I Year Course structure – CSE										
Semester –II										
CODE	SUBJECT NAME	Category	Periods				Sessional Marks	Semester end Exam marks	Total Marks	Credits
			L	T	P	Total				
23MA1202	Ordinary Differential Equations & Numerical Methods	BS	2	1	0	3	40	60	100	3
23PY1102	Applied Physics	BS	3	0	0	3	40	60	100	3
23ME3203	Design Thinking	ES	1	0	2	3	40	60	100	2
23CS3102	Object Oriented Programming using C++	PC	2	0	0	2	40	60	100	2
23EC3103	Digital Logic Design	ES	3	0	0	3	40	60	100	3
23PY1202	Applied Physics Lab	BS	0	0	3	3	50	50	100	1.5
23ME3204	Computer Aided Drafting and Modelling Lab	ES	0	0	3	3	50	50	100	1.5
23CS3202	Applied Python Programming	ES	1	0	2	3	50	50	100	2
23CS3203	Object Oriented Programming using C++ Lab	PC	0	0	3	3	50	50	100	1.5
23MC0102	Environmental Science	MC	2	0	0	2	0	0	0	0
Total			14	1	14	29	400	500	900	19.5

ORDINARY DIFFERENTIAL EQUATIONS AND NUMERICALMETHODS (Common for CSE, CSM & CSD and IT)	
Course Code:23MA1202	**Credits:03**
Instruction**:** 2 Periods & 1 Tutorial/Week	Sessional Marks: 40
End Exam : 3 Hours	End Exam Marks:60

Prerequisites: Matrices, Differentiation, Differential equations, Integration and Functions.

Course Objectives:

Create and analyze mathematical models using first and higher order differential equations to solve application problems such as electrical circuits, orthogonal trajectories and Newton's law of cooling and also familiarize the student in various topics in numerical analysis such as interpolation, numerical differentiation, integration and direct methods for solving linear systemof equations.

Course Outcomes: By the end of the course, students will be able to

1.	Demonstrate solutions to first order differential equations by various methods and solve basic application problems related to electrical circuits, orthogonal trajectories and Newton'slaw of cooling.
2.	Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients.
3.	Apply various numerical methods to solve linear and non-linear equations.
4.	Familiarize with numerical integration and differentiation.
5.	Understand Laplace transforms and its properties, and finding the solution of ordinary differential equations.

CO-PO –PSO Mapping:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	1							1	2			
CO2	3	2	1	1							1	2			
CO3	3	2	1	1							1	2			
CO4	3	2	1	1							1	2			
CO5	3	2	1	1							1	2			

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

SYLLABUS

UNIT I **10 Periods**

Ordinary differential equations of first order and its applications : Linear equations - Bernoulli's equations - Exact differential equations - Equations reducible to exact equations - Orthogonal trajectories - Simple electric circuits (L –R circuit problems) - Newton's law of cooling.

Sections: 11.9, 11.10, 11.11, 11.12, 12.3, 12.5 and 12.6.

UNIT II **10 Periods**

Higher order linear differential equations and its applications : Definitions - Operator D - Rules for finding the complementary function - Rules for finding the particular integral - Methodof variation of parameters - Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation - Legendre's linear equation. Applications**:** L – C – R circuit problems.

Sections: 13.1, 13.3, 13.4, 13.6, 13.8(I), 13.9, 14.5(ii).

UNIT III **10 Periods**

Numerical solutions of algebraic and transcendental equations:

Solution of algebraic and transcendental equations: Bisection method - Regula-Falsi method -Newton-Raphson method.

Solution of linear simultaneous equations: Gauss elimination - Gauss Jordan - Gauss Seidel.

Sections: 28.2, 28.3, 28.5, 28.6(1,2), 28.7(2)

UNIT IV **10 Periods**

Interpolation, Numerical Differentiation and Integration : Finite differences - Other difference operators - Relation between operators - To find one or more missing terms - Newton's interpolation formulae. Interpolation with unequal intervals: Lagrange's interpolation formula.

Numerical differentiation: Newton's forward and backward differences formula to compute first and second derivatives**.**

Numerical integration: Trapezoidal rule - Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Sections: 29.1(1,2), 29.4(i), 29.5, 29.6(1,2), 29.9, 29.10, 30.2(1,2), 30.6, 30.7, 30.8.

UNIT V **10 Periods**

Laplace Transforms and its applications : Introduction - Definitions - Transforms of elementary functions - properties of Laplace transforms - Transforms of periodic functions - Transforms of derivatives - Transforms of integrals - Multiplication by t^n - Division by t – (All properties without proofs) - Evaluation of integrals by Laplace transforms.

Inverse transforms – method of partial fractions - Other methods of finding inverse transforms - Convolution theorem (without proof) - Application's to differential equations - Unit step function and unit impulsive functions.

Sections: 21.1, 21.2, 21.3, 21.4, 21.5, 21.7, 21.8, 21.9, 21.10, 21.11, 21.12, 21.13, 21.14, 21.15, 21.17 and 21.18.

TEXT BOOKS:

1. **B. S. Grewal**, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

REFERENCE BOOKS:

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. **N. P. Bali**, Engineering Mathematics, Lakshmi Publications.
3. **George B. Thomas, Maurice D. Weir and Joel Hass**, Thomas, Calculus, 13/e, PearsonPublishers, 2013.
4. **H. K. Dass**, Advanced Engineering Mathematics, S. Chand and complany Pvt. Ltd.
5. **Michael Greenberg**, Advanced Engineering Mathematics, Pearson, Second Edition.

