

CENTRAL UNIVERSITY OF PUNJAB BATHINDA



**Syllabus Semester I and Semester II
B. Tech Computer Science & Engineering
(1st and 2nd semester)
Batch 2024 & Onwards**

Session - 2024-28

Department of Computer Science & Technology

Programme Educational Learning Outcomes

PEO - I Students will establish themselves as effective professionals by solving real problems through the use of computer science knowledge and with attention to team work, effective communication, critical thinking and problem solving skills.

PEO - II Students will develop professional skills that prepare them for immediate employment and for life-long learning in advanced areas of computer science and related fields.

PEO - III Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies.

PEO - IV Students will be provided with an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

At graduation time, a student should have:

General Graduate Attributes	Discipline Graduate Attributes
G1 Ability to identify a problem, analyze using design thinking techniques, and evolve innovative approaches for solving it.	CS1 Proficiency in writing in at least two dissimilar programming languages programs of modest complexity which are: readable, tested for correctness, efficient, and secure
G2 Ability to apply mathematical concepts and techniques in problem solving.	CS2 Ability to design and apply appropriate algorithms and data structures for evolving efficient computing based solutions for new problems.
G3 Ability to function effectively in multicultural teams to accomplish a common goal.	CS3 Understanding of computing systems at computer architecture, operating systems, and distributed-computing levels, and how they affect the performance of software applications.
G4 Ability to communicate effectively with a wide range of audience.	CS4 Understanding of theoretical foundations, fundamental principles, and limits of computing.
G5 Ability to self-learn and engage in lifelong learning and upgrade technical skills	CS5 Ability to analyse large volumes of data employing a variety of techniques for learning, better prediction, decision making, etc.
G6 An understanding of professional and ethical responsibility	ADVANCED/OPTIONAL GAs CS6 Ability to design, implement, and evaluate computer based system or application to meet the desired needs using modern tools and methodologies
G7 Ability to undertake small research tasks and projects.	CS7 Ability to develop full stack applications using one commonly used tech-stack and modern tool.
G8 An entrepreneurial mind set for opportunities using technology and innovations.	CS8 Understanding of and ability to use advanced techniques and tools in a few different domain areas (e.g. parallel processing, image processing, IR, ...)
G9 An understanding of impact of solutions on economic, societal, and environment context.	CS9 Exposure to emerging technologies such as Cloud Computing, IoT, etc. G10 Strong emotional intelligence, human and cultural value

CENTRAL UNIVERSITY OF PUNJAB
(B. Tech. 1 st Year batch 2024 & Onwards)

Bachelors of Technology 1 st and 2nd semester: It is an Under Graduate (UG)

Programme of 4 years duration (8 semesters)

Eligibility for Admission: As per AICTE norms

Semester I						
2-Week Orientation Programme and Bride Course						
S.No	Course Code	Course Title	L	T	P	Credits
1.	BSC-101	Physics-I	2	0	2	4
2.	BSC-102	Mathematics-I	3	1	0	4
3.	ESC-101	Basic Electrical Engineering	3	1	2	5
4.	ESC-102	Engineering Graphics & Design	1	0	4	3
5.	ESC-103	Programming for Problem Solving	3	0	2	4
6.	HSMC-102	Design Thinking & IDEA Lab Workshop	3	0	2	4
7.	AU-102^	Mentoring and Professional Development	0	0	2	0
Total						24
Note: ^ represents "Audit Course".						

Semester II						
S.No	Course Code	Course Title	L	T	P	Credits
1.	BSC-202	Fundamentals of Modern Computing	4	0	0	4
2.	BSC-201	Mathematics-II	3	1	0	4
3.	HSMC-201	Communication Skills	2	0	2	3
4.	ESC- 201	Object Oriented Programming with C++	3	0	2	4
5.	ESC-202	Workshop/Manufacturing Practices	1	0	4	3
6.	AU-201^	Sports and Yoga or NSS/NCC	2	0	0	0
7.	HSMC(H-102)	Universal Human Values-II: Understanding Harmony And Ethical Human Conduct	2	1	0	3
8.	BMPD201	Mentoring and Professional Development	0	0	2	0
Total						21
Note: ^ represents "Audit Course".						

SEMESTER – 1

SEMESTER – I

L	T	P	Cr
3	0	2	4

Course Code: BSC- 101

Course Title: **Physics – 1**

Total Hours: 30-35

Course Objectives

The objective of the course is to develop a scientific temper and analytical capability in the engineering graduates through the learning of physical concepts and their application in engineering & technology. Comprehension of some basic physical concepts will enable graduates to think logically about the engineering problems that would come across due to rapidly developing new technologies.

Course Learning Outcomes

Course learning outcomes (CLOs): After the completion of the course, the student will be able to:

CLO1: Apply the concepts of Quantum mechanics to one dimensional motion of electrons.

CLO2: Classify solids on the basis of Band theory and to calculate carrier concentrations.

CLO3: Evaluate the electrical conductivity and identify the type of semiconductor.

CLO4: Implement the fundamentals of LASER for different applications.

