Delhi

BTME102C Computer Graphics Lab

Semester	I / II					
Course code	BTME102C					
Category	Engineering Science Courses					
Course title	Computer Graphics Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	2	30	20	01

DETAILED CONTENTS

- 1) Introduction of the CAD software and its utilities in the engineering software.
- 2) Study of the various toolbar options and exercises to familiarize all the drawing tools.
- 3) Study the basic initial setting and viewing of the drafting software interfaces.
- 4) Use of basic entities in 2D.
- 5) Study and Learn Draw and Modify commands of the drafting software.
- 6) Dimensioning in 2D and 3D entries.
- 7) Study and implementing of coordinate systems & UCS.
- 8) Draw the different type of 3D modeling entities using viewing commands to view them (Isometric projection).
- 9) Sanctioning of solid primitives and rendering in 3D.
- 10) Intersection of solid primitives.

HVPE101C: Human Values & Professional Ethics

Semester	I/II (Batch 2022 Onwards)\					
Course code	HVPE101C					
Category	Humanities and Social Sciences including Management courses					
Course title	Human Values & Professional Ethics					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	2	0	0	40	60	2

COURSE OUTCOMES

After undergoing this course, students must be able to:

- 1) Understand the fundamental issues relating to the happiness and real success in both personal and professional life.
- 2) Analyze their own belief to remove confusion and complexes in order to bring self-confidence, clarity and conviction.
- 3) Develop right understanding about oneself and rest of the existence for sustained human happiness and prosperity.
- 4) Refer to natural acceptance in order to understand harmony at all the levels of existence i.e. self, family, society and nature.
- 5) Visualize an appropriate implementation of the knowledge in their respective streams to ensure mutually enriching and sustainable systems

DETAILED CONTENTS

PART -A

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for value education.
 - Self Exploration-what is it?- its content and process; “Natural Acceptance” and Experiential Validation- as the mechanism for self exploration.
 - Continuous Happiness and Prosperity- A look at basic Human Aspirations.
 - Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
 - Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario.
 - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.
- 1. Understanding Harmony in the Human Being - Harmony in Myself!**
- Understanding human being as a co-existence of the sentient “I” and the material “Body”.
 - Understanding the needs of Self (“I”) and “Body” – *Sukh* and *Suvidha*.
 - Understanding the body as an instrument of “I” (I being the doer, seer enjoyer).

- Understanding the characteristics and activities of “I” and harmony in “I”.
- Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail.
- Programs to ensure *Sanyam* and *Swasthya*.

2. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- Understanding harmony in the Family- the basic unit of human interaction.
- Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; Trust(Vishwas) and Respect (Samman) as the foundation values of relationship.
- Understanding the meaning of Vishwas; difference between intention and competence
- Understanding the meaning of Samman, difference between respect and differentiation; the other salient values in relationship.
- Understanding the harmony in the society (society being as extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human goals.
- Visualizing a universal harmonious order in society- Undivided society (Akhand Samaj), Universal order(Sarvabhaum Vyawastha- from family to world family!

PART -B

3. Understanding Harmony in the Nature and Existence -Whole existence as Co-existence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature

4. Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Competence in professional ethics:
 - Ability to utilize the professional competence for augmenting universalhuman order
 - Ability to identify the scope and characteristics of people-friendly andeco-friendly production systems
 - Ability to identify and develop appropriate technologies and managementpatterns for above production systems.
- Case studies of typical holistic technologies, management models and productionsystems.

Suggested Readings / Books:

- 1) R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.
- 2) Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and Harper Collins, USA.
- 3) E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond& Briggs, Britain.
- 4) A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- 5) Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991.
- 6) PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- 7) A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

- 8) Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) Krishi TantraShodh, Amravati.
- 9) Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972,
- 10) *Limits to Growth - Club of Rome's report*, Universe Books.
- 11) E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers*, Oxford University Press.
- 12) M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.
- 13) B P Banerjee, 2005, *Foundations of Ethics and Management*, Excel Books.
- 14) B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008

EVS101C: Environmental Science

Semester	I/II					
Course code	EVS101C					
Category	Basic science course					
Course title	Environmental Science					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	2	0	0	Satisfactory/Non Satisfactory		0

COURSE OUTCOMES:

- 1) Students will enable to recognize environmental problems at local and national level through literature and general awareness.
- 2) The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues.
- 3) The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems.
- 4) Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

DETAILED CONTENTS

Chapter – 1 Introduction to Environmental Studies: Multi-disciplinary nature of Environmental Studies: Scope & Importance Need for Public Awareness.

Chapter-2: Ecosystems Concept of an Ecosystem: Structure & functions of an ecosystem (Producers, Consumers & Decomposers) Energy Flow in an ecosystem: Food Chain, Food web and Ecological Pyramids Characteristic features, structure & functions of following Ecosystems: Forest Ecosystem Aquatic Ecosystem (Ponds, Lakes, River & Ocean)

Chapter-3: Natural Resources Renewable & Non-renewable resources: Forest Resources: Their uses, functions & values (Biodiversity conservation, role in climate change, medicines) & threats (Overexploitation, Deforestation, Timber extraction, Agriculture Pressure), Forest Conservation Act. Water Resources: Their uses (Agriculture, Domestic & Industrial), functions & values, Overexploitation and Pollution of Ground & Surface water resources (Case study of Punjab), Water Conservation, Rainwater Harvesting. Land Resources: Land as a resource; Land degradation, soil erosion and desertification. Energy Resources: Renewable & non-renewable energy resources, use of alternate energy resources (Solar, Wind, Biomass, Thermal), Urban problems related to Energy.

Chapter-4 Biodiversity & its conservation: Types of Biodiversity: Species, Genetic & Ecosystem India as a mega biodiversity nation, Biodiversity hot spots and bio-geographic regions of India, Examples of Endangered & Endemic species of India, Red data book.

Chapter -5: Environmental Pollution & Social Issues: Types, Causes, Effects & Control of Air, Water, Soil & Noise Pollution, Nuclear hazards and accidents & Health risks Global Climate Change: Global warming, Ozone depletion, Acid rain, Melting of Glaciers & Ice caps, Rising sea levels Environmental disasters: Earthquakes, Floods, Cyclones, Landslides.

Chapter -6: Social Issues and the Environment From Unsustainable to Sustainable development, Resettlement and rehabilitation of people; its problems and concerns., Environmental ethics Issues and possible solutions, Case Studies, Public awareness.

SUGGESTED BOOKS

- 1) Bharucha, E. Text Book for Environmental Studies. University Grants Commission, New Delhi.
- 2) Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- 3) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- 4) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- 5) Clark R., Marine Pollution, Clarendon Press Oxford (TB)
- 6) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- 7) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- 8) Down to Earth, Centre for Science and Environment (R)
- 9) Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p

BTCH101C: Chemical Engineering Fundamentals-I

Semester	I					
Course code	BTCH101C					
Category	Certificate Course-I					
Course title	Chemical Engineering Fundamentals I					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

Objective: The objective of this course is to present to the students, an introduction to chemical engineering calculations, establish mathematical methodologies for the computation of material balances, energy balances and to present an overview of industrial chemical processes. It is prerequisite for several other courses in the curriculum, including courses in process dynamics, heat transfer and phase equilibrium.