APPLIED PHYSICS (Common for CSE, CSM & CSD and IT)	
Course Code:23PY1102	**Credits:03**
Instruction**:** L - 3, T- 0 P – 0	Sessional Marks: 40
End Exam : 3 Hours	End Exam Marks:60

Prerequisites: Basic Physics

Course Objectives:

1. To enhance student's knowledge of theoretical and modern technological aspects inphysics and to introduce fundamentals of physics relevant to engineering applications

2. To introduce advances in technology for engineering applications

Course Outcomes: At the end of the course the student will be able to:

CO	CO Statement
CO1	**Classify** the properties of magnetic and super conducting materials to enhance the performance of device applications.
CO2	**Identify** the various dielectric materials for mechanical and communicationdevice applications.
CO3	**Understand** the Synthesis and characterization of nano phase materials for industrial applications.
CO4	**Apply** the optical phenomena like Interference, Diffraction to various fields and make use of Lasers and Optical Fibers in emerging Fields.
CO5	**Extend** the knowledge of basic concepts of semiconductors to **illustrate** the semiconductor devices

CO-PO Mapping:

Cos	Program Outcomes (POs)												PSOs	
	Domain Specific POs					Domain Independent POs								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	2					1		1		2
CO2	3	3	2	2	2					1		1		2
CO3	3	3	2	3	2					1		1		2
CO4	3	2	2	1	1					1		1		2
CO5	3	2	3	2	2					1		1		2

SYLLABUS

UNIT-I **10 Periods**

Magnetic materials: Definition of magnetic permeability, magnetization and magnetic susceptibility, classification of magnetic materials, properties of diamagnetic and paramagnetic materials, ferromagnetic materials - hysteresis curve , domain theory of ferromagnetism, soft and hard ferromagnetic materials and its applications

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

Superconductivity: Introduction, properties of superconductors, effect of temperature and magnetic field, Meissoner effect, flux quantization, type – I and type – II superconductors, applications of superconductors, BCS theory (qualitative)

A text book of engineering physics- M.N.Avadhanulu & P.G.Kshirasagar, S.Chand Publication

UNIT–II **10 Periods**

Dielectric materials: Definition of electric dipole moment, dielectric polarization and dielectric constant, Types of polarization – electronic, ionic and oriental polarization, expression for polarisability, internal fields in solids, Classius – Mossotti equation, properties of ferroelectric materials and their applications.

Electromagnetism: Electromagnetic induction, Maxwell's equations and Electromagnetic wave equations in free space.

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

UNIT–III **10 Periods**

Nanophase materials: Introduction to nanophase materials, properties of nanophase materials, synthesis of nanophase materials – chemical vapour deposition, sol-gel method, mechanical attrition method, applications of nanophase materials

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

Engineering Physics -- A.Marikani, PHI Learning Private Limited

UNIT–IV **10 Periods**

Interference: Introduction, principle of superposition, coherence, Young's double slit experiment, conditions for interference, interference in thin films by reflection, wedge shapedfilm and Newton's rings

Diffraction: Introduction, Fresnel and Fraunhoffer diffraction, diffraction at a single slit

Lasers and Fibre Optics: Introduction, characteristics of a laser beam, spontaneous andstimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, semiconductor laser, applications of lasers, principle of propagation of light in optical fibres,acceptance angle and acceptance cone, Numerical Aperture, Optical fibres in communicationsystem.

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

UNIT–V **10 Periods**

Semiconductor Physics: Intrinsic and extrinsic semiconductors, Fermi level, carrier concentration in intrinsic semiconductor, direct and indirect band gap semiconductors. Lorentz force, Hall Effect and its applications.

Physics of semiconductor devices: Energy diagram of p-n diode, working of a diode, volt- ampere characteristics of p-n junction, light emitting diode (LED), liquid crystal display (LCD), photodiode

Modern Engineering physics S.L Gupta and Sanjeev Gupta, Dhanpat Rai publications

Text books:

Engineering physics-V.Rajendran Tata McGraw Hill Education PrivateLimited.

Engineering Physics- Dattu Ramanlal Joshi Tata McGraw Hill Education Private Limited.

Reference Books:

Engineering Physics -- A.Marikani PHI Learning Private Limited.

Engineering Physics - D.K.Bhattacharya, Poonam Tandon Oxford UniversityPress.

Design Thinking (Common for CSE, CSM & CSD and IT)	
Course Code:23ME3203	**Credits:02**
Instruction**:** L - 1, T- 0 P – 2	Sessional Marks: 40
End Exam : 3 Hours	End Exam Marks:60

Prerequisite: Branch specific

Course Objectives:

1. To familiarize students with design thinking concepts and principles
2. To ensure students can practice the methods, processes and tools of designthinking.
3. To ensure students can apply the design thinking approach and have ability to model real world situations.
4. To enable students to analyze primary and secondary research in the introduction to design thinking

Course Outcomes: At the end of the course the student will be ableto:	
CO-1	**Explain** the design thinking principles &**Identify** an opportunity and scope of the Project and **prepare** the problem statement.
CO-2	**Apply** the empathy tools to study the user and **summarize** finding related toProblem for define phase.
CO-3	**Describe** and **define** the problem specific to the user group and **apply** IdeationTools to **generate** Ideas to **solve** the problem.
CO-4	**Develop** prototypes for test phase.
CO-5	**Test** the ideas and **demonstrate** Story telling ability to present the Ideas.

