Syllabus of Second Year

Department of Information Technology

To be followed from Academic Year 2019-20

(L-T-P) indicates L-Lecture, T-Tutorial and P-Practical

Program Educational Objectives (PEOs):

PEO1	To provide students strong foundation in mathematics and engineering fundamentals to have carrier in various fields of IT such as Networks and Security, Data Analysis and Management, Web Development etc.
PEO2	To imbibe in them professional and ethical responsibilities towards their profession, society and the environment as well as the respect for diversity.
PEO3	To enable graduates apply necessary techniques, Software and Hardware tools to foster innovation, invention and entrepreneurship.
PEO4	To help students acquire effective oral and written communication and lifelong learning skills to have productive careers in IT industries.
PEO5	To provide opportunity to the students to work effectively as individuals or in teams demonstrating their skills in solving IT related problems.

Program Outcomes (POs):

PO1 (a)	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and specialization to solve complex engineering problems.
PO2 (b)	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural and engineering sciences.
PO3 (c)	Design/development of solutions: Design and develop solutions by considering the public health and safety, cultural, societal, and environmental considerations to complex multidisciplinary engineering problems.
PO4 (d)	Conduct investigations of complex problems: Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5 (e)	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex

	engineering activities with an understanding of the limitations.
PO6 (f)	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7 (g)	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8 (h)	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9 (i)	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10 (j)	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11 (k)	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12 (l)	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives (PSOs):

PSO1	Foundation of mathematical concepts: To apply mathematical methodologies to crack the real-world problems using appropriate mathematical analysis, data structure and efficient computer algorithms.
PSO2	Knowledge of recent trends: To provide effective and efficient knowledge of recent technologies such as Web Technologies, Data Science, Machine Learning, Artificial Intelligence, Cyber Security, Internet of Things, etc.
PSO3	Project based learning: To provide platform to the students to develop a new and innovative multidisciplinary software development to cater industry needs.

Table of Correlation :

PO/PSO ➡ ⬇ PEO	a	b	c	d	e	F	g	h	i	j	k	l	PSO 1	PSO 2	PSO 3
I	✓	✓		✓			✓			✓		✓		✓	
II			✓		✓	✓	✓		✓	✓	✓		✓		✓
III		✓		✓		✓				✓		✓	✓		✓
IV					✓	✓		✓		✓		✓		✓	✓

Syllabus Structure

Second Year – Department of Information Technology

Semester I						
Course Code	**Name of the course**	**L**	**T**	**P**	**Credits**	
					Th	**Pr**
BSC273	Mathematics-III: Applied Linear Algebra	3	--	--	3	--
PCC-IT201	Data Structures	3	--	2	3	1
PCC-IT202	Object Oriented Programming	3	--	2	3	1
PCC-IT203	Discrete Mathematics	3	--	2	3	1
PCC-IT204	Digital Systems Design	3	--	2	3	1
LAB-IT205	Computer Laboratory - I	--	--	2	--	1
BSC261	Mathematical Foundation for Engineering*	2	--	--	Audit	
MAC277	Indian Constitution	2	--	--	Audit	
	Total	**19**	**--**	**10**	**20**	
Semester II						
Course Code	**Name of the course**	**L**	**T**	**P**	**Credits**	
					Th	**Pr**
BSC276	Mathematics-IV: Vector Calculus and Statistical Methods	3	--	--	3	--
PCC-IT206	Computer Organization and Architecture	3	--	--	3	--
PCC-IT207	Microprocessors and Interfacing	3	--	2	3	1
PCC-IT208	Java Programming	3	--	2	3	1
LAB-IT209	Computer Laboratory – II	--	--	2	--	1
PEC-IT2**	Elective – I	3	--	2	3	1
LAB-IT214	Soft Skill Development	--	--	2	--	1
HMC278	Human Values and Professional Ethics	2	--	--	2	--
	Total	**17**	**--**	**10**	**22**	

L – No. of Lecture Hours/week, T – No. of Tutorial Hours/week, P – No. of Practical Hours/week

* This Audit course is only for Direct Second Year students and a MANDATORY course.

**** Elective - I**

PEC-IT210 IT Project Management
PEC-IT211 Design Thinking
PEC-IT212 Financial Management
PEC-IT213 Ethical Hacking and Cyber Law

SEMESTER-I

BSC273	Mathematics – III: Applied Linear Algebra	3L:0T:0P	3 credits

Course Objectives:

- To understand fields and vector spaces, subspaces, linear independence and dependence.
- To find basis and dimension of a vector space and understand change of basis. Find a basis for the row space, column space and null space of a matrix and find the rank and nullity of a matrix.
- To compute linear transformations, kernel and range, and inverse linear transformations, and find matrices of general linear transformations.
- To understand eigenvalues and eigenvectors and diagonalization process.
- To learn inner products on a real vector space and orthogonality in inner product spaces and obtain orthonormal bases using Gram-Schmidt process
- To learn the different matrix norms, convergence of matrices and matrix decompositions such as QR, SVD, LU, Cholesky

Unit 1: Vector Spaces (06 hours)

Review of vector spaces, Subspaces, Linear dependence and independence, Basis and dimensions.

Unit 2: Linear Transformations (06 hours)

Basic concepts in Linear Transformations, Use of elementary row operations to find coordinate of a vector, change of basis matrix, matrix of a linear transformations and subspaces associated with matrices. LU decomposition

Unit 3: Inner Product Spaces (06 hours)

Inner Product Spaces, Orthogonal Bases, Gram-Schmidt Orthogonalization, QR Factorization, Cholesky Decomposition, Normed Linear Spaces.

Unit 4: Matrix Norms (05 hours)

Matrix Norm, condition numbers and applications, convergent matrices, stability of non-linear system.

Unit 5: Diagonalization (10 hours)

Eigenvalue and Eigenvectors, Diagonalization and its applications, Positive Definite Matrices and their applications, Computation of Numerical Eigenvalues.

Unit 6: Singular Value Decomposition (SVD) (12 hours)

Singular Value Decomposition, Matrix Properties via SVD, Projections, Least Squares Problems, Application of SVD.