Activities: Units/ Hours	Contents	Mapping with Course Learning Outcome
Unit I 08 Hours	<p>Quantum Mechanics Matter waves, Properties of matter waves, Physical significance of wave function. Schrödinger's time dependent and time independent equations, Operators, Eigen values and Eigen functions, Expectation values, Applications of Schrödinger's equation; Motion of a free particle, Electron in an infinite deep potential well (rigid box).</p> <p>Learning Activities: Lecture and Discussion, Interactive Demonstration</p>	CLO1
II Units 10 Hours	<p>Solid State Physics Band theory of solids, Energy level splitting in a solid as a function of interatomic distance. Band formation in Silicon. Fermi-Dirac probability function, Nearly free electron theory (E-k curve), classification of solids on the basis of band theory</p> <p>Introduction to Semiconductor Physics</p> <p>Learning Activities: Lecture and Discussion, Lecture and Discussion, Problem solving and Lab experiments</p>	CLO2

III Units 8 Hours	Mechanical Vibrations Introduction to Mechanical Vibrations, Equation of motion and its solution, Equivalent stiffness of spring combinations, Natural frequency and time period, concepts of damping and critical damping, Free Vibrations of Un-damped and damped SDOF system.	CLO3
	Learning Activities: Lecture and Discussion, Lecture and Discussion, Problem solving, Group Activity and Lab experiments	
IV Units 7 Hours	Laser Physics Introduction to laser, Spontaneous and stimulated emission of radiations, Thermal equilibrium, Condition for Light amplification, Population inversion, Pumping (Three level and four level pumping), Optical resonator, Laser beam characteristics, Ruby laser, Nd-YAG Laser, He-Ne Laser, Semiconductor Laser, Engineering applications of Laser (Fiber optics, Laser material interaction).	CLO4
	Learning Activities: Lecture and Discussion, Lecture and Discussion, Problem solving, Group Activity and Lab experiments	

Text Books

1. Concepts of Modern Physics, Arthur Beiser; Tata McGraw – Hill Edition.
2. Introduction to Solid State Physics, Charles Kittel, Wiley.

Suggested Readings

1. Introduction to quantum mechanics / David J. Griffiths
2. A text book of Engineering physics, Avadhanulu and Kshirsagar, S. Chand Pub.
3. Concepts of Modern Physics, Arthur Beiser; Tata McGraw – Hill Edition.
4. Introduction to Solid State Physics, Charles Kittel, Wiley.
5. Solid State Physics, S. O. Pillai, New Age International Publishers.
6. Solid state electronic devices, Ben G. Streetman, Sanjay Banerjee Pearson PrenticeHall.
7. LASERS Theory and Applications, K. Thyagarajan, A. K. Ghatak; Macmillan India Ltd.

Alternative NPTEL/SWAYAM Course

S. No.	NPTEL Course Name	Instructor	Host Institute
1	INTRODUCTION TO ELECTROMAGNETIC THEORY	PROF. MANOJ HARBOLA	IIT KANPUR

L	T	P	Cr
0	0	2	1

Course Code: BSC- 101

Course Title: Physics – 1 Laboratory

Hours: 60

Total

Course Objectives

The aim and objective of the Engineering Physics lab is to provide students the firsthand experience of verifying various theoretical concepts learnt in theory courses so that they can use these in Engineering as per their requirement.

Course Learning Outcomes

CLO1: calculate energy gap, carrier concentration and mobility of the given material

CLO2: verify quantum mechanical phenomena

CLO3: Estimate the size of the object using Laser diffraction

CLO4: Determine the magnetic susceptibility and dielectric constant of the material.

Laboratory/ Practical

- 1) Frank-Hertz Experiment
- 2) Planck's Constant
- 3) To determine the wavelengths of light of a given source using diffraction grating
- 4) Band gap of a semiconductor by four probe method
- 5) Hall effect in Semiconductor
- 6) Magnetoresistance measurement of semiconductor
- 7) To determine the reverse saturation current and material constant of PN Junction
- 8) To determine the dielectric constant of material
- 9) Study of Biot-Savart's law
- 10) Measurement of magnetic susceptibility by Quinke's method
- 11) To find the natural frequency of the spring mass system.
- 12) Equivalent stiffness of springs in series and parallel
- 13) Determine the spring constant of a spring by two different methods.

Course Code BSC-102
Course Title: Mathematics-I

L	T	P	Cr
3	1	0	4

Total Hours: 60

Course Objectives

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

Course Learning Outcomes

- CLO1: To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- CLO2: The fallouts of Rolle’s Theorem that is fundamental to application of analysis to Engineering problems.
- CLO3: The tool of power series and Fourier series for learning advanced Engineering Mathematics.
- CLO4: To deal with functions of several variables that are essential in most branches of engineering.
- CLO5: To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

Units/Hours	Contents	Mapping with Course Learning Outcome
UNIT I 12 hours	Basic Calculus: (6 hours) Curvature, evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	CLO1, CLO2
	Single-variable Calculus (Differentiation): (6 hours) Rolle’s Theorem, Mean value theorems and applications; Extreme values of functions; Linear approximation; Indeterminate forms and L' Hospital's rule.	
	Learning Activities: Assignment based and numerical exercise based learning	