COURSE OUTCOMES

Students would be able to:-

- 1) Demonstrate the knowledge of basic Chemical Engineering Calculations involving units & dimensions, stoichiometry and degree of freedom analysis.
- 2) Apply material balance on Chemical Engineering processes with & without chemical reaction.
- 3) Be familiar with equations of state and properties of gases and liquids, including phase transition, crystallization and dissolution operations.
- 4) Be familiar with the scope of Chemical Engg. in everyday life, Industrial environment and Environmental conservation.

DETAILED CONTENTS

Introduction to Chemical Engineering Calculations: (8 hrs)

Units & Dimensions: Conversion of units, Mole concept, Stoichiometric and composition relationship, limiting & excess reactant, conversion and yield, Degrees of Freedom.

Graphical representations of data: Cartesian co-ordinates, Circular, Semi log, Log- log graphsetc.

Material Balance:(14 hrs)

Without Chemical reaction–Solving typical material balance problems not involving chemical reaction – Mixing, drying, distillation & Crystallization.

With Chemical Reaction –Solving typical material balance problems involving chemical reaction–Combustion, Calcination, gas-synthesis, recycle, by pass and purge streams in batch, stage-wise and continuous operations in systems.

Combustion calculation— Material balance calculations involving combustion phenomena

Gases, Vapours and Liquids:(6 hrs)

Equations of state, Vapor pressure, Raoult's law, Henry and Dalton's Law.

Scope of Chemical Engg.: (8 hrs)

Applications in everyday life: Examples in everyday life

Commercial applications: Introduction to major Chemical industries like refineries, Petrochemicals, Fertilizers, pharmaceuticals, Polymer, Pulp & paper, Sugar etc. Fuel Cells, Semi-conductors.

Environmental Conservation: Effluent treatment and Pollution control.

BOOKS RECOMMENDED:

- 1) Himmelblau, D. M., Riggs, J. B. "Basic Principles and Calculations in Chemical Engineering", Eighth Ed., Pearson India Education Services, 2015.
- 2) Bhatt, B. I., Vora, S. M., "Stoichiometry", Fourth Edition, Tata McGraw Hill Publishing Company Ltd, 2004.
- 3) Felder, R. M.; Rousseau, R. W., "Elementary Principles of Chemical Processes", Third Edition, John Wiley & Sons, 2000
- 4) Hougen, O. A., Watson, K. M., Ragatz, R. A., "Chemical Process Principles, Part-I
- 5) Material & Energy Balances", Second Edition, CBS Publishers & Distributors, 2004
- 6) Venkataramani, V., Anantharaman, N., Begum, K. M. Meera Sheriffa, "Process
- 7) Calculations" , Second Edition, Prentice Hall of India.
- 8) Sikdar, D. C., "Chemical Process Calculations", Prentice Hall of India.

BTCE101C: Introduction to Civil Engineering

Semester	I					
Course code	BTCE101C					
Category	Certificate Course-I					
Course title	Introduction to Civil Engineering					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

COURSE OBJECTIVES:

The course should enable the students to:

- 1) Introduced to an overview of Civil Engineering profession and the ethical responsibilities of engineering

COURSE OUTCOMES:

Upon completion of this course the student shall be able to:

- 1) Illustrate the fundamental aspects of Civil Engineering.
- 2) Make choice of career decisions.
- 3) Apply concepts of ethics in professional practice.

DETAILED CONTENTS

Unit – 1

Structural Engineering: Introduction to various basic aspects associated with analysis and design of various structural systems, Introduction to buildings, Bridges and other infrastructure projects.

Unit– 2

Geotechnical Engineering: Soil as construction material, Problems in plain and hilly areas, Earth retaining structures, Introduction to foundations for different types of structures, Embankments.

Unit– 3

Transportation Engineering: Modes of Transportation Engineering, Transportation Systems – Their suitability and utility, Transportation problems and roles of traffic engineers, Introduction to types of pavements, Pavement materials – conventional and new materials.

Unit – 4

Environmental Engineering: Introduction and importance of water and wastewater engineering.

Unit – 5

Surveying: Introduction and importance of surveying in Civil Engineering.

SUGGESTED READING/BOOKS

- 1) Saikia, M. D., Das, B.M. and Das, M.M. “Elements of Civil Engineering”, PHI Learning Private Limited, New Delhi.
- 2) Arora, M.K. and Badjatiya, R.C. “Geomatics Engg”, Nem Chand and Bros., Roorkee.
- 3) Penn, M. R. and Parker, P. J. “Introduction to Infrastructure: An Introduction to Civil and Environmental Engineering”, John Wiley & Sons.
- 4) Arora, K. R. “Soil Mechanics and Foundation Engineering” Standard Publishers Distributors, Delhi.
- 5) Justo, C. E. G., Khanna, S.K. and Veeraragaban, A. “Highway Engineering”, Nem Chand and Bors., Roorkee.

BTCS101C: Computer Basics and Office Automation

Semester	I					
Course code	BTCS101C					
Category	Certificate Course-I					
Course title	Computer Basics and Office Automation					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

DETAILED CONTENTS

UNIT 1: BASICS OF COMPUTER

Introduction to Computer: Definition - History & Generation of Computer (From First to 5th) - Applications of Computer – Advantages of Computer – Terms related to Computer - Characteristics of Computer: Speed, Storage, Versatility and Diligence – Hardware & Software. Block Diagram and Working Principle of Computer - Types of Computer: On the Basis of Working - Analog, Digital & Hybrid, On the Basis of Size - Main frame, Mini Computer, Super Computer, Work station, Micro Computer, Desktop Computer, Laptop Computer, Palmtop Computer; On the basis of Processor – XT, AT & Pentium(i3, i5, i7); Memory: Units, Representation, Types - Primary memory: RAM, ROM, PROM, EPROM, EEPROM, DDR Secondary memory: Hard disk, CD, DVD, Blue ray Disc, Pen Drive Magnetic tape & Zip disk – CPU: Components of CPU - Mother board, Hard disk, RAM, ROM, Processor, SMPS & Connecting wire - Graphics Card, Sound Card, Network Card – Modem; Input, Output devices: Keyboard, Mouse, Scanner, Digital Camera, Joystick, Pen drive, Monitor, Printer, Plotter – Connecting port – Serial, parallel – USB port, Tablet, Smart Phone – concept of mobile phone and Tablet and their uses – Various applications using by Tablets and Smart Phones such as UC browser, WhatsApp, Maps, Skype

UNIT 2 OPERATING SYSTEMS

Windows:

Definition of Operating System - Functions of OS - Types of OS: Single user, Multi-User, multi-task, RTOS, Single-user, Multi-tasking – Windows Desk top - GUI: Definition, Standards, Cursors/Pointers, Icons, GUI Menus, GUI-Share Data – Desktop icons and their functions: My computer, My documents, Network neighbourhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar –

Booting the system – Maintaining user accounts – File systems and special files – Backups and restoration.