References:

1. Gilbert Strang, Linear Algebra and Its Applications, 4th edition, Cengage Publications.
2. Anton and Rorres, Elementary Linear Algebra Applications version, 9th Edition, Wiley India Publications.
3. David C Lay, Linear Algebra and its Applications, Addition-Wesley
4. S. Kumaresan, Linear Algebra – A Geometric Approach, Prentice Hall India
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd edition, Brooks/Cole, 2005.
6. E. Kreyszig, Advanced Engineering Mathematics, 9th edition, John wiley and Sons, 2006.

Course Outcomes:

- **CO1** Determine whether a given structure is vector space, subspace structure and will be able to determine basis and dimension of vector spaces.
- **CO2** Find the null space of a matrix and represent it as the span of independent vectors.
- **CO3** Find the matrix representation of a linear transformation given bases of the relevant vector spaces.
- **CO4** Find the orthogonalization in inner product spaces and find eigenvalues, eigenvectors and diagonalization and apply diagonalization to find powers of matrices, etc.
- **CO5** Calculate Matrix norms and use it in conditioning of numbers and stability problems and convergence of matrices.
- **CO6** Calculate SVD and reconstruct a rectangular and square matrix from SVD elements.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low												
PO **CO**	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	3										2
CO2	3	3										2
CO3	3	3										2
CO4	3	3	2									2
CO5	3	3	2	2	1							2
CO6												

PCC-IT201	Data Structures	3L:0T: 2P	4 credits

Course Objectives

- Understand and remember algorithms and its analysis procedure.
- Introduce the concept of data structures through ADT including List, Stack, Queues.
- To design and implement various data structure algorithms.
- To introduce various techniques for representation of the data in the real world.
- To develop application using data structure algorithms.
- Study and analyze the complexity of various algorithms.

Unit 1: Introduction: Basic Terminologies, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.
Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2: Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3: **Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Unit 4: **Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, Applications of Binary Trees. Tree variants: AVL Tree, B Tree, B+ Tree

Unit 5: Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Unit 6: Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Text Books:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Reference Books:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

Course Outcomes:

- **CO1** Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
- **CO2** Understand abstract data types, basic data structures such as arrays, linked lists, stacks and queues.
- **CO3** Understand non-linear data structures
- **CO4** Describe the hash function and concepts of collision and its resolution methods
- **CO5** Solve problem involving linear and non-linear data structures
- **CO6** Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO **CO**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2		2	3	1			1		2	3	2	2	3
CO2	2		3	2	1			1	1		3	3	3		
CO3	2		3				2			3			3	1	1
CO4	1	2					1				2				
CO5	3	3	3	2	2	3	2			2	3	3	3	1	
CO6		3	2	3	3	3		1		2		3	2		3

PCC-IT202	Object Oriented Programming	3L:0T: 2P	4 credits

Course Objectives

- Introduce the Object Oriented Programming paradigm using C++ and Java as the languages.
- To learn simple Android application development from the fundamentals.
- Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of software development.
- Have the ability to write a computer program to solve specified problems.
- Be able to use the Java SDK environment to create, debug and run simple Java programs.

Unit 1. Introduction : What is object oriented programming? Why do we need object oriented. Programming characteristics of object-oriented languages. C and C++.
Unit 2. C++ Programming basics : Output using cout. Directives. Input with cin. Type bool. The setw manipulator. Type conversions.
Unit 3. Functions : Returning values from functions. Reference arguments.Scope and Visibility of variables in Functions, Overloaded function. Inline function. Default arguments. Returning by reference.
Unit 4. Object and Classes : Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor. Object as function arguments. The default copy constructor, returning object from function. Structures and classes. Classes objects and memory static class data. Const and classes. Arrays of object, string, The standard C++ String class
Unit 5: Constructors and Destructors: Definition of Constructor, Types of Constructor, Static variables and Functions in class.
Unit 6. Operator overloading : Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.
Unit 7. Inheritance : Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation : Classes within classes, inheritance and program development.
Unit 8. Pointer : Addresses and pointers. The address of operator and pointer and arrays. Pointer and Faction pointer and C-types string. Memory management : New and Delete, pointers to objects, debugging pointers.
Unit 9. Virtual Function : Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, Abstract classes, dynamic type information.
Unit 10: Exception handling: Throwing an exception, catching an exception: The try block, Exception handlers, Termination vs. Resumption, Exception specification, rethrowing an exception, uncaught exceptions, Standard exceptions, Programming with exceptions.
Unit 11. Streams and File Handling :
Streams classes, Stream Errors, Disk File I/O with streams, file pointers,Reading a File, Managing I/O Streams, Opening a File – Different Methods, Checking for Failure with File Commands, Checking the I/O Status Flags, Dealing with Binary Files, Useful Functions.
Unit 12. Templates and Exceptions : Function templates, Class templates,Implementing a class template, Implementing class template member functions, Using a class template, Function templates, Implementing function templates, Using template functions, Template instantiation, Template parameters, Static members and variables, Templates.

Text Books:

1. E. Balagurusamy, Object Oriented Programming with C++ and JAVA,
2. McGrawHill, 2015

3. Hardy, Brian, and Bill Phillips, Android Programming: The Big Nerd Ranch
4. Guide. Addison-Wesley Professional, 2013.
5. Yashwant P. Kanetkar, Let us C++, 2/e, BPB Publications, 2003

Reference Books:

1. Deitel, Harvey M., and Paul J. Deitel., Java how to program.,7th International edition." (2007): 390-420.
2. G. Booch, R. A. Maksimchuk, M. W. Engel, and B J. Young, Object-oriented Analysis and Design with Applications, Addison-Wesley, 3rd Edition, 2007.
3. Horstmann, Cay S., and Gary Cornell., Core Java 2: Volume I, Fundamentals, Pearson Education, 2002.
4. Samanta, Debasis, Object-Oriented programming with C++ and Java, PHI Learning Pvt. Ltd., 2006.
5. Stroustrup, Bjarne. The C++ programming language, Pearson Education India, 1986.