<p>UNIT II 10 Hours</p>	<p>Sequences and series: (10 hours) Limits of sequence of numbers, Calculation of limits, Infinite series; Tests for convergence; Power series, Taylor and Maclaurin series; Taylor theorem, convergence of Taylor series, error estimates.</p>	<p>CLO3, CLO4</p>
<p>Learning Activities Assignment based and numerical exercise based learning</p>		
<p>UNIT III Hours 10</p>	<p>Multivariable Calculus (Differentiation): (8 hours) Limit, continuity and partial derivatives, directional derivatives, gradient, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers.</p>	<p>CLO5</p>
<p>Learning Activities: Assignment based and numerical exercise based learning</p>		
<p>UNIT IV 10 Hours</p>	<p>Multivariable Calculus (Integration): (10 hours) Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Gradient, curl and divergence, Theorems of Green, Gauss and Stokes.</p>	<p>CLO4</p>
<p>Learning Activities: Assignment based and numerical exercise based learning</p>		

Textbooks/references:

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. Ramana b.v., higher engineering mathematics, tata mcgraw hill new delhi, 11th reprint, 2010.
4. Veerarajan t., engineering mathematics for first year, tata mcgraw-hill, new delhi, 2008.
5. N.p. bali and manish goyal, a text book of engineering mathematics, laxmi publications, reprint, 2008.
6. B.S. grewal, higher engineering mathematics, khanna publishers, 36th edition, 2010.

L	T	P	Cr
3	1	2	5

Course Code: ESC-101

Course Title: Basic Electrical Engineering

Total Hours: 60

Course Objectives

The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electrical Engineering.

Course Learning Outcomes

CLO1: Have the knowledge of DC circuits, AC Circuits, basic magnetic circuits, working principles of electrical machines, and components of low voltage electrical installations

CLO2: Be able to analyze of DC circuits, AC Circuits

CLO3: Understand the basic magnetic circuits and apply it to the working of electrical machines

CLO4: Be introduced to types of wiring, batteries, and LT switchgear.

Units/ Hours	Contents	Mapping with Course Learning Outcome
Unit 1 15 Hours	D. C. Circuits covering, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits excited by independent voltage sources; Power and energy; Electromagnetism covering, Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced EMF; Concepts of self-inductance, mutual inductance and coefficient of coupling; Energy stored in magnetic fields. Learning Activities: Hands-on Circuit Building, Problem-solving Exercises, simulation based learning, Group Projects, interactive online resources	CLO1
Unit-II 15 Hours	Single Phase A.C. Circuits covering, Generation of sinusoidal voltage- definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, RL, RC and RLC circuits; Real power, reactive power, apparent power and power factor, series, parallel and series- parallel circuits; Three Phase A.C. Circuits covering, Necessity and Advantages of three phase systems, Generation of three phase power, definition of Phase sequence, balanced supply and balanced load; Relationship between line and phase values of balanced star and delta connections; Power in balanced three phase circuits, measurement of power by two wattmeter method	CLO2

	Learning Activities: Hands-on Circuit Building, Problem-solving Exercises, simulation based learning, Group Projects, interactive online resources	
Unit-III 15 Hours	<p>Transformers covering, Principle of operation and construction of single phase transformers (core and shell types). EMF equation, losses, efficiency and voltage regulation; Synchronous Generators covering, Principle of operation; Types and constructional features; EMF equation;</p> <p>DC Machines covering, working principle of DC machine as a generator and a motor; Types and constructional features; EMF equation of generator, relation between EMF induced and terminal voltage enumerating the brush drop and drop due to armature reaction; DC motor working principle; Back EMF and its significance, torque equation; Types of D.C. motors, characteristics and applications; Necessity of a starter for DC motor.</p>	CLO3, CLO4
	Learning Activities: Hands-on Circuit Building, Problem-solving Exercises, simulation based learning, Group Projects, interactive online resources	
Unit –IV 15 Hours	<p>Three Phase Induction Motors covering; Concept of rotating magnetic field; Principle of operation, types and constructional features; Slip and its significance; Applications of squirrel cage and slip ring motors; Necessity of a starter, star-delta starter.</p> <p>Sources of Electrical Power covering, Introduction to Wind, Solar, Fuel cell, Tidal, Geo- thermal, Hydroelectric, Thermal-steam, diesel, gas, nuclear power plants; Concept of cogeneration, and distributed generation.</p>	CLO4
	Learning Activities: Hands-on Circuit Building, Problem-solving Exercises, simulation based learning, Group Projects, interactive online resources	

Text books

1. Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.

Referencs books

1. Hayt and Kimberly, Engineering Circuit Analysis, Tata McGraw Hill.
 2. Kulshreshtha D.C. (2009), Basic Electrical Engineering, Tata McGraw Hill.
 3. Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India
- Hughes, E. 2005

Code: ESC-102

Course Title: Engineering Graphics & Design

L	T	P	Cr
1	0	4	3

Total Hours: 60

Course Objectives

The objective of this Course is to provide the basic knowledge about Engineering Drawing. Detailed concepts are given in projections, technical drawing, dimensioning and specifications, so useful for a student in preparing for an engineering career.

Course Learning Outcomes

CLO1: To describe engineering design and its place in society.

CLO 2: To use engineering graphics standards.

CLO 3: To illustrate solid modelling.

CLO 4: To use computer-aided geometric design.

CLO 5: To discuss the visual aspects of engineering design and to design creating working drawings.