UNIT 3 OFFICE AUTOMATION

Introduction to MS Office - MS Word:

MS Word - Working with Documents-Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page &

setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help, Formatting Documents - Setting Font styles, Font selection- style, size, colour etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering. Setting Page style - Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes – Shortcut Keys; Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles,, Creating Master Documents, Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Drawing - Inserting ClipArts, Pictures/Files etc., Tools – Word Completion, Spell Checks,

Introduction to MS Office – MS Excel:

MS Excel: Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys. Entering & Deleting Data- Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks, Setting Formula - finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Formatting Spreadsheets- Labelling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys. Working with sheets – Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts - Drawing. Printing.

Suggested reading and reference books:

- 1) Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
- 2) Microsoft Office 2007 Bible - John Walkenbach,HerbTyson,FaithWempen,cary
- 3) N. Prague, Michael R.groh, Peter G. Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
- 4) The complete reference Linux - Richard petersen - Tata McGraw - Hill Edition
- 5) A Conceptual Guide to OpenOffice.org 3 - R. Gabriel Gurley- CreateSpace
- 6) Independent Publishing Platform, 2008
- 7) Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena
- 8) Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
- 9) Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
- 10) Operating System Concepts - by Abraham Silberschatz, Greg Gagne, and Peter Baer
- 11) Galvin Publisher: Wiley; 8 edition (July 29, 2008)
- 12) Computer Networking 6th ed. - J.F. Kurose and K.W. Ross - Pearson;
- 13) Data Communications and Networking - Behrouz A. Forouzan, 2nd Edition -McGraw Hill Education;

- 14) Discovering the Internet: Complete - Shelly Cashman 4th Edition – Course Technology
- 15) Computer & Internet Basics Step-by-Step - Etc-end the Clutter - Infinity Publishing
- 16) <https://en.wikipedia.org>
<https://bosslinux.in/sites/default/files/BOSS4.0-Usermanual.pdf> (For EduBOSS3.0)
- 17) <https://wiki.openoffice.org/wiki/Documentation>
<http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>

BTEC101C: Basics of Telecommunication

Semester	I					
Course code	BTEC101C					
Category	Certificate Course-I					
Course title	Basics of Telecommunication					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

COURSE OBJECTIVES: The objective of this course is to familiarize the students with fundamental concepts and principles of telecommunications.

COURSE OUTCOMES:

Students will be able to understand:

- 1) Concepts of modulation, demodulation and multiplexing.
- 2) Concepts of wired, wireless and Cellular Communication systems.
- 3) Basic fundamentals and working of Satellite Communication systems.
- 4) Basic concepts of Wireless standards.

DETAILED CONTENTS

Chapter – 1 Introduction of different Signals, Noise, Attenuation, Modulation techniques, Amplitude Modulation: Transmission and Reception of DSB, SSB and VSB, Frequency Modulation, Analog to Digital: Need, Sampling process, Pulse Amplitude modulation, Pulse code modulation (PCM), Different Multiplexing techniques: FDM, TDM, CDM.

Chapter – 2 Fundamentals of Wired and Wireless Communication, Advantages and Disadvantages of wired and wireless communication systems, Bandwidth- Power concept, Different wired and wireless telecommunication systems, Different wired transmission mediums: Coaxial cable, Optical Fiber; Cellular Communication System, path loss, Fading, Cell structure, Cell capacity and capacity enhanced techniques, Microcells, Pico-cells, Indoor Communication.

Chapter – 3 Basics of satellite Communication, Geo-synchronous and non-synchronous satellites, working of satellite communication system, Satellite bands, free space path loss, power budget.

Chapter – 4 GSM system and its working, Bluetooth, Infrared, Wireless Local Loop

SUGGESTED READING/BOOKS

- 1) Electronic Communications System: Fundamentals Through Advanced, Wayne Tomasi, 5th Edition, Pearson Education, January 2008
- 2) Electronic Communication Systems, George Kennedy, Bernard Davis, S R M Parsana, 5th Edition, Tata McGraw Hill Education
- 3) Principles of Communication Systems, H. Taub, D. L Schilling, G Saha, 3rd Edition, Tata McGraw Hill Education

BTEE103C: Electrical Workshop Practice-I

Semester	I					
Course code	BTEE103C					
Category	Certificate Course-I					
Course title	Electrical Workshop Practice-I					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	3

COURSE OUTCOMES:

After successful completion of course, the students should be able to

- 1) Identify and utilize various electrical components.
- 2) Make various types of joints.
- 3) Acquire the knowledge about working of various lamps.
- 4) Design domestic and go down wiring circuits.

DETAILED CONTENTS

S. No. List of study and practical exercises:

	Hour(s)
1 Introduction with Electrical Symbols.	2
2 Familiarization with tools used in Electrical works	2
3 Introduction with Electrical Materials.	2
4 Introduction with Abbreviations Commonly used in Electrical Engineering.	2
5 Introduction of Electrical safety precaution.	2
6 To make 'Straight' joint on 1/18 PVC wire.	4
7 To make 'T' joint on 1/18 PVC wire.	4
8 To make 'Britannia' joint on GI wire.	4
9 To study fluorescent tube light, Sodium lamp and LED.	6
10 To study the working of Solar panels.	4
11 To study high pressure mercury vapour lamp. (H. P. M. V).	2
12 To wire up a circuit with two lamp controlled by two switch.	4
13 To wire up a circuit with one lamp controlled by one switch	4
14 To wire a circuit used for staircase wiring.	4
15 To study Go down wiring.	4

Recommended Books-

- 1) D K Sharma, Basic *Electrical and Electronics Engineering*, CBS publisher
- 2) H Partab, *Electrical Gadgets*,
- 3) R.P. Singh , *Electrical Workshop: A text Book*, I K International Publisher House Pvt. Ltd

BTME103C: Gas Welding and Allied Processes

Semester	I					
Course code	BTME 103 C					
Category	Certificate Course -1					
Course title	Gas Welding & Allied Processes					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

COURSE OBJECTIVES:

This course has been designed for students to acquire basic knowledge of various gas welding processes used for Manufacturing and production work in workshops and industries. They will learn the use of the basic tools, equipments and various welding processes performed in manufacturing. This is essential for mechanical engineering students to acquaint with knowledge of the gas welding and allied processes used for fabrication of various structural components which are indispensable for routine daily life requirements/necessity.

COURSE OUTCOMES:

After successful completion of this course, the student will have:

1. Knowledge of different gas welding & allied processes and their applications.
2. Understand the use of basic tools, equipment and devices used in aforesaid processes.
3. Learn the safety measures and precautions to be taken during gas welding & allied processes.
4. Visualize the various welding defects and their possible remedies.
5. Learn about the various welding nomenclature and methodology used in welding and allied processes.