Course Outcomes:

CO1 Be able to understand the basics of OOP and Object-oriented approach to design software to solve real world problems based on object-oriented principles.
CO2 Students be able to think in terms of classes, Objects, Interfaces.
CO3 Be able to test, document and prepare a professional looking software.
CO4 To be able to apply an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3	3	3	1			3		2	2	1	3	3
CO2	1	3	3	3	3				2		1	3	1	3	3
CO3	1	2	2	2	3				2		1	3	1	3	3
CO4	1	2	3	3	3	1			2		1	2	1	3	3

PCC-IT203	Discrete Mathematics	3L:0T:2P	4 credits

Course Objectives:
Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

- Use mathematically correct terminology and notation.
- Construct correct direct and indirect proofs.
- Use division into cases in a proof.
- Use counter examples.
- Apply logical reasoning to solve a variety of problems.

UNIT 1: Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.
Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT 2: Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

UNIT 3: Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.

Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT 4: Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT 5: Graphs: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example.

UNIT 6: Trees: Introduction, Applications of Trees, Tree Traversal, Trees and Sorting, Spanning Trees, Minimum Spanning Trees.

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and Its Application to Computer Science", TMG Edition, Tata Mcgraw-Hill.
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.
3. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson, Discrete Mathematics, Tata McGraw – Hill.

Course Outcomes

- **CO1** For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives.
- **CO2** For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference.
- **CO3** For a given a mathematical problem, classify its algebraic structure.
- **CO4** Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
- **CO5** Develop the given problem as graph networks and solve with techniques of graph theory.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low														
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2					1			2	3	1	
CO2	3	2	2	2					1			2	3	1	
CO3	3	2	2	2					1			2	3	1	
CO4	3	2	2	2					1			2	3	1	
CO5	3	2	2	2					1			2	3	1	

PCC-IT204	Digital Systems Design	3L:0T:2P	4 credits

Course Objectives:

- To understand different number systems and codes with conversion from one to another.
- To understand various concepts of combi national logic design and to design & implement various combi national logic circuits.
- To understand various concepts of sequential circuits and to analyse, design & implement sequential systems in terms of state machines.
- To understand the working, properties and use of various semiconductor memories
- To understand implementation of various combi national and sequential logic circuits using MultiSim and VHDL.

UNIT 1: Number Systems and Codes: Binary, Octal, Decimal and Hexadecimal number Systems and their conversion, Binary Addition and Subtraction, Gray Code, BCD Code, Excess-3 code, ASCII Code, Hamming code.

UNIT 2: Combinational logic design: Switching algebra, Minimizing SOP and POS expressions, Combinational circuit analysis, Combinational circuit minimization: K-Map of two, three, four, five variable functions, Quine Mc-Clusky minimization, timing hazards, circuit timing, Standard Combinational circuits: Encoders, Decoders, Tri-State devices, Multiplexes, Comparators, Arithmetic circuits: Half and full adders, Ripple adders, Subtractors, Carry look ahead adders, Design of combinational logic circuits using multiplexers and decoders.

UNIT 3: Sequential logic design: Latches and flip flops, Edge triggered and Master-Slave flip flops (SR, JK, D, T etc.), Clocked synchronous state machine analysis and design, Designing state machines using state diagrams, Counters and shift registers, synchronous design methodology, clock skew, gating the clock, asynchronous inputs.

UNIT 4: Designing using MultiSim and VHDL: Introduction to MultiSim, design and simulation of various circuits, Introduction to VHDL, Modelling styles, Data flow, behavioural, structural and mixed, VHDL description of combinational networks, compilation and simulation of VHDL code, VHDL models for multiplexer, decoders, adders etc., modelling flip flops using VHDL, modelling sequential circuits like counters and shift registers.

UNIT 5: Counters and shift Registers: Asynchronous counters, Synchronous counters, MOD counters, Shift- counters, Up-down counters, Ripple counters, Shift Registers: Serial in Serial out, Serial in parallel out, Parallel in Serial out and Parallel in Parallel out, universal shift registers.

UNIT 6: Memories: Random access memory, TTL RAM cell, read write cycles, MOS-static RAM cell, dynamic RAM cell, refreshing ROMs.

Text / Reference books:

1. J. F. Wakerly, "Digital design- Principles and practices", PH International Pearson India, Third edition
2. J. Bhasker, "VHDL primer", Pearson Education Asia, third edition
3. W. I. Fletcher, "An Engineering approach to digital design", PHI
4. Samuel C. Lee, "Digital circuits and logic design", PHI
5. C. H. Roth Jr., "Digital systems design using VHDL", PWS publishing company
6. Kevin Skahill, "VHDL for programmable logic", Addison Wesley

Course Outcomes

After successful completion of this course, the students will be able to:

- **CO1** Apply the knowledge of number systems and codes in problem solving related to number system and code conversion.
- **CO2** Do the analysis, design and implementation of combinational logic circuits

CO3 Do the analysis, design and implementation of sequential logic circuits
CO4 Classify and decide the use of various semiconductor memories according to application
CO5 Implement and simulate combi national and sequential logic circuits using MultiSim and VHDL

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2		2		1				1		1	3	1	
CO2	3	3	3	2	2		2		1	1		1	3	1	2
CO3	3	3	3	2	2	2	2	1		1	1	2	3	1	2
CO4	1	2	2	2	2	2		1		1	1	2	3		
CO5	2		3	1	3			2		2	1	2	1		3

LAB-IT205	**Computer Laboratory - I**	**0L:0T:2P**	**1 credits**

Selected Language: C Language

Course Objectives:

- Students are expected to perform minimum 10-12 experiments using the above software.
- Use the variety of data types appropriate to specific programming problems.
- Utilize the modular features of the language. Demonstrate efficiency and readability.
- Demonstrate the use of the various control flow constructs.

BSC261	Mathematical Foundation for Engineering	2L:0T:0P	Audit

Course Objectives:

- To develop the sound conceptual understanding of Algebra, coordinate geometry, complex numbers , vectors, matrices, Calculus and Differential Equations.
- To develop the foundation for engineering mathematics and other engineering courses.

Unit-1 Complex Numbers (05 hours)

Complex numbers as ordered pairs. Argand's diagram. Triangle inequality. Powers and roots of complex numbers, De Moivre's Theorem.

Unit-2 Algebra (05 hours)

Quadratic equations and express-ions. Permutations and Combinations. Binomial theorem for a positive integral index.