CO-PO-PSO Mapping:

Cos	**Program Outcomes (POs)**												**PSOs**	
	Domain Specific POs					**Domain Independent POs**								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2			2			2	2	2				2
CO2		2			2			2	2	2				2
CO3		2			2			2	2	2				2
CO4		2			2			2	2	2				2
CO5		2			2			2	2	2				2

CO-Course Outcome; PO- Program Outcome; PSO- Program Specific Outcome;

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

SYLLABUS

Week 1: Introduction to Design Thinking, Need of design thinking, 7 characteristics of design thinking,comparison of design thinking to other ways of thinking, tools and resources, 5 actions phases of Design thinking, 5 characteristics of action plan. Double Diamond Technique for Design thinking. **Activity:** Case Studies related to application of Design Thinking in General, engineering and service areas **Home Task:** Identify an opportunity and scope of the project for providing solution through design thinking.
Week 2: Problem statement (5W+H &HMW) tool for defining the identified problem Innovation in Designthinking, Definition of Innovation, Types of Innovations **Activity:** 1. Prepare the initial Problem statement for the identified problem applying design thinking[Initial Statements – 1:1, final statement 1: Team.]
Week 3: Product innovation, Process Innovation and Organizational Innovation. Characteristics of Innovation, Levels of Innovation, Innovation Towards Design**,** Design principles tool. **Activity:** 2. Develop a chart with the design principles that will guide your design thinking process.[Design Principles sheet 1: Team]
Week 4: Human Centric Design Process. Tools for Empathy Phase, Interview for empathy, Ask 5x why,Stakeholder map **Activity:** 3. Prepare the Questionnaire for doing Interview for empathy [Min 20 Questions] 4. Prepare the Stake Holder Map [1: Team.] 5. Apply Ask 5x why tool for identifying the cause identification of the problem[1:1] **Home Task:** Prepare the Google form to collect the basic information of interviewee and the responses forempathy questionnaire / conduct the interview to the stake holders and record the responses.
Week 5: Persona/User profile, Emotional response cards, Empathy map and Customer journey map. **Activity:** 6. Prepare the Persona based on the responses received from the Stake holders. [3: Team] 7. Prepare the Empathy Map/ Customer Journey Map for summarizing pains & gains of stakeholders andinsights [1: Team.] **Home Task:** Use Jam Board as the extension activity for preparing multiple Empathy Map/ Customer Journey Maps
Week 6: Define point of view, Prepare "How might we…" tool for redefine the problem statement **Activity:** 8. Define the Point of view from the insights of Empathy Map/ Customer Journey Map. [1:1] 9. Prepare HMW questions based on POV [10 questions] 10. Re-define the problem statement using HMW tool [1: Team.]
Week 7: Ideate Phase tools: Brainstorming, 6-3-5Method, Special brainstorming, Analogies & benchmarking as inspiration. **Activity:** 11. Conduct Brainstorming Session/ Special Brainstorming Session/ 6-3-5Method [Generate lots of Ideas] **Home Task:** Use Jam Board as the extension activity for shortlisting Ideas

Week 8: Ideate Phase tools: Dotvoting,2x2Matrix **Activity:** 12. List out the Ideas and shortlist using dot voting, 2x2Matrix [Minimum 3]
Week 9: PrototypingPhase:Methodsand Tools, Low fidelity and High Fidelity prototypes, Low fidelity Prototype techniques **Activity:** 13. Prepare the Low fidelity prototypes of the sort listed ideas (Sketches, Paper Models etc.) [1: 1]
Week 10: High fidelity prototype techniques. Exploration map **Activity:** 14. Finalize the Prototype by Exploration Map. [1: Team] 15.Preparation of High fidelity prototype (3D Model) [1: Team]
Week 11: Prototype to test. **Activity:** 16.PrepareFinal prototype and prepare it for testing[1: Team]
Week 12: Test Phase Methods and Tools, Testing sheet, Feedback capture grid **Activity:** 17.Test the prototype and collect the feedback [3: Team] **Home Task:** Test the prototype with external stakeholders if necessary
Week 13: Guide lines for Project report Preparation **Activity:** 18.Iterate any phase based on the feedback received from stakeholders, modify the prototype
Week 14: Roadmapforimplementation, Storytelling as a presentation tool **Activity:** 19. Prepare a road Map for the implementation. [1: Team]
Week 15: **Activity:** 20.ProjectPresentation by Storytelling and Project report Submission

Note:

- All iterative activities prior to the testing phase must be completed as home task.
- Before starting the empathy Phase, the faculty/HoD must approve and finalize the initialproblem statement, which can be domain specific or general.

TEXTBOOKS:

1. Daniel Ling Complete Design Thinking Guide for Successful Professionals", Emerge Creatives Group LLP, Print ISBN: 978-981-09-5564-9.
2. TimBrown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins e-books, 2009.
3. Jeanne Liedtka, Andrew King, And Kevin Bennett, "Solving Problems with Design Thinking" ,Columbia University Press Publishers, E-ISBN 978-0-231-53605-9
4. Michael Lewrick, Patrick Link,LarryLeifer, The Design Thinking Toolbox, JohnWiley & Sons, 2020.

REFERENCE BOOKS:

1. Idris Mootee, “Design Thinking for Strategic Innovation”, 2013 John Wiley & Sons
2. Michael G.Luchs, Scott Swan, Abbie Griffin, “Design Thinking: New Product Development Essentials from the PDMA”, ISBN-13 : 978-1118971802
3. Beverly RudkinIngle, “Design Thinking for Entrepreneurs and Small Businesses”, Apress, ISBN: 9781430261827
4. JoseBetancur, “The Art of Design Thinking: Make More of Your Design Thinking Workshops”,ISBN: 9781522095378
5. Michael Lewrick, Patrick Link, Larry Leifer, The Design Thinking Play book, John Wiley&Sons,2018

WEB RESOURCES:

1. https://dschool.stanford.edu/resources/design-thinking-bootleg
2. https://www.ideo.com/post/design-thinking-for-educators
3. https://static1.squarespace.com/static/57c6b79629687fde090a0fdd/t/58890239db29d6cc 6c3338f7/1485374014340/METHODCARDS-v3-slim.pdf.
4. https://www.intel.com/content/dam/www/program/education/us/en/documents/K12/desig n-and-discovery/student-guide-full-curriculum-session1-18.pdf