DETAILED CONTENTS

Applications of gas welding processes in industry and rural areas. Basic knowledge of working and measuring tools used in gas welding and allied processes, Safety measures and their necessity in gas welding processes.

Introduction to gas welding and gas cutting, Terminology used in gas welding, Equipments and Accessories used in gas welding and gas cutting, gas welding tools, common gases used in gas welding and gas cutting, classification of oxyacetylene flames, flame temperature and their application, Technique used for gas welding, Welding symbols and welding positions, Study of weld joints and common defects observed in the weld joints

Basic fundamentals of gas cutting, Precautions to be taken during gas welding and cutting, types of cutting torches, properties of acetylene gas and oxygen gas, colour coding of gas cylinders, Brazing and its applications.

SUGGESTED TEXT BOOKS

- 1) A Text Book of Welding Technology by O.P.Khanna, Dhanpat Rai Publications , New Delhi
- 2) Welding Engineering and Technology by R.S. Parmar , Khanna Publishers, Delhi
- 3) Welding and Welding Technology by Richard L.Little, Tata McGraw Hill Publications

BTAC-101C: Chemistry

Semester	I/II					
Course code	BTAC-101C					
Category	Basic Science Course					
Course title	Chemistry					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	1	0	40	60	4

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 and knowledge about polymers and composites used in day to day life.
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.

DETAILED CONTENTS

Chapter-1

Atomic and Molecular Structure (12 Hrs.)

Bohr Model and its limitations, Line spectrum of H-atom and its explanation, Dual nature of electron, De-Broglie equation, Aufbau principle, Pauli's Exclusion Principle, Hund's Rule of max. multiplicity, Molecular orbitals and energy level diagrams of homonuclear and heteronuclear diatomic molecules. Pi-molecular orbit level diagrams for transition metal ions and their magnetic properties. Band structure of butadiene and benzene and aromaticity. Crystal field theory and the energy, Nature of solids and the role of doping on band structures.

Chapter-2

Spectroscopic Techniques and Applications (12 Hrs.)

Elementary idea of Principles, Instrumentation and applications of spectroscopy : Electronic spectroscopy and Fluorescence, Vibrational and rotational spectroscopy of diatomic Molecules , Nuclear magnetic resonance and magnetic resonance imaging.

Polymers and Composites

Introduction; Functionality; Types of polymerization; Specific features of polymers; Structures - regularity and irregularity; Tactility of polymers; Average molecular weights and size; Determination of molecular weight by number average method; Effect of molecular weight on the properties of polymers; Introduction to polymer reinforced composite.

Chapter-3

Use of Free Energy in Chemical Equilibria (10Hrs.)

Introduction to Thermodynamic functions: energy, entropy and free energy. Simple Numerical problems based on of entropy and free energies. Free energy and emf. Cell potentials, the Nernst Equation and applications. Acid base, oxidation reduction and solubility equilibria. Electrochemical Corrosion and its mechanism. Periodic Properties : 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.

Chapter-4

Stereochemistry (8 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. Organic Reactions and Synthesis of a Drug Molecule

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

SUGGESTED READING/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 Funct.

BTAC102C: Chemistry Lab

Semester	I/II					
Course code	BTAC102C					
Category	Basic Science Course					
Course title	Chemistry Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	2	30	20	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.

DETAILED CONTENTS

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 conduct metrically.
- 9) Potentiometer - 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 ϵ_{\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 - Ataminophen aspirin.

Laboratory Outcomes

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry laboratory 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

BTHU201C: Mathematics-II

Semester	II					
Course code	BTHU201C					
Category	Basic Science course					
Course title	Mathematics-II					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	1	0	40	60	4

Course Objective:

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

Course Outcomes:

On successful completion of the course, students would learn:

- 1) The mathematical tools needed in evaluating multiple integrals and their usage.
- 2) To compute the derivatives and line integrals, surface and volume integrals of scalar and vector functions, their inter-relations and learn their applications.
- 3) To use the effective mathematical tools for the solutions of differential equations that model the physical processes.
- 4) To recognize certain basic types of first order ODEs for which exact solutions may be obtained and to apply the corresponding methods of solution. It will help them to explore some of the basic theory of linear ODEs, gain ability to recognize certain basic types of higher-order linear ODEs for which exact solutions may be obtained, and to apply the corresponding methods of solution.
- 5) To demonstrate their understanding of how physical phenomena are modelled using special functions. They will be able to explain the applications and the usefulness of special functions.

DETAILED CONTENTS

Multivariable Calculus (Integration): (10 lectures)

Multiple Integration: Double integrals (Cartesian), change the 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), Simple applications involving cubes, sphere and rectangular parallelepipeds.

Vector Calculus: (10 lectures)

Line Integral, Vector Integral, gradient, divergence, curl, Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds

Ordinary differential equations of first order: (8 lectures)

Exact, linear and Bernoulli's 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 orders: (8 lectures)

Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation,

Power series solutions: (8 lectures)

Power series solution of Legendre Equation and Bessel Equation. Legendre Polynomials, Bessel functions of the first kind and their properties.

Suggested Text/Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. 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, third Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
9. B. V. Ramana, Higher Engineering mathematics, Tata Mcgraw Hills, New Delhi.

BTEE101C: Basic Electrical Engineering

Semester	I/II					
Course code	BTEE101C					
Category	Engineering Science Course					
Course title	Basic Electrical Engineering					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	1	0	40	60	4

COURSE OUTCOMES:

- 1) To understand and analyze basic electric circuits.
- 2) To study the working principles of electrical machines.
- 3) To introduce the components of transformers.
- 4) To introduce the components of Low voltage Electrical Installation.

DETAILED CONTENTS

Module 1: Direct Current (DC) Circuits

Circuit elements and connected terminology, Kirchoff's Laws- Statement and Illustrations, Method of solving circuits by Kirchoff's laws, Ohm's Law and its limitations, Analysis of D.C circuits, Superposition Theorem, Thevenin's Theorem and Norton's Theorem. (10 hours)

Module 2: Alternating Current (AC) Circuits

Representation of sinusoidal waveforms, Peak, Root Mean Square and Average value of alternating current, Phasor representation, real power, reactive power, power factor, Generation of alternating electro-motive force EMF, Concept of 3-phase EMF Generation, Introduction of Resistive, Inductive & Capacitive circuits and their series and parallel combinations. Concept of resonance in series and parallel circuits, Analysis of balanced 03 phase system with star-delta connections, Star-Delta Conversion. (10 hours)

Module 3: Transformers

Laws of Electromagnetic Induction, Magnetic Materials, BH Characteristics, Single Phase Transformer: Construction, working principle, losses, Efficiency, Voltage regulation, Auto – transformer and three phase transformer connections (star and delta). (8 hours)

Module 4: Electrical Machines

Generation of rotating magnetic fields, Construction and working of D.C. machines (motors and generators), Construction and working of a three phase Induction motor, starting of induction motors and applications (8 hours).