Course contents:

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

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

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

Units/Hours	Contents	Mapping with Course Learning Outcome
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<p>Unit I 15 Hours</p>	<p>Introduction to Engineering Drawing:</p> <p>Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;</p> <p>Orthographic Projections:</p> <p>Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;</p> <p>Projections of Regular Solids:</p> <p>Covering those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.</p> <hr/> <p>Learning Activities: Technical drawing exercises, and assignments, CAD Software Training, design challenges for real world problems, Project-Based Learning</p>	<p>CLO1</p>
<p>Unit II 15 Hours</p>	<p>Sections and Sectional Views of Right Angular Solids:</p> <p>Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).</p> <p>Isometric Projections:</p> <p>Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;</p> <hr/> <p>Learning Activities: Technical drawing exercises, and assignments, CAD Software Training, design challenges for real world problems, Project-Based Learning</p>	<p>CLO2 & 3</p>
<p>Unit III 15 Hours</p>	<p>Overview of Computer Graphics: Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object</p>	<p>CLO 4</p>

	<p>Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids.</p> <p>Customisation & CAD Drawing: Consisting of set up of the drawing page and the printer, including scale settings, setting up of Modules and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.</p>	
	<p>Learning Activities: Technical drawing exercises, and assignments, CAD Software Training, design challenges for real world problems, Project-Based Learning</p>	
<p>Unit IV 15 Hours</p>	<p>Annotations, layering & other functions: Covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer- aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;</p> <p>Demonstration of a simple team design project that illustrates: Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding</p>	<p>CLO5</p>

	according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).	
	Learning Activities: Technical drawing exercises, and assignments, CAD Software Training, design challenges for real world problems, Project-Based Learning	

Text Books

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

Reference Books

1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kanniah (2008), Text book on Engineering Drawing, Scitech Publishers.
4. (Corresponding set of) CAD Software Theory and User Manuals.

L	T	P	Cr
3	0	2	4

Course Code: ESC. 103

Total Hours: 60

Course Title: **Programming for Problem Solving**

Course Objectives:

This course covers computer fundamentals, program development steps, C programming syntax and semantics, structured programming approach, algorithm formulation, and output analysis based on input variables.

COURSE LEARNING OUTCOMES:

The student will learn following through lectures:

CLO1: To formulate simple algorithms for arithmetic and logical problems.

CLO2: To translate the algorithms to programs (in C++ language).

CLO3: To test and execute the programs and correct syntax and logical errors.

CLO4: To implement conditional branching, iteration and recursion.

Units/ Hours	Contents	Mapping with Course Learning Outcome
Units I Hours 15	<p>Introduction to Programming; Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)</p> <p>Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.</p> <p>From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.</p> <p>Arithmetic expressions and precedence. Conditional Branching and Loops. Writing and evaluation of conditionals and consequent branching. Iteration and loops.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning</p>	CLO1, CLO2
Units II Hours 15	<p>Arrays, Arrays (1-D, 2-D), Character arrays and Strings. Basic Algorithms, Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)</p>	CLO2, CLO3

	Function, Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference	
	Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning	
Units III Hours 15	Recursion, Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort. Structures, Defining structures and Array of Structures	CLO3
	Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning	
Units IV Hours 15	Pointers, Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)	CLO4
	File handling (only if time is available, otherwise should be done as part of the lab).	
	Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning	

Text books

1. Object Oriented Programming with C++ by Balaguruswamy, 8th edition, 2020.
2. Let Us C++" by Yashavant Kanetkar (17th Edition, 2020)

Suggested readings

1. Object-Oriented Programming in C++ By Robert Lafore, 2001.
2. Mastering C++ By K.R Venugopal , Rajkumar, TMH, 2017.
3. Problem Solving and Program Design in C" by Jeri R. Hanly and Elliot B. Koffman (8th Edition, 2015)
4. C++ and Object-Oriented Programming By - Kip R. Irvine, Prentice Hall, 1997

Course Code: ESC-103

Course Title: Problem Solving Skill with Programming Laboratory Total Hours: 30

Lab outcomes

- To formulate the algorithms for simple problems.
- To translate given algorithms to a working and correct program.
- To be able to correct syntax errors as reported by the compilers.
- To be able to identify and correct logical errors encountered at run time.
- To be able to write iterative as well as recursive programs.
- To be able to represent data in arrays, strings and structures and manipulate them through a program.

Practicals

1. Familiarization with programming environment
2. Simple computational problems using arithmetic expressions
3. Problems involving if-then-else structures
4. Iterative problems e.g., sum of series
5. 1D Array manipulation
6. Matrix problems, String operations
7. Simple functions
8. Programming for solving Numerical methods problems
9. Recursive functions
10. Pointers and structures
11. File operations

L	T	P	Cr
3	0	2	4

Course Code: HSMC-102

Total Hours: 60

Course Title: Design Thinking & IDEA Lab Workshop

Course Objectives

The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

Course Learning Outcomes

CLO1: Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products.

CLO2: Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development

CLO3: Perceive individual differences and its impact on everyday decisions and further Create a better customer experience.

CLO4: Design and assemble basic electronic circuits, understanding the function and placement of components such as resistors, capacitors, transistors, and ICs.

CLO5: Utilize PCB design software to create and fabricate printed circuit boards for custom electronic projects.