Object Oriented Programming using C++ (CSE)	
Course Code: 23CS3102	**Credits : 02**
Instruction **:** 2 Lectures /Week	Sessional Marks : 40
End Exam : 3 Hours	End Exam Marks : 60

Course Objective:

- Familiarize with the syntax and key features of C++ programming language, including data types, variables, control structures, and functions.
- Implement object-oriented design principles to create solutions that follow the principles of abstraction, modularity, and information hiding.
- Effectively use functions to break down complex tasks into smaller, manageable components to address specific problem requirements.
- Develop the skill to analyze problem scenarios and identify the most suitable generic programming techniques, such as templates, to create flexible and reusable code.
- Gain proficiency in using the Standard Template Library (STL) to leverage pre-built generic data structures (like vectors, lists, maps) and algorithms (like sorting, searching) to improve code efficiency and reduce development time.

Course Outcome: At the end of the course, the student will be able to

1	Understand the principles of OOPs and key features of C++
2	Apply object oriented concepts to develop solution for the given problem
3	Apply functions as per the problem requirement
4	Analyze the given scenario and choose appropriate generic programming aspects/ exception handling mechanism to solve the problem
5	Apply Standard Template Library for Real-time applications

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3						2	2	2	3		
CO2	3	3	3	3					2	2	2	2	3		
CO3	3	3	3	3	1	2	2	2	3	2	2	2	3		
CO4	3	3	3	3	1	2	2	2	3	2	2	2	3		
CO5	3	3	3	3	1	2	2	2	3	2	2	2	3		

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

SYLLABUS

Unit - I: **10 Periods**

Introduction: Difference between C and C++, Evolution of C++, Programming Paradigms, Key concepts of OOP, Advantages of OOP, Usage of OOP.

I/O in C++: Pre-defined streams, stream classes, Scope access operator, Name space, memory management operators.

Functions: Introduction, Parts of a function, Passing arguments, Return by reference, Returning more values by reference, Default arguments, const arguments, Inline functions, Function overloading.

Unit - II: **10 Periods**

Classes and Objects: classes in C++, Declaring objects, Access specifiers and their scope, Defining Member Functions, Characteristics of member functions, Outside member function as inline, rules for Inline functions, static member variables, static member functions, static objects, object as function arguments, Friend Function.

Constructors and Destructors: Constructors and Destructors, characteristics of constructors and destructors, Applications with constructors, Parameterized constructors, Multiple constructors, copy constructors, destructors, calling constructors and destructors.

Operator Overloading: The keyword operator, Overloading Unary Operators, Overloading binary operators, Rules for Overloading operators, Overloading Friend function.

Unit - III: **10 Periods**

Inheritance: Access specifiers and simple inheritance, protected data with private inheritance,

Types of Inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid and Multipath, Virtual Base Classes.

Pointers: void pointer, wild pointer, The this pointer. Binding,

Polymorphism, and Virtual Functions: Binding in C++, Pointer to Base and Derived class, Virtual Function, Rules for Virtual functions, Pure Virtual Functions, Abstract Classes

Unit - IV: **10 Periods**

Files: Introduction, File stream classes, Steps for file operations, Checking for errors, Finding end of file, File opening modes, File pointers and manipulators.

Exception Handling: Principles of Exception Handling, The Keywords try, throw and catch, Guidelines for Exception Handling, Multiple catch statements, Catching Multiple Exceptions, Re-Throwing Exceptions, Specifying Exceptions.

Unit - V: **10 Periods**

Generic Programming with Templates: Need for Templates, Definition of class Templates, Function Template, Working of Function Templates, Class Template with more parameters, Function Template with more parameters.

Standard Template Library: Introduction to STL, STL Programming model, containers, sequence container: vector, list; Associative containers: set, map; Algorithms: sort, search, find; Iterators

TEXT BOOKS

1. Programming in C++, Ashok N. Kamthane, Second Edition, 2013, Pearson Education.

REFERENCES

1. The C++ Programming Language, BjarneStroustup, Fourth Edition, 2013, Addison-Wesley.
2. Object-Oriented Programming Using C++ Paperback, Joyce Farrell, Fourth Edition, 2013, Cengage.

Digital Logic Design(Other Departments)	
Code: 23EC3103	**Credits: 3**
Instruction: 3 Periods/ Week	Sessional marks: 40
End exam: 3hours	End exam marks: 60

Course Outcomes: At the end of the course the student will be able to:

CO	CO Statement
CO1	Perform conversions between different number systems and codes andapply the Boolean algebra to minimize the given logic expressions.
CO2	Minimize the given Boolean expressions using logic gates and K-Maps
CO3	Design and Analyze combinational logic circuits.
CO4	Design and Analyze sequential logic circuits like flip-flops and registers
CO5	Design and Analyze counters logic circuits and PLDs

Program Matrix

Cos	Program Outcomes (POs)												PSOs		
	Domain Specific POs					Domain Independent POs									
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	1	-	-	-	-	-	-	-	-	1	-	-	1
CO2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
CO3	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
CO4	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
CO5	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1

SYLLABUS

UNIT –I **10 Periods**

NUMBER SYSTEMS

Number representation, Conversion of bases, Binary Arithmetic, Representation of Negative numbers, Binary codes: weighted and non-weighted BOOLEAN ALGEBRA: Basic definitions, Axiomatic Definitions, Theorems and properties, Boolean Functions, Canonical and standard forms.
(TB1-chapters1&2)

UNIT– II **10 Periods**

LOGIC GATES- AND, OR, NAND, NOR, XOR,XNOR (TB2-chapter 4)