Module 5: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Important Characteristics for Batteries, Use of Multimeter and Meggar. (6 hours)

Suggested Books

- 1) D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
- 2) A Textbook of Electrical Technology by B.L Theraja.& A.K Theraja, S Chand publishers.
- 3) Electrical Technology, Edward Hughes, Addison Wesley Longman Limited.
- 4) Samarjit Ghosh, “Fundamentals of Electrical and Electronics Engineering”, Prentice Hall India, Reprint 2016.

BTEE102C: Basic Electrical Engineering Lab

Semester	I/II					
Course code	BTEE102C					
Category	Engineering Science Course					
Course title	Basic Electrical Engineering Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	2	40	60	1

COURSE OUTCOMES:

- 1) Get an exposure to common electrical components and their ratings.
- 2) Make electrical connections by wires of appropriate ratings
- 3) Understand the basic characteristics of transformers and electrical machines.

DETAILED CONTENTS

List of Experiments to be performed

- 1) To verify Ohm's Law and its limitations.
- 2) To verify Kirchhoff's Laws.
- 3) To measure the resistance and inductance of a coil by ammeter-voltmeter method.
- 4) To find voltage-current relationship in a R-L series circuit and to determine the power factor of the circuit.
- 5) To verify the voltage and current relations in star and delta connected systems.
- 6) To measure power and power factor in a single- phase AC circuit.
- 7) To verify series and parallel resonance in AC circuits.
- 8) To observe the B-H loop of ferromagnetic core material on CRO.
- 9) To use a bridge rectifier for full- wave rectification of AC supply and to determine the relationship between RMS and average values of the rectified voltage.
- 10) To measure the minimum operating voltage, current drawn, power consumed, and the power factor of a fluorescent tube light.
- 11) To perform open and short circuit tests on a single phase transformer and calculate its efficiency
- 12) To connect, start and reverse the direction of rotation of a -
 - i.* DC motor
 - ii.* Induction motor (star and delta connections)
- 13) To study the use of Multimeter.
- 14) To measure the insulation resistance using Meggar.

Note: At least ten experiments should be performed in semester.

BTHU101C: Communication Skills In English

Semester	I/II					
Course code	BTHU101C					
Category	Humanities and Social Sciences including Management courses					
Course title	Communication skills in English					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	3

COURSE OUTCOMES:

- 1) Understand the significance of effective communication in English at work place.
- 2) Enhance vocabulary and acquire effective reading skills for academic and professional efficiency.
- 3) Utilize suitable writing styles while expressing their thoughts and ideas in an organized way in written form.
- 4) Produce effectively different forms of professional writing.
- 5) Enhance grammatical competence in English language

DETAILED CONTENTS

Chapter – 1: **Importance of Communication in English Communication:** Its meaning, Process, Types, Channels and Barriers to effective communication, Language as a tool of communication, significance of communicating in English

Chapter – 2: **Reading Skills & Vocabulary Building:** Reading Process, Reading Strategies, Reading Comprehension, Synonyms, Antonyms, and Standard abbreviations

Chapter – 3: **Basic Writing Skills & Writing Styles:** Sentence Structure; creating coherence; organizing principles of paragraphs in documents, Paragraph writing, Essay writing, Précis writing, Identifying Common errors in writing Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles and Prepositions

Chapter – 4: **Writing Practices** -Business letters,: Complaint letter, Collection Letter, Sales Letter, Inquiry Letter, Order Placement Letter; Job Applications and Resume/CV Writing, Business Emails, Memorandum and Report Writing.

Chapter – 5: **Speaking Skills and Listening Skills:** Importance of Oral presentation, Outlining and Structuring of Presentation, Role of Visual Aids, Guidelines for Effective Presentation, Interview Skills, Importance of Listening in communication, Poor Listening Habits, Types of Listening, Qualities of a good Listener

SUGGESTED READING/BOOKS

- 1) Fundamentals of Technical Communication, Meenakshi Raman & Sangeeta Sharma, Oxford university Press.
- 2) Effective business Communication, Asha Kaul, Prentice Hall of India.
- 3) Communication Skills for Engineers, Sunita Mishra & C. Mualikrishna, PearsonEducation.
- 4) Effective Technical Communication, M. Ashraf Rizvi, McGraw Hill
- 5) Remedial English Grammar. F.T. Wood. Macmillan.2007
- 6) On Writing Well. William Zinsser. Harper Resource Book. 2001
- 7) Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press.2006.
- 8) Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press.2011.

BTHU102C: Communication Skills Lab

Semester	I/II					
Course code	Laboratory (BTHU-102C)					
Category	Humanities and Social Sciences including Management courses					
Course title	Communication skills Lab					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	0	0	2	30	20	1

COURSE OUTCOMES:

- 1) Receive and understand spoken material accurately besides developing ability to converse fluently.
- 2) Demonstrate fluency in speech in acceptable accent.
- 3) Acquire proficiency in skills involved in effective workplace communication.
- 4) Develop a knack for structured public talk.
- 5) Imbibe the skills required to perform satisfactorily in job interviews.

DETAILED CONTENTS

1. Interactive practice sessions in Language Lab on Oral Communication
2. Listening Comprehension: Listening to a recorded talk and participation in conversation.
3. English Sound System, Pronunciation and Stress Placement.
4. Communication at Workplace: Self-introduction, Discussion Skills, Meeting Skills and Telephonic Skills.
5. Oral Presentations: Power Point Presentation.
6. Interviews: Pre-interview Preparation, Question-answer Strategies, Projecting a positive image.

SUGGESTED READING/BOOKS

- 1) Michael Swan. OUP. 1995.
- 2) Handbook of Practical Communication. Chrissie Wright. Jaico Publishers.
- 3) Effective Technical Communication, M.Ashraf Rizvi Tata McGraw Hills.
- 4) Spoken English , R.K. Bansal & J.B. Harrison Orient Longman.
- 5) A Practical Course in English Pronunciation, J.Sethi, Kamlesh Sadanand & D. V. Jindal Prentice Hall of India Pvt. Ltd. New Delhi.
- 6) A Text book Of English Phonetics for Indian Students T. Balasubramaniam, Macmillan English Pronouncing Dictionary ,Daniel Jones, Current Edition with CD Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

BTMP101C: Manufacturing Practice

Semester	I / II					
Course code	BTMP101 C					
Category	Engineering Science Courses					
Course title	Manufacturing Practice (Theory and Lab)					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	1	0	4	60	40	03

COURSE OBJECTIVES:

This course has been designed for students to acquire basic knowledge of various conventional machines and tools used for Manufacturing and production processes in Workshops. They will learn the use of the basic tools, equipments etc. and various operations performed on the machines for different processes involved in manufacturing. This training is essential for all branches of engineering to acquaint with knowledge of the various basic manufacturing processes used for fabrication of commercial and domestic structural components which are indispensable for routine daily life requirements/necessity.

