ShriVaishnavVidyapeethVishwavidyalaya, Indore

ShriVaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech Computer Science and Engineering-Mobile Applications-Apple Authorized Training Center

SEMESTER-III(2024-2028)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS301N	**DCC**	**Discrete Structures**	**60**	**20**	**20**	0	0	3	0	0	**3**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Provide the fundamentals of formal techniques for solve the problems in computational domain and algorithm development.
2. Apply appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
3. Formulate and evaluate possible solutions to problems, and select and defend the chosen solutions.
4. Construct graphs and charts, interpret them, and draw appropriate conclusions.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. Define sets and perform operations and algebra on sets.
3. Demonstrate an understanding of relations and functions and be able to determine their properties.
4. Analyze logical propositions via truth tables.
5. Write an argument using logical notation and determine if the argument is or is not valid.
6. Understand some basic properties of graphs and related discrete structures and be able to relate these to practical examples.
7. Model problems in Computer Science using graphs and trees.
8. Be able to use effectively algebraic techniques to analyze basic discrete structures and algorithms.
9. Draw hasse diagram and identify lattice.
10. Understand generating functions and recurrence relation.

SYLLABUS

UNIT I — 10 HOURS

Set Theory: Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), pigeonhole principle. Relation: Definition, types of relation, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.

UNIT II — 9 HOURS

Propositional logic: Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, proof by using truth table.

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UNIT III 9 HOURS

Graph Theory: Terminology Graph Representation Graph isomorphism; Connectedness; Various graph properties; Euler & Hamiltonian graph; shortest paths algorithms. Trees: Terminology; Tree traversals; prefix codes; Spanning trees; Minimum spanning trees.

UNIT IV 8 HOURS

Algebraic Structure: Binary composition and its properties definition of algebraic structure; Groupoid, Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).

UNIT V 9 HOURS

Posets, Hasse Diagram and Lattices: Introduction, ordered set, well ordered set, Hasse diagram of partially, Lattices, properties of Lattices, bounded and complemented lattices. Generating functions, Solution by method of generating functions. Recurrence Relation and Generating Function: Introduction to Recurrence Relation, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions.

TEXTBOOKS:

1. Kenneth H. Rosen, *Discrete Mathematics and its applications*, McGraw Hill, 8th Ed., 2021.
2. Trembley J.P & Manohar, *Discrete Mathematical Structure with Application CS*, McGraw Hill, 1st Ed., 2017.

REFERENCE:

1. Biswal, *Discrete Mathematics & Graph Theory*, PHI, 4th Ed., 2015.
2. Seymour Lipschutz, M.Lipson, *Discrete Mathemataics*, Tata McGraw Hill, 4th Ed., 2021.
3. C. L. Liu, D. P. Mohapatra, *Elements of Discrete Mathematics*, Tata McGraw-Hill Edition, 4th Ed., 2017.

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BTCS306M	**DCC**	**Fundamentals of Data Structures**	60	20	20	30	20	3	0	2	**4**

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COURSE OBJECTIVES:

The student will have ability to:

1. To understand efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To understand the concept of protection and management of data.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Get a good understanding of applications of Data Structures.
2. Develop application using data structures.
3. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
4. Decide the appropriate data type and data structure for a given problem.
5. Select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.

SYLLABUS

UNIT I — 10 HOURS

Introduction: Overview of Data structures, Types of data structures, Primitive and Non Primitive data structures and Operations, Introduction to Algorithms & complexity notations. Characteristic of Array, One Dimensional Array, Operation with Array, Two Dimensional Arrays, Three or Multi-Dimensional Arrays, Sparse matrix, Drawbacks of linear arrays. Strings, Array of Structures, Pointer and one dimensional Arrays, Pointers and Two Dimensional Arrays, Pointers and Strings, Pointer and Structure.

UNIT II — 9 HOURS

Linked List: Linked List as an ADT, Linked List Vs. Arrays, Dynamic Memory Allocation & De-allocation for a Linked List, Types of Linked List: Circular & Doubly Linked List.

Linked List operations: All possible insertions and deletion operations on all types of Linked list Reverse a Single Linked List; Divide a singly linked list into two equal halves, Application of Linked List.

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BTCS306M	**DCC**	**Fundamentals of Data Structures**	60	20	20	30	20	3	0	2	**4**

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UNIT III — 8 HOURS

Stack: The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation. Types of Recursion, problem based on Recursion: Tower of Hanoi. **The Queue**: The Queue as an ADT, Queue operation, Array Representation of Queue, Linked Representation of Queue, Types of Queue: Circular Queue & DE queue, Introduction of Priority Queue, Application of Queues.