LOGICMINIMIZATION

The K-Map Method: Two variable map, Three variable map, four variable map Prime Implicants, Don't Care conditions, NAND and NOR implementation, Quine-Mccluskey (QM) (up to four variables)Technique.(**TB1-chapters3)**

UNIT– III **10 Periods**

COMBINATIONAL LOGIC DESIGN

Combinational circuits, Analysis Procedure, Design Procedure, Code Converters (BCD to XS3 (XS3 to BCD)), Gray to Binary (Binary to Gray), Binary Adder-Subtractor, Decimal adder, Binary Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers.
De-Multiplexer

(TB1-chapters 4&9.7)

UNIT– IV **10 Periods**

SEQUENTIAL CIRCUITS-1

Sequential logic- Introduction to Latch and Flip flop, clocked S-R, JK, D, T flip flops. Excitation table of Flip flop, Flip flop conversion, Clocked flip flop design, Edge triggered flip flop Registers, Applications of Shift registers, universal shift register, **(TB2-chapters7&8 (till8.5))**

UNIT –V **10 Periods**

SEQUENTIAL CIRCUITS-2

Counters- Ripple counters, Synchronous counters, Ring counters, Johnson counter.PLD's- PAL, PLA and PROM

TEXTBOOKS

1. M. Morris Mano and Michael D.Ciletti, "Digital Design", 6th Edition, Pearson Publishers, 2018.
2. R. P Jain, "Modern Digital Electronics", 5th Edition, TMH, 2022.

REFERENCEBOOKS

1. William I.Fletcher, "An Engineering Approach to Digital Design", PHI, 2015.
2. John F.Wakerly,"Digital Design Principles and Practices", 3rd Edition, Prentice Hall,2015

APPLIED PHYSICS LAB (Common for CSE, CSM & CSDS and IT)	
Code: 23PY1202	**Credits: 1.5**
Instruction: 3 Practical/Week	Sessional marks: 50
End exam: 3hours	End exam marks: 50

Course Objectives:
To enable the students to acquire skill, technique and utilization of the Instruments

Course Outcomes:
At the end of this course, the students will be able to

	COURSE OUTCOMES
CO-1	**Apply** the theoretical knowledge as working principles of Laboratory experiments related to Optics, Mechanics, Electromagnetic and Electronics. (L3)
CO-2	**Adopt** the experimental procedure to perform the experiments for Data procurement / Acquisition. (L3)
CO-3	**Compute** the required parameters by suitable formula using experimental values (observed values) in Mechanics, Optics, Electromagnetic and Electronics. (L3)
CO-4	**Analyze** the experimental data and obtain the results through graphical interpretation. (L4)
CO-5	**Perform** effectively as an individual or as a team and be Accountable / Responsible to the work rendered. (L4)

CO-PO Mapping:

	Program Outcomes (POs)												**PSOs**	
	Domain Specific POs					**Domain Independent POs**								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				1	2						3		
CO2		2	1											
CO3				2				1						
CO4	1			3								1		
CO5								2	3	1	2			

List of experiment (any eight to ten experiments have to be completed)

1. Estimation of thickness of a thin paper by forming parallel interference fringes-Wedge method.

2. Newton's rings- determination of radius of curvature of a convex lens

3. Find out the wavelengths of spectral lines in mercury spectrum-using diffraction grating innormal incidence position.
4. Evaluation of refractive indices o-ray and e-ray in quartz crystal (double refraction)

5. Calculation of Cauchy's constants of the material of the prism using spectrometer.
6. Determination of band gap of semiconductor (Thermistor) by varying resistance with temperature
7. Verification of laws of resistance and determination of specific resistance of wire by usingCarey- Foster's bridge.
8. Calibration of a low-range voltmeter using potentiometer.

9. Study of variation of magnetic field along the axis of a current carrying circular coil – Stewartand Gee's apparatus
10. Determination of the frequency of an electrically maintained tuning fork - Melde's experiment.

11. Find the Numerical aperture of a given optical fiber

12. Estimation of the wavelength of diode laser using a transmission grating

13. Determination of dielectric constant by variation of temperature method (Ferro electric crystal)

14. Magnetic Hysteresis curve experiment (B-H curve)

15. V-I characteristics of Semiconductor diode.

Prescribed Book

Physics Laboratory Manual Prepared by Department of Physics ANITS

Reference books

1. D.P Siva Ramaiah and V. Krishna Murthy, "Practical Physics", Maruti book Depot, 2000.

2. A.R Vegi, "Comprehensive Practical Physics", Vegi Publishers Pvt.Ltd., 2004.

COMPUTER AIDED DRAFTING AND MODELLING LAB (For CSE & IT)	
Code: 23ME3204	**Credits: 1.5**
Instruction: 3 Practical/Week	Sessional marks: 50
End exam: 3hours	End exam marks: 50

Prerequisites: Anyone can learn the course.

Course Objectives:

- The course is designed to develop skill to use software to create 2D and 3D models.

Course Outcomes:

By the end of the course, students will be able to

1.	**Draft** 2D drawings with dimensions using CAD software.
2.	**Design** 3D Wireframe model with dimensions using CAD software.
3.	**Design** 3D Surface model with dimensions using CAD software.
4.	**Design** 3D model with dimensions using CAD software.

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	1		3			1		2		1		2	
CO2	1	2	1		3			1		2		1		2	
CO3	1	2	1		3			1		2		1		2	
CO4	1	2	1		3			1		2		1		2	

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

SYLLABUS

Module I: COMPUTER AIDED DRAFTING

Introduction, Applications, CAD software- AutoCAD, GUI, function keys, Drawing entities, Drafting aids(limits, layers, dimensioning, object snap, zoom), modify commands, Block, WBlock and insert, List of commands, Setting Isometric mode, Iso-planes, isometric commands.