Units I 15 Hours	Basics of Design Thinking: Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, TestBeing Ingenious & Fixing Problem: Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem SolvingProcess of Product Design: Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design	CLO1 CLO2
	Learning Activities: Empathy Interviews	

<p>Unit II 15 Hours</p>	<p>Design Thinking & Customer Centricity: Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design Feedback, Re-Design & Re-Create: Feedback loop, Focus on User Experience, Address “ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – “Solving Practical Engineering Problem through Innovative Product Design & Creative Solution”.</p>	<p>CLO3</p>
	<p>Learning Activities: Students will be encouraged to iterate on their designs based on insights gained from user testing, feedback, and reflection.</p>	
<p>Unit III 15 Hours</p>	<p>Electronic component familiarization, Understanding electronic system design flow. Schematic design and PCB layout and Gerber creation using EagleCAD. Documentation using Doxygen, Google Docs, Overleaf. Version control tools - GIT and GitHub. Overview of Software Basic 2D and 3D designing using CAD tools such as FreeCAD, Sketchup, Prusa Slicer, FlatCAM, Inkspace, OpenBSP and VeriCUT Introduction to basic hand tools - Tape measure, combination square, Vernier caliper, hammers, fasteners, Introduction wrenches, pliers, saws, tube cutter, chisels, vice and clamps, tapping and threading. Adhesives</p>	<p>CLO 4</p>
	<p>Learning Activities: Brainstorming sessions, Prototyping Sessions</p>	

<p>Unit IV 15 Hours</p>	<p>Circuit prototyping using (a) breadboard, (b) Zero PCB (c) ‘Manhattan’ style and (d) custom PCB. Single, double and multilayer PCBs. Single and double-sided</p> <p>PCB prototype fabrication in the lab. Soldering using soldering iron/station. Soldering using a temperature controlled reflow oven.</p> <p>Electronic circuit building blocks including common sensors. Arduino and Raspberry Pi programming and use. Digital Input and output. Measuring time and events. PWM. Serial communication. Analog input. Interrupts programming. Power Supply design (Linear and Switching types), Wireless power supply, USB PD, Solar panels, Battery types and charging Basics of IPR and patents; Accessing and utilizing patent information in IDEA Lab</p> <hr/> <p>Learning Activities: Brainstorming sessions, Prototyping Sessions</p>	<p>CLO 5</p>
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Suggested Readings

1. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Bloomsbury Publishing India Private Limited
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Business
3. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018. ISBN-13: 978-1681884325.
4. The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press. ISBN: 9780521809269
5. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill. ISBN-13: 978-1259641633
6. Pro GIT. 2nd edition. Scott Chacon and Ben Straub. A press. ISBN-13 : 978-1484200773
7. Chapman W.A.J, “Workshop Technology”, Volume I, II, III, CBS Publishers and distributors, 5th Edition, 2002.

S. No.	List of Lab activities and experiments
1.	Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
2.	Machining of 3D geometry on soft material such as soft wood or modelling wax.
3.	3D scanning of computer mouse geometry surface. 3D printing of scanned geometry using FDM or SLA printer.
6.	Familiarity and use of welding equipment.
7.	Familiarity and use of normal and wood lathe.
8.	Embedded programming using Arduino and/or Raspberry Pi.
9.	Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.

L	T	P	Cr
0	0	2	0

Course Code: AU[^]-102

Course Title: Mentoring and Professional Development

Total Hours: 30

Guidelines regarding Mentoring and Professional Development

The objective of mentoring will be development of

- Overall Personality
- Aptitude (Technical and General)
- General Awareness (Current Affairs and GK)
- Communication Skills
- Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A (Class Activities)

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B (Outdoor Activities)

1. Sports/NSS/NCC
2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B

Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

SEMESTER – II

SEMESTER -II

L	T	P	Cr
4	0	0	4

Course Code: BSC-202

Total Hours: 60

Course Title: **Fundamentals of Modern Computing**

Course Objectives

This course introduces Artificial Intelligence concepts, cloud computing architecture, IoT systems, machine learning, and Generative AI, covering concepts, theories, applications, architecture, services, deployment models, and algorithms for creating new content.

Course Learning Outcomes:

The student will learn following through lectures

CLO1: To understand the basic concepts and terminology of fuzzy systems

CLO2: To understand the core concepts and architecture of cloud computing and explore the fundamental principles and components of IoT systems

CLO3: To understand the key concepts and algorithms in machine learning

CLO4: To gain knowledge about generative AI.

Units/Hours	Contents	Mapping with Course Learning Outcome
Units I Hours 15	Introduction to Artificial Intelligence: · Definition and history of AI, Applications of AI in various industries, Ethical considerations in AI, Overview of AI techniques: Search algorithms, logic, and reasoning, Introduction to AI tools and platform	CLO1, CLO2
	Learning Activities: Interactive Lectures and Demonstrations, assignments involving practical applications of fuzzy logic	

<p>Units II</p> <p>Hours 15</p>	<p>Introduction to Cloud and IoT: Overview of cloud computing, History and evolution of cloud computing, Key characteristics and benefits of cloud computing and Cloud service models (IaaS, PaaS, SaaS).</p> <p>Definition and characteristics of IoT, History and evolution of IoT, IoT architecture and protocols and IoT Components and Devices.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, assignments involving practical applications of cloud and IoT technologies</p>	<p>CLO2, CLO3</p>
<p>Units III</p> <p>Hours 15</p>	<p>Introduction to Machine Learning: Overview of machine learning, Types of machine learning: supervised, unsupervised, Data Pre-processing and Feature Engineering, Applications of machine learning and Tools.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, Weekly assignments, Class participation and engagement</p>	<p>CLO3</p>
<p>Units IV</p> <p>Hours 15</p>	<p>Introduction to Generative AI: Overview of generative AI, Applications of generative models in pics and text generation, Text generation models (e.g., GPT-3), Applications of generative AI in NLP, Ethical considerations in generative AI.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, Weekly assignments, Class participation and engagement</p>	<p>CLO4</p>

Textbook:

1. Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig

Suggested readings

1. Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, 2013.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things" by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, and Jerome Henry, 2017.
3. Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller and Sarah Guido (2016).
4. Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play" by David Foster (2019).