Unit-3 Coordinate Geometry (07 hours)

Coordinate Geometry: Locus. Straight lines. Equations of circle, parabola, ellipse and hyperbola in standard forms. Parametric representation.

Unit-4 Vectors and Matrices (08 hours)

Addition of vectors. Multiplication by a scalar. Scalar product, cross product and scalar triple product with geometrical applications. Matrices and Determinants: Algebra of matrices. Determinants and their properties. Inverse of a matrix. Cramer's rule.

Unit-5 Differential Calculus (10 hours)

Function. Inverse function. Elementary functions and their graphs. Limit. Continuity. Derivative and its geometrical significance. Differentiability. Rules of derivatives, Applications of Derivatives: Tangents and Normals, Increasing and decreasing functions. Maxima and Minima.

Unit-6 Integral calculus (10 hours)

Integration as the inverse process of differentiation. Integration by parts and by substitution. Definite integral and its application to the determination of areas (simple cases). Solving first order differential equations:Exact differential equations and first order linear differential equations.

Reference books:

1. Bernard and Child, Higher Algebra, Macmillan and Co. Pvt. Ltd, New York.
2. J.V. Uspensky, Theory of equations, macGraw Hill Publications.
3. S. L. Loney, The Elements of Coordinate Geometry, Macmilliams and Co., New York
4. G.B.Thomas, M.D.Weir, J. Hass, Thomas' calculus, 12th edition, Pearson Publications
5. H.Anton, C. Rorrers, Elementary Linear Algebra Applications version, 9th edition, Wiley publications.

Course Outcomes

- **CO1** Analyze the structure of complex numbers, quadratic equations, vectors and matrices and their uses.
- **CO2** Find the standard and general equations of lines, circles, conic sections, and their properties.
- **CO3** Sketch the graphs of functions and can evaluate limit, continuity, derivatives, integrations.
- **CO4** Formulate and solve first order differential equations.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low												
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
CO1	3	3	1	2								2
CO2	3	3	1	2								1
CO3	3	3										1
CO4	3	3	2									2

MAC277	Indian Constitution	2L:0T:0P	AU

Course Objectives:

- To help students understand the basic foundation of our nation as well as to understand the basic law for the governance of our nation.
- Understanding the history and the different types of Constitutions.
- Understanding the importance of the Constitution. Understanding the different aspects considered by the framers while framing the Constitution.
- To know and understand the different rights enshrined in the Constitution and understand the rights and duties of the government.
- To understand the basis and procedure of amendments and the different important amendments.
- To know the different aspects of the Union and the State Executive.
- To know how our country was founded, who founded it, what our rights are, what life was like, how life has changed, how the rights still apply today.

UNIT 1: Understanding the concept 'Rule of Law ' Meaning and history of Constitution. Understanding the concept of Human Rights and Fundamental Rights.

UNIT 2: Introduction to The Constitution of India, understanding its objects. Preamble to the constitution of India.

UNIT 3: Fundamental rights under Part – III, exercise of the Rights, limitations and important cases.

UNIT 4: Fundamental duties & their significance. Relevance of Directive principles of State Policy.

UNIT 5: Legislative, Executive & Judiciary (Union and State Level) Prerogative Writs.

UNIT 6: Constitutional Provisions for Scheduled Castes, Scheduled Tribes, & Backward classes. Constitutional Provisions for Women & Children.

UNIT 7: Emergency Provisions. Electoral procedure in India Amendment procedure and few important Constitutional Amendments

Text / Reference books:

1. Introduction to the Constitution of India by Durga Das Basu (Students Edn.) Prentice – Hall EEE, 19th/20th Edn..
2. Engineering Ethics by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia,.
3. An Introduction to Constitution of India by M.V. Pylee, Vikas Publishing.

Course Outcomes

CO1 Define a constitution

CO2 Describe the salient features of the Indian Constitution

CO3 List the Fundamental Rights and Fundamental Duties of Indian citizens

CO4 Describe the Directive Principles of State Policy and their significance

SEMESTER-II

BSC276	Mathematics-IV: Vector Calculus and Statistical Methods	3L:0T:0P	3 credits

Course Objectives:

- To Define and compute the line integral, surface integral, volume integral using Green's Theorem, Stokes's Theorem and the Divergence Theorem.
- To provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science.
- To understand probability distributions (univariate and bivariate) and their properties.
- To learn the statistical parameters for different distributions, correlation and regression.
- To understand the method of curve fitting, testing of hypothesis, goodness of fit

Unit 1: Vector Calculus (10 hours)

Line integrals, surface integrals, Integral Theorems: The divergence theorem of Gauss, Greens theorem, and Stokes theorem

Unit 2: Analysis of Statistical Data (03 hours)

Frequency distribution; Frequency curve and histogram; Measure of central tendency and dispersion.

Unit 3: Random variables and Probability Distributions (08 hrs)

Basic concepts of probability and its properties; Conditional probability and independent events; Random variables, discrete and continuous random variables, Mean and variance of Binomial, Poisson and Normal distributions and applications.

Unit 4: Sampling Distributions and Interval of Estimation (08 hours)

Sampling Distributions: t distribution, Chi-square distribution, F-distribution, Interval of estimation

Unit 5: Testing of Hypothesis-Large sample Tests (08 hours)

Relation between confidence interval and testing of hypothesis; testing of hypothesis, classification of hypothesis tests; large sample tests.

Unit 6: Testing of Hypothesis-Small Samples Tests (08 hours)

t-test for single mean and differences of means, F-test for equality of two population variances,; chi-square test for single variance, Chi-square test for goodness of fit, simple correlation and regression.

Reference books:

1. E. Kreyszig, Advanced Engineering Mathematics, Eighth Edition, John Wiley and Sons, 2015.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Fifth Edition, Narosa Publishing House, 2016.
3. V. K. Rohatgi and A.K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, 2nd Edition.
4. D. C. Montgomery and G.C. Runger, "Applied Statistics and Probability for Engineers", 5th edition, John Wiley & Sons, (2009).
5. P. S. Mann, Introductory Statistics, Wiley Publications, 7th edition (2013).