Weekly Exercises:

Exercise 1: Auto CAD Layout and Drafting Aids
Exercise 2: 2D Drafting exercise on modify commands, Block
Exercise 3: 2D Drafting exercise on layers and annotations
Exercise 4: 2D Drafting exercise on Symmetrical drawings and Array function
Exercise 5: 2D Drafting exercise on Polygons and Hatching
Exercise 6: Orthographic Views
Exercise 7: Isometric Views

Module II: 3D WIREFRAME MODELLING

VPOINT, Coordinate System, UCS, 3D Cylindrical Coordinate Method, 3D Spherical CoordinateMethod.

Weekly Exercises:

Exercise 8: 3D Wireframe modelling by VPOINT method.
Exercise 9: 3D Wireframe modelling by UCS method.

Module III: 3D SURFACE MODELLING

3D Surface modelling: VPOINT, UCS, SHADEMODE, ELEV, 3DFACE, PFACE, Revolvesurface, Tabulated surfaces, Ruled surface, Edge surfaces, 3DMESH, primitives

Weekly Exercises:

Exercise 10: 3D Surface modelling by Elevation method. **Exercise 11:** 3D Surface modelling by Revolve surface Method.**Exercise 12:** 3D Surface modelling using Primitives.

Module III: 3D SOLID MODELLING

VPOINT, UCS, SHADEMODE, REGION, EXTRUDE, REVOLVE, BOOLEAN OPERATIONS: UNION, SUBTRACT, INTERSECT; 3DARRAY, FILLET, CHAMFER, ROTATE3D, MIRROR3D, SLICE

Exercise 13: 3D Modelling by Extrude.
Exercise 14: 3D Modelling by Revolve.
Exercise 15: 3D Modelling by BOOLEAN OPERATIONS.
Exercise 16: 3D Modelling by 3DARRAY

REFERENCE BOOKS:

1. **Pradeep Jain** "Engineering Graphics & Design" ISBN 9789391505066, Khanna Book Publishing
2. **N. D. Bhatt** "Engineering Drawing" Charotar Publishing House Pvt. Ltd, 53rd Edition:2014.
3. **Lab Manual**

Applied Python Programming (Common to CSE, EEE)	
Course Code: 23CS3202	**Credits :02**
Instruction **:** 1 Lecture, 2 Practical /Week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objective:

1. Demonstrate a solid understanding of Python's fundamental syntax, data structures, and control flow constructs.
2. Explore various types of mutable and immutable data types
3. Explore different types of exceptions and how to raise custom exceptions when necessary.
4. Demonstrate the ability to apply OOP principles to create modular, reusable, and maintainable code

Course Outcomes

After course completion, the students will be able to:

1	Apply the features of Python language in various real world applications
2	Apply iterative statements to solve complex problems
3	Implement appropriate core data structure of Python for solving a problem
4	Apply modularity to programs and apply file handling mechanism to solve distinct applications
5	Design object-oriented programs using Python for solving real-world problems

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3					3					3	
CO2	3	3	3	3	2				3					3	
CO3	3	3	3	3	3	2	2	2	3	2	2	2		3	
CO4	3	3	3	3	3	2	2	2	3	2	2	2		3	
CO5	3	3	3	3	3	2	2	2	3	2	2	3		3	

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

SYLLABUS

Unit - I: **10 Periods**

Introduction to Python Programming: Introduction and Syntax of Python Program: Variables, Keywords, Constants, Installing IDE and Editor, Python Operators and Control Flow Statements

Coding Exercises 01:

1a. Identify the given Variables, Keywords and constants in Python
lb. Use indentation, comments in the given program.
1c. Install the given Python IDE and editor.
Id. Develop the python program to display the given text.
1e. Write simple Python program for the given arithmetic expressions.
1f. Use different types of operators for writing the the arithmetic expressions.
1g. Write a 'Python' program using decision making structure for two-way branching to solve the given problem.
1h. Write a 'Python' program using decision making structure for multi-way branching to solve the given problem.

Unit - II: **10 Periods**

Data Structures: Lists, Tuples, Sets and Dictionaries

Functions, Modules and Packages: Python Built-in Functions, User-Defined Functions: Function definition, Function calling, function arguments and parameter passing, Return statement, Scope of Variables: Global variable and Local Variable.

2a. Write Python program to use and manipulate lists for the given problem
2b. Write python program to use and manipulate Tuples for the given problem
2c. Write python program to use and manipulate Sets for the given problem
2d. Write python program to use and manipulate Dictionaries for the given problem

Unit - III: **10 Periods**

Modules: Writing modules, importing modules, importing objects from modules, Python built — in modules (e.g. Numeric and mathematical module, Functional Programming Module) Namespace and Scoping.

Python Packages: Introduction, Writing Python packages, Using standard (e.g. math, scipy, Numpy, matplotlib, pandas etc.) and user defined packages.

3a. Use the Python standard functions for the given problem.
3b. Develop relevant user defined functions for the given problem using Python code.
3c. Write Python module for the given problem
3d. Write Python package for the given problem

Unit - IV: **10 Periods**

Object-Oriented Programming: Class, Objects and Inheritance: Defining Classes, The Self parameter and Adding Methods to a Class, Display Class Attributes and Methods, Special Class Attributes, Accessibility, The __init Method (Constructor), Passing an Object as Parameter to a Method, del () (Destructor Method), Class Membership Tests,

Method Overloading, Operator Overloading, Inheritance, The Object Class.

4a Create classes and objects to solve the given problem.
4b Write Python code for data hiding for the given problem.
4c Write Python code using data abstraction for the given problem
4d. Write Python code using Inheritance for the given problem.

Unit - V: **10 Periods**

I/O Handling: I/O Operations: Reading keyboard input, Printing to screen.