L	T	P	Cr
3	1	0	4

Course Code: BSC-201

Total Hours: 60

Course Title: Mathematics- II

Course Objectives

Mathematics fundamental necessary to formulate, solve and analyse engineering problems.

Course Learning Outcomes

CLO1: The essential tool of matrices and linear algebra in a comprehensive manner.

CLO2: The effective mathematical tools for the solutions of differential equations that model physical processes.

CLO3: The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Units/ Hours	Contents	Mapping with Course Learning Outcome
UNIT I 16 Hours	<p>Matrices (10 hours): Linear Systems of Equations; Linear Independence; Rank of a Matrix; Determinant, Inverse of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Orthogonal transformation; Diagonalization of matrices; Cayley-Hamilton Theorem.</p> <p>First order ordinary differential equations: (6 hours) 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.</p> <p>Learning Activities: Math Worksheets, games and puzzles, Interactive Whiteboard Activities</p>	CLO1
UNIT II 14 Hours	<p>Ordinary differential equations of higher orders: (8 hours) Second order linear differential equations with variable coefficients: Euler-Cauchy equations, solution by variation of parameters; Power series solutions: Legendre's equations and Legendre polynomials, Frobenius method, Bessel's equation and Bessel's functions of the first kind and their properties.</p>	CLO2

	Learning Activities: Interactive Whiteboard Activities, games and puzzles, group activities	
UNIT III 15 Hours	Complex Variable – Differentiation: (8 hours): Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.	CLO3
	Learning Activities: Group Problem Solving, questions that promote critical thinking, mathematical debates	
UNIT IV 15 Hours	Complex Variable – Integration: (8 hours): Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour	CLO4
	Learning Activities: Group Problem Solving, questions that promote critical thinking, mathematical debates	

Textbooks

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

Suggested Readings

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

L	T	P	Cr
2	0	2	3

Course Code: HSMC-201

Total Hours: 45

Course Title: Communication Skills

Course Objectives

The program aims to enhance students' English language skills through guided activities, employability training, and hands-on experiences through case studies, mini-projects, and presentations.

Course Learning Outcomes

CLO1: To help the students become the independent users of English language.

CLO2: To acquire basic proficiency in reading & listening, comprehension, writing and speaking skills.

CLO3: To be able to understand spoken and written English language, particularly the language of their chosen technical field.

CLO4: To be able to converse fluently.

CLO5: To be able to produce on their own clear and coherent texts.

Units/Hours	Contents	Mapping with Course Learning Outcome
Units I Hours 10	<p>Vocabulary Building The concept of Word Formation Root words from foreign languages and their use in English Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.</p>	CLO1, CLO2
	<p>Learning Activities: Reading Assignments, Technical vocabulary building, presentations</p>	
Units II Hours 12	<p>Basic Writing Skills Sentence Structures Use of phrases and clauses in sentences Importance of proper punctuation Creating coherence Organizing principles of paragraphs in documents Techniques for writing precisely</p>	CLO1
	<p>Learning Activities: Reading Assignments, Technical vocabulary building, presentations</p>	

<p style="text-align: center;">III Units 13 hours</p>	<p>Identifying Common Errors in Writing: Subject-verb agreement Noun-pronoun agreement Misplaced modifiers Articles, Prepositions, Redundancies, Clichés</p> <p>Nature and Style of sensible Writing: Describing Defining Classifying Providing examples or evidence Writing introduction and conclusion</p> <hr/> <p>Learning Activities: : Peer Editing Sessions, debates and discussions, Role-Playing Exercises</p>	<p>CLO3</p>
<p style="text-align: center;">IV Units 10 hours</p>	<p>. Writing Practices: Comprehension, Précis Writing, Essay Writing</p> <p>Oral Communication: (This Module involves interactive practice sessions in Language Lab)</p> <p>Listening Comprehension Pronunciation, Intonation, Stress and Rhythm Common Everyday Situations: Conversations and Dialogues Communication at Workplace Interviews Formal Presentations</p> <hr/> <p>Learning Activities: Reading Assignments, Technical vocabulary building, presentations</p>	<p>CLO4, CLO5</p>

Textbook

1. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

Reference Books

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

L	T	P	Cr
3	0	2	4

Course Code: ESC-201

Course Name: Object Oriented Programming with C++

Course Objectives:

This course aims to teach fundamental C++ programming concepts, advanced class features, operator overloading techniques, inheritance, functions, exception handling, file I/O operations, and Standard Template Library (STL) usage.

Course Learning Outcomes

Upon completing this course, students will be able to:

CLO1: Demonstrate a solid understanding of C++ programming basics and differentiate between C++ and C syntax.

CLO2: Implement and utilize advanced class features and operator overloading to write efficient and effective C++ programs.

CLO3: Apply the principles of inheritance and function management, including the use of virtual and friend functions, in complex C++ applications.

CLO4: Effectively handle exceptions and manage file input/output operations to ensure robust and error-free C++ programs.

CLO5: Employ the Standard Template Library (STL) to develop reusable and efficient code, leveraging containers, algorithms, and iterators.