Course Outcomes

- **CO1** Evaluate line integrals, surface integrals, and volume integrals and convert line integrals into area integrals and surface integrals into volume integrals using integral theorems
- **CO2** To develop techniques of data interpretation.
- **CO3** Develop problem solving techniques needed to accurately calculate probabilities and describe the properties of discrete and continuous distribution functions.
- **CO4** Use statistical tests in testing hypotheses on data.
- **CO5** Compute covariances, and correlations, Apply the tests of goodness of fit

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low												
PO **CO**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
CO1	3	3	2	2								2
CO2	3	3										2
CO3	3	3	2									2
CO4	3	3	2	3		1						2
CO5	3	3	2	2		1					1	1

PCC-IT206	Computer Organization and Architecture	3L:0T:0P	3 credits

Course Objectives:

- To conceptualize the basics of organizational and architectural issues of a digital computer.
- To analyze performance issues in processor and memory design of a digital computer.
- To understand various data transfer techniques in digital computer.
- To analyze processor performance improvement using instruction level parallelism

Unit 1: Introduction: Concept of computer organization and architecture, Fundamental unit, Computer function and interconnection, CPU structure and function.

Unit 2: Instruction Sets: Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Machine state and processor status, Structure of program, Introduction to RISC and CISC architecture.

Unit 3: Computer Arithmetic: The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation, Floating point arithmetic, Introduction of arithmetic co-processor.

Unit 4: Memory Organization: Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers.

Unit 5: Control Unit: Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro-programmed Control Unit, Basic concepts, Micro-instruction sequencing, Micro-instruction execution, Applications of micro-programming.

Unit 6: Input/ Output Organization: External devices, I/O module, Programmed I/O, Interrupt driven I/ O, Direct memory access, I/O channels and processors, External interface. Instruction pipe-lining: Concepts. Parallel processing: Multiple processor organization, Symmetric multiprocessor, Cache coherence and the MESI protocol.

Text Books:

1. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.
2. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.
3. Zaky, Computer Organization, McGraw-Hill Publication, 5th Edition, 2011.

Reference Books:

1. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and Kaufman Publication, 4th Edition, 2007.
2. Morris Mano, Computer System Architecture, Pearson Education India, 3rd Edition, 2007.
3. Mostafa Abd-El-Barr, Hesham El-Rewini, Fundamentals of Computer Organization and Architecture, Wiley Publication, 1st Edition, 2004.
4. Miles J. Murdocca, Vincent P. Heuring, Computer Architecture and Organization: An Integrated Approach, Wiley Publication, 1st Edition, 2007.
5. Sajjan G. Shiva, Computer Organization, Design, and Architecture, CRC Press, 5th Edition, 2013.

Course Outcomes

CO1 Ability to understand basic structure of computer.

CO2 Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.

CO3 Become proficient in quantitative performance evaluation of computer systems.

CO4 Understand how programs and data are stored and represented in a computer system.
CO5 To be able to design and analyze pipelined control units.
CO6 To be able to understand and design parallel processing architectures.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1		2	2			2			1			3	3		
CO2	3		3			2							3		3
CO3						3			3			3		3	
CO4	3	3		2					1					3	
CO5	3	3	2			2						3		2	3
CO6	3	3		2					1			2	3		3

PCC-IT207	Microprocessors and Interfacing	3L:0T:2P	4 credits

Course Objectives:

- To understand Intel 8085 architecture and programming in assembly language.
- To understand basic concepts of interfacing memory and peripheral devices to a microprocessor.
- To understand architectures of Intel 8086, 80186, 80286, etc.
- To understand the ways in which microprocessors can be used in automated systems.

Unit 1: The 8085A Microprocessor Basics: Evolution of Microprocessor, Architecture of 8085A microprocessor, Pin configuration, the 8085A timing diagrams, State diagram, Memory and I/O synchronization, logic levels, loading and Buffering, the 8085 Instruction set, Interrupt structure of 8085.

Unit 2: Assembly Language Programming: Concepts of program assembly and testing, simple programs with and without loops, Arithmetic problems, stacks and subroutines, Delay subroutines.

Unit 3: Memory Interfacing with 8085A: Memory mapped I/O and I/O mapped I/O, memory system Design, Exhaustive and Partial decoding, Design Examples.

Unit 4: Fundamental of I/O Interfacing: Data transfer schemes, Programmable Interfacing Chips: 8155, 8255 & 8279, A to D and D to A Conversion Methods, Interfacing of ADCs and DACs with 8085.

Unit 5: 8086 and other Intel Microprocessor architectures: Architecture of 8086; Programming Model, Addressing modes: Data, program, Stack, memory-addressing modes, Overview of the Instruction set of 8086, Architecture of other Intel microprocessors like 80186, 80286, etc.

Text/Reference Books:

1. B. RAM, “Microprocessors and Microcomputers", Dhanpat Rai Publications.
2. Gaonkar Ramesh, “Microprocessor, Interfacing and Applications”, Prentice Hall.
3. Kenneth L. Short, “Microprocessors and Programmed Logic" PHI.
4. Hall D.V., “Microprocessors and Digital Systems", Mcgraw - Hill Book Company.
5. Kulkarni U.V., Sontakke T. R., "The 8085A Basics, Programming and Interfacing", Sadhusudha Prakashan.

Note: Student will perform at least 12 Practical’s based upon above syllabus.

Course Outcomes

- **CO1** Differentiate between various Intel microprocessors.
- **CO2** Distinguish between different instructions of 8085 microprocessor and apply them in assembly language programming.
- **CO3** Realize the interfacing of memory & various I/O devices with 8085 microprocessor.
- **CO4** Do assembly language programming by applying the concepts of 8085 programming like interrupts, stacks, subroutines & interfacing.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	3	1							1			3		3	
CO2	3	3	3	1								2	3		2
CO3	3	3	3	1					3			2	3		2
CO4	3	3	3	2	2	1	2	1	1			3	2	3	3

PCC-IT208	Java Programming	3L:0T: 2P	4 credits

Course Objectives

- Programming in the Java programming language,
- knowledge of object-oriented paradigm in the Java programming language,
- the use of Java in a variety of technologies and on different platforms.
- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
- To develop applications using generic programming and event handling

Unit 1.Introduction to Java: History of Java, Features of Java, Java Development Kit (JDK), Security in Java

Unit 2: Java Basics: Keywords; Working of Java; Including Comments; Data Types in Java; Primitive Data Types; Abstract / Derived Data Types; Variables in Java; Using Classes in Java; Declaring Methods in Java, Code to Display Test Value; The main() Method, Invoking a Method in Java; Saving, Compiling and Executing Java Programs. Installing the Java Software Development Kit, Development Environments, Using the Command Line Tools, Using an Integrated Development Environment, Compiling and Running Programs from a Text Editor, Graphical Applications, Applets.