File Handling: Opening file in different modes, accessing file contents using standard library functions, Reading and writing files, closing a file, Renaming and deleting files, Directories in Python, File and directory related standard functions.

Exception Handling: Introduction, Exception handling - 'try: except' Statement, 'raise' statement, User-defined exceptions.

5a. Write Python code for the given reading values from keyboard
5b Read data from the given file.
5c Write the given data to a file.
5d Write Python code to handle the given exceptions through Python program.

TEXT BOOKS

1. Programming and problem solving with Python by Ashok Namdev Kamthane, Amit Ashok Kamthane (2018): McGraw Hill Education (India) Private Limited.
2. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
3. Python 3 for Absolute Beginners, Tim Hall and J-P Stacey, Apress.

REFERENCES

1. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019.
2. Python Pocket Reference 5ed: Python in Your Pocket, Mark Lutz, 2014.

Object Oriented Programming using C++ Lab (CSE)	
Course Code: 23CS3203	**Credits : 1.5**
Instruction **:** 3 Practical/Week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objective:

- Familiarize with the syntax and key features of C++ programming language, including data types, variables, control structures, and functions.
- Implement object-oriented design principles to create solutions that follow the principles of abstraction, modularity, and information hiding.
- Effectively use functions to break down complex tasks into smaller, manageable components to address specific problem requirements.
- Develop the skill to analyze problem scenarios and identify the most suitable generic programming techniques, such as templates, to create flexible and reusable code.
- Gain proficiency in using the Standard Template Library (STL) to leverage pre-built generic data structures (like vectors, lists, maps) and algorithms (like sorting, searching) to improve code efficiency and reduce development time.

Course outcome: At the end of the course, the student will be able to

1	Understand the principles of OOPs and key features of C++
2	Apply object oriented concepts to develop solution for the given problem
3	Apply functions as per the problem requirement
4	Analyze the given scenario and choose appropriate generic programming aspects/ exception handling mechanism to solve the problem
5	Apply Standard Template Library for Real-time applications

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3						2	2	2	3		
CO2	3	3	3	3					2	2	2	2	3		
CO3	3	3	3	3	1	2	2	2	3	2	2	2	3		
CO4	3	3	3	3	1	2	2	2	3	2	2	2	3		
CO5	3	3	3	3	1	2	2	2	3	2	2	2	3		

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

SYLLABUS

Coding Exercise-1:

1. Write a program to display "Hello, Welcome to C++ Programing
2. Write a program to print details name, rollnumber in a single and two lines.
3. Write a program to print name by reading, assigning and initializing to a variable with an appropriate prompt.
4. Write a program to print your personal details name, surname (single character), totalmarks, gender(M/F), result(P/F) by taking input from the user.
5. Write a program to convert centigrade into Fahrenheit. Formula: C=(F-32)/1.8
6. Write a program that declares two integers, determines whether the first is a multiple of the second and print the result. (Hint: Use the remainder operator)
7. Write a program that prompts the user to enter two integer values in int variables val1, val2 and find largest, sum, difference, product and ratio of these values.
8. Write a program that prompts the user to enter three integer values, and then outputs the values in numerical sequence separated by commas. So, if the user enters the values 10 4 6, the output should be 4,6,10. If two values are the same, they should just be ordered together. So, the input 4 5 4 should give 4,4,5.

Coding Exercise-2:

1. Write a Program to design a class having static member function named showcount() which has the property of displaying the number of objects created of the class.
2. Write a Program using class to process Shopping List for a Departmental Store. The list include details such as the Code No and Price of each item and perform the operations like Adding, Deleting Items to the list and Printing the Total value of a Order.
3. Write a Program which creates & uses array of object of a class.(for eg. implementing the list of Managers of a Company having details such as Name, Age, etc..).
4. Write a Program to find Maximum out of Two Numbers using friend function.
   Note: Here one number is a member of one class and theother number is member of some other class.
5. Write a Program to swap private data members of classes named as class_1, class_2 using friend function.
6. Write a Program to design a class complex to represent complex numbers. The complex class should use an external function (use it as a friend function) to add two complex numbers. The function should return an object of type complex representing the sum of two complex numbers.
7. Write a Program using copy constructor to copy data of an object to another object.
8. Write a Program to allocate memory dynamically for an object of a given class using class's constructor
9. Write a Program to overload operators like *, <<, >> using friend function. The following overloaded operators should work for a class vector.

Coding Exercise-3:

1. Write a Program illustrating how the constructors are implemented and the order in which they are called when the classes are inherited. Use three classes named alpha, beta, gamma such that alpha, beta are base class and gamma is derived class inheriting alpha & beta.
2. Write a Program to design a student class representing student roll no. and a test class (derived class of student) representing the scores of the student in various subjectsand sports class representing the score in sports. The sports and test class should be inherited by a result class having thefunctionality to add the scores and display the final result fora student.
3. Write a program to maintain the records of person with details (Name and Age) and find the eldest among them. Theprogram must use this pointer to return the result.
4. Write a Program to illustrate the use of pointers to objects which are related by inheritance.
5. Write a program illustrating the use of virtual functions inclass.
6. Write a program to design a class representing the information regarding digital library (books, tape: book & tapeshould be separate classes having the base class as media).The class should have the functionality for adding new item, issuing, deposit etc. the program should use the runtimepolymorphism.

Coding Exercise-4:

1. Write a program to implement I/O operations on characters. I/O operations includes inputting a string, Calculating lengthof the string, Storing the string in a file, fetching the stored characters from it, etc.
2. Write a program to copy the contents of one file to another.
3. Write a program to perform read/write binary I/O operation ona file (i.e. write the object of a structure/class to file).
4. Write a program for reading and writing data to and from thefile using command line arguments.
5. Write a program to implement the exception handling with multiple catch statements.
6. Write a program to implement the exception handling with the functionality of testing the throw restrictions.