Units / Hours	Contents	Mapping with Course Learning Outcome
Units I Hours 15	<p>Basics of C++ and Object-Oriented Programming Concepts</p> <p>C++ programming basics: input and output directives, the setw manipulator, type conversions, syntax similarities and differences with C language.</p> <p>Object and classes: introduction to classes, objects, encapsulation, abstraction, polymorphism, implementation of class in C++, creating objects, C++ object as data types, constructor, object as function arguments, the default copy constructor, returning object from function, structures and classes.</p>	CLO1
	<p>Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning</p>	

Units II Hours 15	<p>Advanced Class Features and Operator Overloading</p> <p>Classes objects and memory: static class data. Arrays as class member data: arrays of object, string, the standard C++ String class. Concept of Namespace, Nested Namespaces, Namespaces and Classes, Extending Namespace</p> <p>Operator overloading: overloading unary operations, overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords, explicit and mutable.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning</p>	CLO2
Units III Hours 15	<p>Inheritance and Functions</p> <p>Inheritance: concept of inheritance, generalization and specialization, derived class and base class, derived class constructors, member functions, public and private inheritance, aggregation.</p> <p>Functions: virtual function, friend function, static function, assignment and copy initialization, this pointer, dynamic type information.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning</p>	CLO3
Units IV Hours 15	<p>Exception Handling, File I/O, and Standard Template Library</p> <p>Exception handling: list of exceptions, catching exception, handling exception.</p> <p>Streams and files: streams classes, stream errors, disk file I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, printer output.</p> <p>Standard Template Library (STL): overview of Standard Template Library, containers, algorithms, iterators, other STL elements, container classes, vectors.</p> <p>Learning Activities: Interactive Lectures and Demonstrations, Hands-on Coding Labs, Peer Programming and Code Reviews, Project-Based Learning</p>	CLO4

Text books

1. The C++ Programming Language, 4th Edition, B. Stroutstrup, Pearson Education, 2013.
2. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education, 2017

Suggested Readings

1. The Complete Reference C++, 4th Edition, Herbert Schildt, Tata McGraw Hill, 2017.
2. OOP in C++, 3rd Edition, T. Gaddis, J. Walters and G. Muganda, Wiley Dream Tech Press, 2002
3. Object Oriented Programming in C++, 3rd Edition, R. Lafore, Galigotia Publications Pvt Ltd, 1999.

Course Code: ESC-201

Course Title: Object Oriented Programming with C++ Laboratory

Total Hours: 30

Lab outcomes

- To able to understand the concept of OO Programming.
- To able to implement the Classes and Objects.
- To be able implement the concept of Inheritance and operator overloading .
- To be able to implement the exception Handling and File handling.

PRACTICALS

1. Implementation of function overloading.
2. Implementation of classes and objects.
3. Implementation of different type of constructors.
4. Implementation of functions in classes.
5. Implementation of operator overloading.
6. Implementation of different types of inheritance.
7. Implementation of Streams.
8. Implementation of various operations on files.
9. Implementation of exception handling.
10. Implementation of STL.

L	T	P	Cr
1	0	4	3

Course Code: ESC-202

Total Hours: 45

Course Title: Workshop/Manufacturing Practices

Course Objectives

The program aims to provide students with hands-on experience in Civil, Mechanical, Electrical, and Electronics Engineering, including plumbing, carpentry components, gas welding, foundry operations, electrical measurement, and soldering.

Course Learning Outcomes

CLO1: To fabricate components with their own hands.

CLO2: To relate practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

CLO3: To design small devices of their interest by assembling different components.

Units/Hours	Contents	Mapping with Course Learning Outcome
Unit-I (12 hours)	Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods. CNC machining, Additive manufacturing.	CLO1
Unit-II (12 hours)	Fitting operations & power tools. Carpentry	CLO2
Unit-III (12 hours)	Plastic moulding, glass cutting Metal casting	CLO3
Unit-IV (9 hours)	Welding (arc welding & gas welding), brazing.	CLO4

Textbooks

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

Reference Books

1. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
2. Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
3. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
4. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017

L	T	P	Cr
1	0	4	3

Course Code: ESC-202

Total Hours: 45

Course Title: Workshop/Manufacturing Practices Laboratory

Practicals

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical & Electronics
5. Welding shop (Arc welding + Gas welding)
6. Casting
7. Smithy
8. Plastic moulding & Glass Cutting

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

L	T	P	Cr
2	0	0	0

Course Code: AU-201^
Course Title: Sports and Yoga
Total Hours: 30

Course Objectives

The program aims to educate students about health and fitness principles, encourage them to engage in physical and yogic activities, develop a safe, progressive, and efficient activity plan, and promote physical activity as a lifetime health pursuit.

Course Outcomes

CLO1: To practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation, learn breathing exercises and healthy fitness activities

CLO2: To learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.

CLO3: To perform yoga movements in various combination and forms, assess current personal fitness levels.

CLO4: To demonstrate an understanding of sound nutritional practices as related to health and physical performance.

CLO5: To identify and apply injury prevention principles related to yoga and physical fitness activities, correctly apply biomechanical and physiological principles related to exercise and training.