Unit 3: OOP concepts : Data abstraction, encapsulation, inheritance, benefits of inheritance, constructors, polymorphism, classes and objects, Procedural and object oriented programming paradigms Java programming,Exceptions, Summary of Object-Oriented concepts.

Unit 4 : Objects and Classes: Introduction to Object-Oriented Programming, Using Existing Classes, Building Your Own Classes, Static Fields and Methods, Method Parameters, Object Construction, Packages, Documentation Comments, Class Design Hints.

Unit 5 : Inheritance & Interfaces: Inheritance hierarchies, super and sub classes, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods Polymorphism- dynamic binding, method overriding, abstract classes and methods. Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Unit 6: Inner classes: Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples. Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

Unit 7 :Exception handling : Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes. Multithreading – Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

Unit 8 : Applets : Applet Basics, The Applet HTML Tags and Attributes, Multimedia, The Applet life cycle , components of applet, Context, JAR Files.

Unit 9: Swing : Introduction to Swing, Creating a Frame, Frame Positioning, Displaying Information in a Panel, 2D Shapes, Colors, Text and Fonts, Images. User Interface Components with Swing,The Model-View-Controller Design Pattern, An Introduction to Layout Management, Text Input, Making Choices, Menus, Sophisticated Layout Management, Dialog Boxes,

Unit 10 : Event Handling: Basics of Event Handling, the AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types, Actions, Multicasting, The Event Queue.

Unit 11: Java Data Base Connectivity: Java Data Base Connectivity; Database Management; Mechanism for connecting to a back end database; Loading the ODBC driver

Unit 12: Streams and Files : Streams, The Complete Stream Zoo, ZIP File Streams, Putting Streams to Use Object Streams, File Management

Text Books:

1. E. Balagurusamy, Object Oriented Programming with C++ and JAVA,
2. McGrawHill, 2015
3. Hardy, Brian, and Bill Phillips, Android Programming: The Big Nerd Ranch
4. Guide. Addison-Wesley Professional, 2013.
5. Yashwant P. Kanetkar, Let us C++, 2/e, BPB Publications, 2003

Reference Books:

1. Herbet Schildt, "JAVA: Complete Reference", TMH, India.
2. Cay S. Horstmann, Gary Cornell, "Core Java", Sun Publication, India.
3. Deital and Deital, "Java How to program", Pearson Education.
4. Java 2 programming black books, Steven Horlzner
5. Programming with Java , A primer ,Forth edition , By E. Balagurusamy
6. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann,
7. Gary Cornell, Prentice Hall, Sun Microsystems Press.

Course Outcomes:

CO1 Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.

CO2 Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.

CO3 Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.

CO4 Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.

CO5 Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events .

CO6 Identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture

Articulation Matrix:

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	3	1									1		
CO2	2	3	2		1		2				2				
CO3	1	2		3					1				1		
CO4	1	1	2	1			2								2
CO5					2				1		2				
CO6							3					2			1

LAB-IT209	Computer Laboratory - II	0L:0T:2P	1 credit

Selected Language: Web Designing S/W - HTML-5, CSS, Word Press, Blogger.

Course Objectives:

- Students are expected to perform minimum 15 experiments using the above software.
- They are also expected to develop their own blog
- Practical examination shall be of 3 hours duration and shall consist of an experiment/ demonstration of the project carried and the oral based on the above syllabus and term work.

LAB-IT214	Soft Skill Development	0L:0T:2P	1 credits

Term work:

Students will have to perform at least 10-12 practical in the subject. The practical will be designed by the concerned teacher and should be based on the current trends and technology in the relevant subject.

Teacher should also give some home assignment to the students. The evaluation of the student should be done continuously and based on his/her performance and attendance for the practical during the semester, marks should be given at the end of the semester.

HMC278	Human Values and Professional Ethics	2L:0T:0P	2 credits

Course Objectives:

- Making the students aware and sensitive to value system in real life situations.
- To help the students to discriminate between ephemeral and eternal values.
- To discriminate between essence and form.

Unit 1: Course Introduction: Need, Basic Guidelines, Content and Process for Value Education. Understanding the need, basic guidelines, content and process for Value Education. A look at basic aspirations: Self Exploration, Happiness and Prosperity. Fulfillment of human aspirations and harmony.

Unit 2: Understanding the Harmony: Thoughtful human being harmony, sentient, attitude and its importance in relationship. Significance of restraint and health (Yama and Niyama). Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order.

Unit 3: Understanding professional Ethics: Harmony at various levels and understanding professional ethics. Creating environmentally aware engineers. Humanistic universal education, natural acceptance of human values, ethical human conduct.

Unit 4: Competence of professional ethics: Management models for present technologies, strategies for integrating humans in family and at all levels of existence. Relevance of the above strategies in becoming responsible engineers, technologists and managers.

Unit 5: Motivation: Contribution of ancestors in science and technology development to raise self-esteem in Indian context.