COURSE OUTCOMES:

After successful completion of this course, the student will have:

- 1) Knowledge of basic machines and tools used in workshop
- 2) Understand/Learn the use of main tools, devices and machines used in workshop
- 3) Hands on practice of various tools, equipments and operations on the conventional machines for fabrication/Manufacturing processes
- 4) Utilize skill acquired in the workshop through practice
- 5) Acquire practical knowledge of various tools, equipments and basic operations performed on machines

DETAILED CONTENTS

CARPENTARY AND PATTERN MAKING SHOP

Introduction to wood working, Marking and measuring tools used in carpentry Steel rule, try square, marking gauge, Cutting Tools- Saws, chisels, jack planes, Drilling tools, drill bits, Striking tools-hammers, mallet etc., Holding tools- bench vice etc., Miscellaneous tools- rasps, files, screw driver, pincer etc. Brief study of operations like marking, sawing, planning, chiseling, boring, grooving, Introduction to pattern making, moulding and foundry. Study of pattern making materials like wood, cast Iron, brass, aluminum, etc., different types of patterns, pattern allowances.

FOUNDARY SHOP

Introduction to casting process, core-boxes, core prints, Brief study of various hand tools used in foundry - shovel, riddle, rammer, trowel, slick, lifter, sprue pin, bellow, vent rod etc. molding sands, grain shape and size, properties of moulding sand, sand preparation and testing , Necessity of gating systems, Functions of risers, directional solidification. Casting- permanent mould, casting process

SMITHY SHOP

Introduction to Tools and equipment used in hand forging, Hearth, anvil, sewage block, tongs, hammers, chisels, punches, fullers etc., Forgeability of metals, Forging temperature, Study of forging operation

MACHINING SHOP

Introduction to Machines, Cutting tools, Use of coolant, Study of Lathe machine, Drilling machine, Grinders, Shaper machine etc. and various machining operations related to these machines

WELDING SHOP

Introduction to different welding methods, Gas and arc welding, Study of tools and welding equipment used in gas and arc welding, Welding electrodes, Welding joints, Welding defects

ELECTRICAL SHOP

Introduction to tools and equipments used in electrical shop, AC and DC power supply, Study of electrical materials, wires and electrical connections etc., preparation of PCB, soldering ,types of cables

SHEET METAL SHOP

Introduction to sheet metal work, Brief study of hand tools used in sheet metal shop - Steel rule, vernier calipers, micrometer, sheet metal gauge etc., scriber, divider, punches, chisels, snips, pliers, rivets etc., Study of basic sheet metal related processes like shearing, bending, drawing, squeezing etc.

FITTING SHOP

Introduction to fitting, brief study of tools used in fitting - bench vice, hammers, chisels, Various types of files, scrapers, hacksaws, try squares, drill machine, drill bits, dies etc, Brief introduction to Fitting relevant operations.

MANUFACTURING PRACTICE LAB

- 1) To prepare a job in the carpentry shop
- 2) To prepare a sand mould in the foundry shop
- 3) To prepare a job in the smithy shop
- 4) To prepare a work piece on centre Lathe as per drawing
- 5) To prepare a job in the welding shop
- 6) To prepare a job in the Electrical shop
- 7) To prepare a job in the sheet metal shop
- 8) To prepare a job in the Fitting shop related to fitting operations

SUGGESTED TEXT/REFERENCE BOOKS

- 1) Elements of Workshop Technology, Vol.I (2008) and Vol.II (2010) by S.K. Hajra Choudhury, A.K Hajra Choudhury and Nirjhar Roy, Media Promoters and Publishers Private Limited, Mumbai.
- 2) Manufacturing Engineering and Technology, 4th Edition (2002) by S. Kalpakjian and Steven S. Schmid, Pearson Education India Edition
- 3) Manufacturing Technology –I (2008) by S.Gowri, P. Hariharan and A. Suresh Babu, Pearson Education
- 4) Processes and Materials of Manufacture, 4th Edition (1998) by Roy A. Lindberg, Prentice Hall India
- 5) Manufacturing Technology Vol.I and Vol. II (2017) by P.N.Roy, Tata McGraw Hill House

SBS101C: Introduction to Shaheed Bhagat Singh and His Co-Patriots

Semester	I / II					
Course code	SBS101C					
Category	Humanities and Social Sciences including Management courses					
Course title	Introduction to Shaheed Bhagat Singh and His Co-Patriots					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	1	0	0	Satisfactory/Non Satisfactory		0

DETAILED CONTENTS

Chapter 1: Introduction to Bhagat Singh as a person through the eyes of his colleagues

Family background and childhood, Education and participation in National Freedom Movement, his visit to Jallianwala Bag and Nankana Sahib.

Chapter 2: His Contribution to National Freedom Movement

Building of Youth Movement, His contribution through his writings, National College Movement and his comrades, Dwarka Das Library, Lahore Science Movement, List of books Shaheed Bhagat Singh read.

Chapter 3: Shaheed Bhagat Singh's experience at Kanpur

As journalist and joining Hindustan Republican Association

Chapter 4: His Return to Punjab

Jaiton Morcha, His first experience of underground life, Shaheed Bhagat Singh at Kirti Magazine Establishment, Hindustan Socialist Republican Association.

Chapter 5: Shaheed Bhagat Singh's Attacks on British rule

Saunders case, Assembly Bomb Case, Hunger Strike for Jail Reforms, 'Cut Short Justice' system of the British.

Chapter 6: Overall contributions and his vision of free India

Reference Books

- 1) Sardar Bhagat Singh by Jatinder Nath Sanyal, National Book Trust, New Delhi
- 2) Bhagat Singh Enduring Legacy for Justice, Liberty and Equality, published by Social Change papers, New Delhi.
- 3) Shaheed Bhagat Singh and his comrades by Prof. Jagmohan Singh Chetna Parkashan, Punjabi Bhawan, Ludhiana
- 4) Yash Ki Dhrohar Edited by Banarsi Das Chaturvedi published by Atma Ram and Sons, Delhi.
- 5) Samaritan by Shiv Verma published by Lok Prakashan Greh, Delhi
- 6) Amar Shaheedon Ke Sansmaran by Raja Ram Shashtri published by Sadhna Sahitya Mander Parkashan Kanpur
- 7) Bhagat Singh the Eternal Rebel by Malwinderjit Singh Waraich Published by Unistar Book Pvt Ltd.
- 8) www.shaheedbhagatsingh.org

BTCH201C: Chemical Engineering Fundamentals II

Semester	II					
Course code	BTCH201C					
Category	Certificate Course-II					
Course title	Chemical Engineering Fundamentals II					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

Course Objective:

The course introduces students briefly the principles of fluid mechanics, heat and mass transfer mechanisms in solids and fluids and that are of fundamental importance to chemical engineers. The concept of Energy Balance and Humidity to chemical processes has been underlined through this course.

COURSE OUTCOMES

Students would be able to:-

- 1) Understand basics of typical unit operations involved in Chemical Engg.
- 2) Demonstrate the knowledge of basic Chemical Engineering Calculations involving application of thermo physics and thermo chemistry laws for applying energy balance on Chemical Engineering processes.
- 3) Comprehend the concept of humidity and usage of psychometric charts and steam tables.