Unit s/ Hours	Contents	Mapping with Course Learning Outcome
Unit I (8 hours)	<p>Introduction to Physical Education;</p> <p>Meaning & definition of Physical Education Aims & Objectives of Physical Education Changing trends in Physical Education</p> <p>Olympic Movement:</p> <p>Ancient & Modern Olympics (Summer & Winter) Olympic Symbols, Ideals, Objectives & Values Awards and Honours in the field of Sports in India Dronacharya Award, Arjuna Award, Dhyanchand Award, Rajiv Gandhi Khel Ratna Award etc.)</p>	CLO1

	<p>Physical Fitness, Wellness & Lifestyle:</p> <p>Meaning & Importance of Physical Fitness & Wellness Components of Physical fitness Components of Health related fitness Components of wellness Preventing Health Threats through Lifestyle Change Concept of Positive Lifestyle</p>	
	<p>Learning Activities:</p>	
<p>Units II (7 hours)</p>	<p>Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga:</p> <p>Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)</p> <p>Define Anatomy, Physiology & Its Importance</p> <p>Kinesiology, Biomechanics & Sports:</p> <p>Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports Newton’s Law of Motion & its application in sports. Friction and its effects in Sports.</p> <p>Postures</p> <p>Meaning and Concept of Postures. Causes of Bad Posture. Advantages & disadvantages of weight training. Concept & advantages of Correct Posture. Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis. Corrective Measures for Postural Deformities</p>	<p>CLO1, CLO3</p>
	<p>Learning Activities:</p>	

<p style="text-align: center;">III Units (8 hours)</p>	<p>Yoga Elements of Yoga Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana) Relaxation Techniques for improving concentration - Yog-nidra Yoga & Lifestyle: Asana as preventive measures. Hypertension, Obesity, Back Pain, Diabetes, Asthma:</p> <p>Psychology & Sports: Definition & Importance of Psychology in Physical Edu. & Sports Define & Differentiate Between Growth & Development Adolescent Problems & Their Management Emotion: Concept, Type & Controlling of emotions Meaning, Concept & Types of Aggressions in Sports. Psychological benefits of exercise. Anxiety & Fear and its effects on Sports Performance. Motivation, its type & techniques. Understanding Stress & Coping Strategies.</p>	<p style="text-align: center;">CLO2,CL O3</p>
<p style="text-align: center;">Learning Activities</p>		
<p style="text-align: center;">Unit 4 (7 hours)</p>	<p>Training and Planning in Sports: Meaning of Training, Warming up and limbering down Skill, Technique & Style Meaning and Objectives of Planning. Tournament – Knock-Out, League/Round Robin & Combination</p> <p>Doping Meaning and Concept of Doping, Prohibited Substances & Methods, Side Effects of Prohibited Substances</p> <p>Sports Medicine First Aid – Definition, Aims & Objectives. Sports injuries: Classification, Causes & Prevention.</p>	<p style="text-align: center;">CLO4</p>

	<p>Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries Sports / Games</p> <p>Following subtopics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. History of the Game/Sport. Latest General Rules of the Game/Sport. Specifications of Play Fields and Related Sports Equipment. Important Tournaments and Venues. Sports Personalities. Proper Sports Gear and its Importance.</p>	
	<p>Learning Activities:</p>	

Text Books

1. Modern Trends and Physical Education by Prof. Ajmer Singh.

References

1. Light On Yoga by B.K.S. Iyengar.
2. Health and Physical Education – NCERT (11th and 12th Classes)

<p>Units II</p>	<p>Harmony in the Human Being</p> <p>Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health</p> <p>Tutorial 4: Practice Session PS4 Exploring the difference of Needs of Self and Body</p> <p>Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the Self</p> <p>Tutorial 6: Practice Session PS6 Exploring Harmony of Self with the Body</p>	<p>CLO2</p>
<p>Units III</p>	<p>Harmony in the Family and Society Harmony in the Family – the Basic Unit of Human Interaction</p> <p>'Trust' – the Foundational, Value in Relationship</p> <p>'Respect' – as the Right Evaluation</p> <p>Other Feelings, Justice in Human-to-Human Relationship</p> <p>Understanding Harmony in the Society</p> <p>Vision for the Universal Human Order</p> <p>Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust</p> <p>Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect</p> <p>Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal</p> <p>Harmony in the Nature/Existence</p> <p>Understanding Harmony in the Nature</p> <p>Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature</p> <p>Realizing Existence as Co-existence at All Levels</p> <p>The Holistic Perception of Harmony in Existence</p> <p>Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature</p> <p>Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence</p>	<p>CLO3, CLO4</p>

Unit IV	<p>Implications of the Holistic Understanding – a Look at Professional Ethics Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order</p> <p>Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies Strategies for Transition towards Value-based Life and Profession</p> <p>Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order</p>	CLO4
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Textbook

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R

Reference Books

1. Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, RR Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-
3. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
4. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
5. The Story of Stuff (Book).

Course Code: AU-202^

Total Hours: 30

L	T	P	Cr
0	0	2	0

Course Title: Mentoring and Professional Development

Guidelines regarding Mentoring and Professional Development

The objective of mentoring will be development of

- Overall Personality
- Aptitude (Technical and General)
- General Awareness (Current Affairs and GK)
- Communication Skills
- Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part – A (Class Activities)

7. Expert and video lectures
8. Aptitude Test
9. Group Discussion
10. Quiz (General/Technical)
11. Presentations by the students
12. Team building Exercises

Part – B (Outdoor Activities)

1. Sports/NSS/NCC
2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B

Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.