Reference Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
5. A.N. Tripathy, 2003, Human Values, New Age International Publishers
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
8. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
9. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
10. Subroto Bagchi, The Professional
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008. Scheme and Syllabus Bachelor of Computers

Course Outcomes

- **CO1** Understand the core human values that shape the ethical behavior of a person.
- **CO2** Understand how values act as an anchor of actions for life.
- **CO3** Learn the need of Human values and Professional ethics in life.
- **CO4** Understand Harmony at Four levels of life. Understand the core human values that shape the ethical behavior of a person.
- **CO5** Learn the moral issues and problems in profession and find the solution to those problems.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low												
PO **CO**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**
CO1			1			2		3				
CO2								3				
CO3								3				3
CO4						2		3				
CO5			1			2		3	2			3

PEC-IT210	Elective – I: IT Project Management	3L:0T:2P	4 credits

Course Objectives:

The objective of this course is to provide a foundation to prepare students, as future IT project managers, IT engineers, or system architects, to play leading roles in the application and management of e-business system construction. Upon successful completion of the course, students will be able to:

- Understand the job roles of an IT project manager;
- Recognize the key issues during the IT project management procedures;
- Describe the best practices in IT project management processes;
- Build a performing organization and project team
- Develop Work Breakdown Structures (WBS)
- Establish project estimates and project schedules
- Create project plans
- Manage overall change control
- Control project execution processes
- Terminate a project with a close-out strategy
- Build up the baseline knowledge for further career in IT project management fields.

Unit 1: Course Introduction and Overview of IT Project Management: Project management principles: including what constitutes good, useful project management standards. Project roles and responsibilities: defining project sponsor, project manager, team leader and many more. Project definition: turning ideas into defined, planned projects.

Unit 2: IT Project Planning, Estimating, and Resourcing: Project planning, estimating and resourcing - listing the techniques for planning and estimating how much the project might cost; top down and bottom up methods; rules of thumb; ensuring user resources, are assigned to IT projects.

Unit 3: IT Project Risk, Issue, and Quality Management: Project issue management: how to manage issues, not just log and forget them; sample issue forms. Project risk management: assessing and managing risk; includes a very comprehensive risk checklist and a sample risk register. Project quality management: walking through inspections, prototyping simulations, quality measurements, cause analysis.

Unit 4: Scope Change Management, Organizational Change Management, Control and Report: Project change management: introducing mechanisms for controlling change requests; who controls change; sample change request forms. Project controlling and reporting: how to use project status data, compare to plan and identify problems, how to report status vs. plan data at team level, project manager level and project sponsor level.

Unit 5: Contract Management, Team Building, SSME: Service Science, Management, and Engineering (SSME): discussing the management topics of IT service projects.

Unit 6: Financial Control, Configuration Management, IT Infrastructure Library (ITIL): IT Infrastructure Library (ITIL): introducing the basic principle of technical support processes of IT projects.

Unit 7: Communication Management, Speaker Training, Job Interview Insights:

Communication management and team building : discussing the methods for communicating inside and outside of the project teams, and building up an effective team.

Reference :

1. http://www.epmbook.com/
2. http://w3-3.ibm.com/transform/project/
3. http://www.pmi.org
4. http://www.maxwideman.com/pmglossary/index.htm
5. http://www.gantthead.com/article.cfm?ID=94587
6. https://castlelearning.com/

Course Outcomes

- **CO1** Understanding of the Project roles and responsibilities.
- **CO2** Knowledge of Project Quality Management.
- **CO3** Understanding of the Project Controlling and reporting..
- **CO4** Ability to understand Communication Management and Team Building.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	1			2		2	2	1			3		3	2	
CO2		2	3	1	2			2			3		3	3	2
CO3			3		3			3				2			3
CO4	3					3		3			3	1	2		3

PEC-IT211	**Elective – I: Design Thinking**	**3L:0T:2P**	**4 credits**

Course Objectives:

This course provides an introduction to design thinking for budding business titans, policy makers, social innovators and anyone else interested in learning more about an approach that can be applied to a variety of "wicked" problems.

Unit 1: Why Design Thinking and The Design Process provides context and an introduction to key concepts, terminology, and structure for the course.

Unit 2: Scoping, The Design Brief and Visualization introduces ways to clarify the scope of a project and its intent, questions to explore, target stakeholders, and establishes the importance of pictures and storytelling in the overall process.

Unit 3: Fundamentals of Ethnography and Identifying Insights reviews how to observe users in their "natural habitat" and efficiently extract useful patterns from collected data.

Unit 4: Establishing Design Criteria and Brainstorming shows how to develop a succinct expression of the ideal end state of a project, and deliberately generate many fresh alternatives to the status quo.

Unit 5: Concept Development and The Napkin Pitch details how to choose the best ideas, assemble them into detailed solutions, and rationally evaluate them, as well introduce a simple, consistent format for summarizing and communicating new concepts.

Unit 6: Assumptions Testing and Prototyping introduces a tool for surfacing key assumptions underlying the attractiveness of a new concept and using data to assess the likelihood that they are true, as well as ways to create visual manifestations of concepts.

Unit 7: Co-Creation, Learning Launches, and "So What?" highlights ways to engage stakeholders in the development of new concepts, conduct experiments in the world quickly and inexpensively, and lead innovation in organizations.

Text / Reference Book :

1. Jeanne Liedtka and Tim Ogilvie Designing for Growth: A Design Thinking Tool Kit for Managers (Columbia University Press, 2011).

2. Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, The Designing for Growth Field Book: A Step-by-Step Project Guide (Columbia University Press, 2014).
3. Tom Kelly, The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm (Profile Books, 2002).
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009).
5. Jeff Dyer, Hal Gregersen, Clayton Christensen, The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators (Harvard Business Review Press, 2009).

Course Outcomes

CO1 Enhances innovation activities in terms of value creation, speed, and sustainability Class participation, assignments,

CO2 Strengthen the project Build students' individual and collaborative capabilities to identify problems/issues/needs, develop sound hypotheses, collect and analyze appropriate data.

CO3 Develop ways to collect meaningful feedback in a real-world environment Class participation, assignments, final project, peer review Experience.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	3			3	2	2	3		3		2		2		3
CO2		3		3	2	1		2			3	2	3	3	
CO3		1		3	3	3			3			3	2	3	3

PEC-IT-212	**Elective – I** **Financial Management**	**3L:0T:2P**	**4 credits**

Course Objectives:

The focus of this course is in the area of financial management. We will show managers how to interface with accounting and finance departments, help them to understand how firms meet their financial objectives utilizing financial decision-making. This course will also explain financial tools and techniques, which can be used to help firms maximize value by improving decisions relating to capital budgeting, capital structure, and working capital management. The main goal of this course is to develop a foundation of financial management concepts.