DETAILED CONTENTS

Introduction to Unit operations in Chemical Engineering: (4hrs)

Basic outline of various unit operations in Chemical Engineering- Fluid mechanics, Heat Transfer, Mass Transfer & operations involving particulate matter.

Introduction to fluid mechanics: (6hrs)

Concept of fluid, Classification of fluids - ideal and real fluids, Newtonian and non-Newtonian Fluids, Criterion of Laminar & Turbulent flow based on Reynold's Number, Continuity Equation, Bernoulli's Equations.

Introduction to Heat Transfer: (6hrs)

Conduction: Conductive heat transfer through solid Fourier's law

Convection: Concept of Free and forced convection, Convective heat transfer coefficient.

Radiation: Distribution of radiant energy, Definition of emissivity, absorptivity, Reflectivity and transmissivity, concept of Black and Grey bodies

Introduction to Mass Transfer operations: (6 hrs)

Importance and classification of mass transfer operations in Chemical Engineering, Mass transfer in simple situations –with and without chemical reaction, Fick's First law of diffusion, diffusion through fluids, steady state diffusion, concept of mass transfer coefficients.

Introduction to Energy Balance: (12hrs)

Standard heat of formation and combustion, standard heat of reaction, problems using Hess's Law, open and closed system, heat capacity, calculation of enthalpy changes.

Heat balances for nonreacting processes and reaction processes. Theoretical flame & Adiabatic reaction temperature

Humidity: (8hrs)

Absolute Humidity, Relative Humidity, Dew point, Saturation, humid heat, humid volume Dry bulb & Wet bulb temperature, use of psychometric Chart and Steam tables.

BOOKS RECOMMENDED:

1. McCabe, Warren L., Smith, Julian C. and Harriot, P., Unit Operations of Chemical Engg., 7th Ed., McGraw Hill, 2005
2. Backhurst J.R., Harker J.H., Coulson J.F., Richardson J.M., Chemical Engineering – Volume 1, 6th Ed., Butterworth Heinemann, 1999
3. Chattopadhyay, P., Unit Operations of Chemical Engg. Vol.1, 3rd Ed., Khanna Publishers.
4. Holman, J.P., Heat Transfer, 10th Ed., McGraw Hill, 2010.
5. Kern D.Q., Process Heat Transfer, McGraw Hill.
6. Kumar D. S. Basics of Heat and Mass Transfer, Kataria, S. K., & Sons
7. Treybal Robert E., Mass Transfer Operations, 3rd Ed., McGraw Hill, 2001.

BTCE201C: Building Materials

Semester	II					
Course code	BTCE201C					
Category	Certificate Course-II					
Course title	Building Materials					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

COURSE OBJECTIVES: The course should enable the students to:

- 1) Develop knowledge of material science and behaviour of various building materials used in construction.
- 2) Identify the construction materials required for the assigned work.
- 3) Provide procedural knowledge of the simple testing methods of brick, cement, lime and concrete etc.
- 4) Understanding of damp proofing course, finishing, plastering and pointing.

COURSE OUTCOMES: Upon completion of this course the student shall be able to:

- 1) Understand the concept of various methods of manufacture of bricks.
- 2) Obtain differentiate the fine aggregates and coarse aggregates under various views.
- 3) Explain various types of cements and their applications in construction. Various field and laboratory tests on cement.
- 4) Explain the methods of plastering, materials and its types.
- 5) Understanding the concept of dampness in buildings.

DETAILED CONTENTS

Unit – 1

Bricks: General terms, Classification of bricks, Composition of good brick earth, Harmful ingredients in brick earth, Qualities of good bricks, Tests for bricks.

Timber: Definition, Classification of trees, Structure of a tree, Seasoning of timber, Defects in timber, Market forms of timber

Unit– 2

Lime: Introduction, Definitions: Calcination, Hydraulicity, Setting, Slacking, Sources of lime, Classification of limes and their uses, Tests for lime stones.

Cement: Different types of cement, Constituents of cement, Manufacturing of Portland cement, Hydration of cement, Tests for cement, Uses of different types of cement.

Unit – 3

Concrete: Introduction, Constituents of concrete, Batching of materials, Manufacturing process of cement concrete, Workability and factors affecting it, Methods to determine workability, Segregation and bleeding of concrete, Strength of concrete and factors affecting it, Tests for concrete.

Unit – 4

Damp Proofing: Causes and bad effects of dampness, Preventive measures for dampness in buildings.

Plastering and Pointing: Objectives, Methods of plastering, Materials and types, Defects in plastering, Special material for plastered surface, Distempering, White washing and colour washing.

SUGGESTED READING/BOOKS

- 1) Shetty, M.S. “Concrete Technology”, S. Chand Publication.
- 2) Bindra, S.P. and Arora, S.P. “Building Construction”, Dhanpat Rai Publication.
- 3) Duggal, S.K. “Building Materials”, New Age International Publishers.
- 4) Rangwala, ‘Engineering Materials’, Charotar Publication House.
- 5) Punmia, B.C. “Building construction”, Laxmi Publication.
- 6) Singh, P. “Civil Engineering Materials”, S K Kataria and Sons

BTCS201C: Advance Office Automation and Uses of Internet

Semester	II					
Course code	BTCS201C					
Category	Certificate Course-II					
Course title	Advance Office Automation and Uses of Internet					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

DETAILED CONTENTS

UNIT 1:

Role of CMOS settings: Date and Time settings, Role of CMOS battery, Boot sequence, Enabling/Disabling various on board components.

Unit 2:

MS Office: Handling Large documents; like how to manage same format for the entire document with headings of different level. Add Table of Contents, Custom Page numbering at bottom of page, Mail Merge. Embed Excel sheet in MS-Word.

Unit 3

Data Communication

Computer Networks: Data Communications –Types of Computer Networks – Local Area Networks & Wide Area Networks.

Internet and Web Browsers: Definition & History of Internet - Uses of Internet - Definition of Web- Addressing-URL-Different types of Internet Connections; Dial up connection, Broad band (ISDN, DSL, Cable), Wireless (Wi-Fi, WiMax, Satellite, Mobile) naming convention, browsers and its types, internet browsing, searching - Search Engines - Portals - Social Networking sites- Blogs - viewing a webpage, downloading and uploading the website; Creating an email-ID, e-mail reading, saving, printing, forwarding and deleting the mails, checking the mails, viewing and running file attachments, addressing with cc and bcc.