Coding Exercise-5:

1. Write a function template that will sort an array of implicit types like int, float, char etc. it can also sort user-defined objects like strings & date. The necessary classes contains overloading of operators.
2. Write a C++ program to write a function template for finding the minimum value

TEXT BOOKS

1. Programming in C++, Ashok N. Kamthane, Second Edition, 2013, Pearson

REFERENCES

2. The C++ Programming Language, BjarneStroustup, Fourth Edition, 2013, Addison-Wesley.
3. Object-Oriented Programming Using C++ Paperback, Joyce Farrell, Fourth Edition, 2013, Cengage.

ENVIRONMENTAL SCIENCE	
Course Code: 23MC0102	**Credits : 00**
Instruction **:** 2 Practical/Week	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objectives:

- Inculcating in students the awareness toward components in environment.
- Understand the importance natural resources, Structure, and functions of an ecosystem
- Inducing knowledge on Sources, effects, and methods to reduce environmentalpollution.
- Able to know the meaning of sustainable development and correlate social issues related to Environment.

Course Outcomes:

By the end of the semester, the student will be able to:

CO	Statement
CO-1	Identify the characteristics of various natural resources and can implement the conservation practices
CO-2	Realize the importance of Ecosystem and Biodiversity for maintaining ecological balance
CO-3	Classify, analyze various pollutants and can Develop methods for solving problems related to environment
CO-4	Implement the environmental laws or defend issues by getting awareness onlegal aspects related to environmental issues
CO-5	Promote awareness on local environmental issues by participating in groupactivities, seminars, taking project work

CO-PO-PSO Mapping

PO/CO's	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1						1	2	1		1		1		
CO2						1	2	1		1		1		
CO3						2	2	1		1		1		
CO4						2	3	1		1		1		
CO5						2	2	1	3	2		1		

Correlation levels 1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)

UNIT I: INTRODUCTION TO ENVIRONMENT AND NATURAL RESOURCES

10 Periods

Introduction: Definition, Multidisciplinary nature of environmental studies, Scope and Importance of Environmental Sciences, Need for public awareness.
Natural Resources: Renewable and Non-Renewable sources-Forest resources-use and overexploitation, deforestation, Water resources- aquifers, dams and benefits, conflicts over water; Food resources- effects of modern agriculture practices, Energy resources-conventionaland non -conventional energy resources.

Activities:
Need for Public Awareness (Campaign), Renewable vs. Non-Renewable Resources (Group Discussion),Deforestation and its Impact, Water Conflict (Case studies).

UNIT- II: ECOSYSTEM &BIODIVERSITY 10 Periods
Ecosystem: Concept of an ecosystem structure and function of ecosystem Food chains, food web sand ecological pyramids, Energy flow in an ecosystem, Ecosystem regulation, Ecological succession.
Biodiversity: Definition, types, India as a Mega diversity Nation, Values of biodiversity, Hotspots of biodiversity, Threats to biodiversity, Endangered and endemic species, Conservation of biodiversity.

Activities:
Ecosystem (Field trip), Food chain and Food Web (Models), Endangered Species (Case Studies),
Ecosystem regulation, Values of Biodiversity (Group Discussion), Endangered Species Awareness
(Posterpresentation).

UNIT –III: ENVIRONMETAL POLLUTION ANDWASTEMANAGEMENT
10 Periods
Pollution: Sources, effects and control measures of Air pollution, Noise Pollution, Water Pollution, Soil Pollution, Radio Active Pollution; Climate Change, Ozone depletion, Acid rains –causes and adverse effects.

Solid waste management: Sources and effects of municipal waste, bio-medical waste, Industrial waste, e-waste, Process of waste management-composting, sanitary landfills, incineration. Green Chemistry concepts,

Activities:
Pollution (Slogan writing), Pollution Control Measures (Group Discussion) ,Climate Change (CaseStudies), Waste-to-Art (Poster presentation).

UNIT- IV: SOCIALISSUESANDENVIRONMENTALLEGISLATIONS 10 Periods
Social Issues and the Environment: Sustainable development, Environmental Impact Assessment, Rain water harvesting, water shed management. Resettlement and rehabilitation of people, Environmental ethics.

Legislation Acts: Importance of Environmental legislation, Air (Prevention and Control of Pollution) act, Water (Prevention and control of Pollution) act, Wildlife Protection act, and Forest Conservation act.

Activities:
Sustainable Development, Environmental Ethics (Group Discussion), Environmental Impact Assessment (EIA), Resettlement and Rehabilitation (Case Studies), Rainwater Harvesting (Model), Environmental Legislation (Awareness Campaign).

UNIT- V HUMAN POPULATION ANDTHEENVIRONMENT 8 Periods

Human population and environment- Population growth, Population explosion; Family Welfare Programmes: Role of information technology on environment and human health; Value Education – HIV/AIDS – Women andChild Welfare

FIELD WORK/PROJECT: Visit to a local area to document environmental problem and submit
a Record

Activities:
Population Growth, Role of Information Technology and Environment, Women Empowerment, FamilyWelfare Program (Awareness Campaign),Women and Child Welfare (Case Study),Population and Environment (Short film)

Prescribed Book

1. **Anubha Kaushik & C.P.Kaushik**, "Perspertives of Environmental Studies" by 5th edition New Age International Publications, 2015.
2. **ErachBharucha, "**Textbook of Environmental studies for Undergraduate Courses", Universities Press Commission, 2013.
3. **Palaniswamy**- "Environmental Studies", 2nd edition, Pearson education2015.

Reference Books

1. **S. Deswal, A. Deswal**, "Basic course in Environmental studies", 2nd edition, DhanpatraiPublications,2008.