- This will enable to the student to understand how corporations make important investment and financing decisions, and how they establish working capital policies.
- The course also lays a foundation for more complex financial topics that arise in additional elective courses in finance.
- This course in financial management describes the corporation and its operating environment; it will help any future manager to understand how the finances of a company work, and how they will be interfacing with finance.

Unit 1: Business Finance: Introduction of Business Finance: Meaning, Definition of Financial Management, Goals of Financial Management (Profit Maximization and Wealth Maximization),

Modern approaches to Financial Management – (Investment Decision, Financing Decision and Dividend Policy Decisions) Finance and other related disciplines, Functions of finance manager, Key strategies of financial management, Financial Planning – Principles and Steps in Financial Planning.

Unit 2: Capital structure: Meaning, Factors affecting the capital structure, Different Sources of Finance and its Types, Concept and measurement of cost of capital, measurement of specific costs WACC, Trading on equity and its types.

Unit 3: Techniques of Financial Analysis: Meaning , Nature, Objectives, Understanding of financial statements, Schedule VI of Companies Act, Tools of analysis, interpretation and limitations of financial analysis, Fund flow statement (Working capital basis), Understanding Cash flow statement – Difference between Cash flow and Fund flow statement, Ratio analysis (computation and interpretations of ratios)

Unit 4 : Capital Budgeting: Meaning, Definition and types of evaluating the project on the basis of Traditional Techniques and Modern Techniques (viz. Payback period, Discounted Payback period, NPV, ARR, IRR, PI) Time Value of Money.

Unit 5 : Working Capital Management: Nature and Scope, Components of working capital, operating cycle, types of working capital, Sources of Working Capital Financing, Factors affecting working capital, estimation of working capital requirement.

Text / Reference Book :

1. Financial Management by Khan & Jain (TATA McGraw Hill)
2. Contemporary Financial Management by Rajesh Kothari (Macmillan Publication)
3. Financial Management by I. M. Pandey (Vikas Publication)
4. Corporate Finance, Theory and Practice, Aswath Damodaran (Wiley Publication)
5. Financial Management Principle and Practices by S. Sudarsana Reddy(Himalaya Publication)
6. Fundamentals of Financial Management by Sheeba Kapil (Pearson Publications)
7. Financial Management by Dr. E. B. Khedkar and Dr. D. B. Bharati

Course Outcomes

CO1 Understand and evaluate financial management related issues from an ethical perspective.

CO2 Value the equity, operations and debt of companies using different valuation approaches/models and financial statement information

CO3 Analyze and reformulate financial statements to identify a firm's business strategy and value drivers so as to facilitate forecasting and valuation

CO4 Analyze market prices, value drivers and financial measures, e.g., profitability, growth, P/B and P/E ratios, and their relations to estimated fundamental value

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	1				3	3	3	3			1	1	2	3	2
CO2	2	1				3	2	3			2			2	2
CO3	2	2			1	1		3			3	3	3	3	3
CO4					3	2						2	3		

PEC-IT213	Elective – I: Ethical Hacking and Cyber Law	3L:0T:2P	4 credits

Course Objectives:

The objectives of introducing this course is to provide knowledge to the students in the field of cybercrimes, cyber security and cyber laws and its emerging trend in addition to the legal measures and the types of cybercrimes. Upon successful completion of the course, students will be able to:

- Ability to do ethical hacking and penetration testing by taking this course
- To initiate a serious debate on how to combat the tendency of netizens to commit cybercrimes.

Unit 1: Introduction Ethical Hacking terminology- Five stages of hacking- Vulnerability ResearchLegal implication of hackingImpact of hacking. Foot printing & Social engineering Information gathering methodologies- Competitive Intelligence- DNS Enumerations- Social Engineering attacks.

Unit 2: Scanning & Enumeration Port Scanning- Network Scanning- Vulnerability Scanning- NMAP scanning tool- OS FingerprintingEnumeration.

Unit 3: Introduction Computers and its Impact in Society Overview of Computer and Web Technology Need for Cyber Law Cyber Jurisprudence at International and Indian Level

Unit 4 : Cyber Law - International Perspectives UN & International Telecommunication Union (ITU) Initiatives Council of Europe - Budapest Convention on Cybercrime Asia-Pacific Economic Cooperation (APEC) Organization for Economic Co-operation and Development (OECD) World Bank Commonwealth of Nations

Unit 5 : Constitutional & Human Rights Issues in Cyberspace Freedom of Speech and Expression in Cyberspace Right to Access Cyberspace – Access to Internet Right to Privacy Right to Data Protection

Unit 6: Cyber Crimes & Legal Framework Cyber Crimes against Individuals, Institution and State Hacking Digital Forgery Cyber Stalking/Harassment Cyber Pornography Identity Theft & Fraud Cyber terrorism Cyber Defamation Different offences under IT Act, 2000 Module V: Cyber Torts Cyber Defamation Different Types of Civil Wrongs under the IT Act, 2000, Electronic Evidence.

Unit 7: **Intellectual Property Issues in Cyber Space** Interface with Copyright Law Interface with Patent Law Trademarks & Domain Names Related issues

Text / Reference Book :

8. Kimberly Graves, "CEH: Official Certified Ethical Hacker Review Guide", Wiley Publishing Inc., 2007. ISBN: 978-0-7821-4437-6.
9. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.
10. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
11. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012
12. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011) 5. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd

Course Outcomes

- **CO5** Understand of Ethical Hacking and its fundamentals.
- **CO6** Demonstrate a critical understanding of the Cyber law with respect to Indian IT/Act
- **CO7** Give Learners In Depth Knowledge Of Information Technology Act And Legal Framework Of Right To Privacy, Data Security And Data Protection
- **CO8** To address and Understand the latest threats, impacts, growing complexity and the emerging information on cyber laws, cyber security and cybercrimes.

Articulation Matrix :

(3) High, **(2)** Medium, **(1)** Low															
PO CO	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO1**	**PSO2**	**PSO3**
CO1	1				3	3	3	3			1	1		3	2
CO2	2					3		3			1		2	2	
CO3		2				1		3			3	3	3	3	3
CO4					3	2		2				2	3		