Suggested reading and reference books:

- 1) Fundamentals of computers - V.Rajaraman - Prentice- Hall of india

- 2) Microsoft Office 2007 Bible - John Walkenbach, Herb Tyson, Faithe Wempen, Cary
- 3) N. Prague, Michael R. Groh, Peter G. Aitken, and Lisa A. Bucki - Wiley India Pvt. Ltd.
- 4) The Complete Reference Linux - Richard Petersen - Tata McGraw - Hill Edition
- 5) A Conceptual Guide to OpenOffice.org 3 - R. Gabriel Gurley - CreateSpace Independent Publishing Platform, 2008
- 6) Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena
- 7) Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.
- 8) Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
- 9) Operating System Concepts - by Abraham Silberschatz, Greg Gagne, and Peter Baer
- 10) Galvin Publisher: Wiley; 8 edition (July 29, 2008)
- 11) Computer Networking 6th ed. - J.F. Kurose and K.W. Ross - Pearson;

BTEC201C: Basics of Computer Networking

Semester	II					
Course code	BTEC201C					
Category	Certificate Course-II					
Course title	Basics of Computer Networking					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

COURSE OBJECTIVES: The objective of this course is to familiarize the students with basics of computer networking, networking devices, topologies and protocols.

COURSE OUTCOMES: Students will be able:

- 1) To understand the concepts of Data Communication.
- 2) To familiarise with the Transmission Media and Error Detection & Correction.
- 3) To understand the features and functionalities of standard networking components.
- 4) To understand the concepts of different types of networks, topologies and protocols.

DETAILED CONTENTS

Chapter – 1 Data Communication System & its Components, Representation of data using different formats, Different Transmission Media, Local Asynchronous Communication (RS-232), Baud rate, Bit rates, and SNR ratio, Multiplexing (FDM/TDM/CDM), Wavelength division Multiplexing.

Chapter – 2 Packets, Frames and Error detection: Concept of packets, packets and hardware frames, Byte stuffing, Transmission errors, Parity bits and parity checking, Probability and Error detection with checksums and CRC checks.

Chapter – 3 Networking and Internetworking, significance of data networking, Growth of Internet, Networking Components: Hubs, Switches, Routers, Bridges, Amplifiers, Repeaters, Regenerators, and Modems: Optical, radio-frequency, and dialup modems, Modem hardware, Basics of Wi-Fi and Li-Fi networking.

Chapter – 4 Local area network (LAN): Wired LAN, Wireless LANs, Metropolitan area network (MAN), and Wide area network (WAN) and their comparison, LAN topologies, Ring topology and Token passing, Star networks, Ethernet: Thin and Thick Ethernet, OSI Models, TCP/IP protocols.

SUGGESTED READING/BOOKS

- 1) Computer Networks, D E Comer, M.S Narayanan, 4th Edition, Pearson Education, January 2004

- 2) Data communications and networking, Behrouz A. Forouzan, 4th Edition, July, 2017, Tata McGraw Hill Education
- 3) Computer Networking With Internet Protocols and Technology, William Stallings, January 2003, Pearson Education

BTEE201C: Electrical Workshop Practice-II

Semester	I					
Course code	BTEE201C					
Category	Certificate Course-II					
Course title	Electrical Workshop Practice-II					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	3

COURSE OUTCOMES:

After successful completion of course, the students should be able to

- 1) Know the importance of safety devices in domestic installation.
- 2) Learn different types of house wiring and wiring tools.
- 3) Understand distribution of electrical energy in domestic electric installation.
- 4) Study different type of home appliances.

DETAILED CONTENTS

S.No. List of study and practical exercises:

	Hour(s)
1 Introduction of Electrical safety precaution.	2
2 Importance of Safety device in domestic installation Study of safety devices such as Fuses, Miniature circuit breaker (MCB), Moulded Case Circuit Breaker (MCCB), Earth Leakage Circuit Breaker (ELCB) and Earthing.	4
3 Study of wiring tools and accessories	2
4 Electrical wiring practices (House wiring) Distribution of electrical energy in a domestic electrical installation.	4
5 Study of home appliances – Table Fan.	2
6 Study of home appliances – Ceiling Fan.	4
7 Study of home appliances – Mixer Grinder.	4
8 Study of home appliances – Electric Iron.	4
9 Study of home appliances – Geyser.	4
10 Study of home appliances – Desert Cooler.	4
11 Study of home appliances – Refrigerator.	4
12 Study of home appliances – Air Conditioner.	4
13 Study of home appliances – Energy meter.	4

14	Study of motor starter – Direct Online Starter (DOL).	4
15	Study of – Contactors, Circuit Breaker used in Electrical Engineering.	4

Recommended Books

- 1) D. K. Sharma, Basic Electrical and Electronics Engineering, CBS publisher
- 2) H.Partab,Electrical Gadgets, DhanpatRai and Sons
- 3) R. P. Singh, Electrical Workshop: A text Book, I. K. International Publisher House Pvt. Ltd

BTME201C: Fundamentals of Arc Welding

Semester	II					
Course code	BTME 201 C					
Category	Certificate Course-II					
Course title	Fundamentals of Arc Welding					
Scheme and Credits	L	T	P	Internal Marks	External Marks	Credits
	3	0	0	40	60	03

COURSE OBJECTIVES:

This course has been designed for students to acquire basic knowledge of various arc welding processes used for Manufacturing and production work in workshops and industries. They will learn the use of the basic tools, equipments and various arc welding processes used in manufacturing. This is essential for mechanical engineering students to acquire the knowledge of the different arc welding processes used for fabrication of various structural and commercial components.

COURSE OUTCOMES:

After successful completion of this course, the student will have:

1. Knowledge of arc welding & advanced welding methods and their applications
2. Understand the use of basic tools, equipment and devices used in the various arc welding processes and learn the safety measures and precautions to be taken during arc welding processes
3. Study of the various weld joints and metal joining processes
4. Study of various destructive and Non- destructive test used in welding
5. Learn about the welding nomenclature and methodology used in arc welding and various advanced welding methods

DETAILED CONTENTS

INTRODUCTION TO WELDING

Applications of arc welding processes in industry and rural areas. Basic knowledge of working and measuring tools used in arc welding, Safety measures and their necessity in arc welding processes.

ARC WELDING

Arc welding and its applications, Study of relevant equipments and tools used, Precautions to be taken during arc welding process.

WELDING ELECTRODES

Concept of Polarity and its importance in different arc welding processes, Arc welding and its application, Welding positions - Flat, Horizontal, Vertical and Overhead. Welding electrodes,

Types of Flux coating, and Precautions in handling & storage of electrodes, Use of filler rod and flux etc.

WELD JOINTS

Welding metals and their properties, Study of different methods for metal joints like Riveting, Soldering, Brazing and welding, various types of weld joints, Defects in weld joints, welding of similar and dissimilar metals.

INSPECTION AND TESTING OF WELDS

Inspection and testing of welds, Study of Destructive and Non Destructive tests carried out for testing of weld.

ADVANCE WELDING METHODS

Introduction to advance welding methods, Submerged arc welding, Tungsten Inert gas welding, Metal Inert gas welding, CO₂ welding, Electron Beam welding, Friction welding, Resistance welding.

SUGGESTED TEXT BOOKS

- 1) A Text Book of Welding Technology by O.P.Khanna, Dhanpat Rai Publications ,New Delhi
- 2) Welding Engineering and Technology by R.S. Parmar , Khanna Publishers, Delhi
- 3) Welding and Welding Technology by Richard L.Little, Tata McGraw Hill Publications