UNIT IV — 7 HOURS

Tree: Definitions and Concepts of Binary trees, Types of Binary Tree, Representation of Binary tree: Array & Linked List. General tree, forest, Expression Tree. Forest and general tree to binary tree conversion. Binary Search Tree Creation, Operations on Binary Search Trees: insertion, deletion & Search an element, Traversals on Binary SEARCH TREE and algorithms. Height balanced Tree: AVL, B-Tree, 2-3 Tree, B+Tree: Creation, Insertion & Deletion.

Graph: Definitions and Concepts Graph Representations: Adjacency MATRIX, Incidence matrix, Graph TRAVERSAL (DFS & BFS), Spanning Tree and Minimum Cost Spanning Tree: Prim's & Kruskal's Algorithm.

UNIT V — 8 HOURS

Sortings: Sorting Concept and types of Sorting, Stable & Unstable sorting. Concept of Insertion Sort, Selection sort, Bubble sort, Quick Sort, Merge Sort, Heap & Heap Sort, Shell Sort & Radix sort. Algorithms and performance of Insertion, selection, bubble, Quick sort & Merge sort.

TEXTBOOKS:

1. Ashok N. Kamthane, *Introduction to Data structures*, 2nd Ed., Pearson Education India,2011.
2. Tremblay & Sorenson, *Introduction to Data- Structure with applications*, 8th Ed., Tata McGrawHill,2011.

REFERENCE:

1. Rajesh K. Shukla, *Data Structures Using C & C++*, Wiley-India 2016.
2. ISRD Group, *Data Structures Using C*, Tata McGraw-Hill 2015.
3. E. Balagurusamy, *Data Structure Using C*, Tata McGraw-Hill 2017.
4. Prof. P.S. Deshpande, Prof. O.G. Kakde, *C & Data Structures*, Charles River Media 2015.
5. GavPai, *Data Structures*, Tata McGraw-Hill, 2015.

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BTCS306M	**DCC**	**Fundamentals of Data Structures**	60	20	20	30	20	3	0	2	**4**

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LIST OF PRACTICALS

1. To develop a program to find an average of an array using AVG function.
2. To implement a program that can insert, delete and edit an element in array.
3. To implement an algorithm for insert and delete operations of circular queue and implement the same using array.
4. Write a menu driven program to implement the push, pop and display option of the stack with the help of static memory allocation.
5. Write a menu driven program to implement the push, pop and display option of the stack with the help of dynamic memory allocation.
6. Write a menu driven program to implementing the various operations on a linear queue with the help of static memory allocation.
7. Write a menu driven program to implementing the various operations on a linear queue with the help of dynamic memory allocation.
8. Write a menu driven program to implement various operations on a linear linked list.
9. Write a menu driven program to implement various operations on a circular linked list.
10. Write a program for implementation of Bubble sort.
11. Write a program for Insertion sort.
12. Write a program for Merge Sort.
13. Write a program to implement Heap sort.
14. Write a program to implement Quick sort.
15. Write a program to Construct a Binary Search Tree and perform deletion, in order traversal on it.
16. Write a program to develop an algorithm for binary tree operations and implement the same.
17. Write a program to design an algorithm for sequential search, implement and test it.
18. Write a program to develop an algorithm for binary search and perform the same.

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BTCS307M	DCC	Principles of Operating Systems	60	20	20	30	20	3	0	2	4

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COURSE OBJECTIVES:

The student will have ability to:

1. To learn the fundamentals of Operating Systems.
2. To study the mechanisms of Operating System to handle processes and threads and their communication.
3. To gain knowledge of process management concepts that includes architecture, Mutual exclusion algorithms, deadlock detection and recovery algorithms.
4. To learn the mechanisms involved in memory management in Operating System.
5. To know the components and management aspects of disc scheduling.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. To describe the detail structure of Operating System.
2. To design and Implement Process management Techniques in Operating System.
3. To calculate CPU Scheduling criteria.
4. To understand The Memory Management of Operating System.
5. To elaborate Disc Scheduling.

SYLLABUS

UNIT I — 10 HOURS

Introduction to Operating System: Introduction and Need of operating system, Layered Architecture/Logical Structure of Operating system, Type of OS(Multiprogramming , Time Sharing, Real Time ,Networked, Distributed, Clustered, Hand Held), Operating system as Resource Manager and Virtual Machine, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits.

UNIT II — 9 HOURS

Process Management: Process Model, Creation, Termination, States & Transitions, Context Switching, Process Control Block, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling.

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BTCS307M	**DCC**	**Principles of Operating Systems**	60	20	20	30	20	3	0	2	**4**

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UNIT III — 8 HOURS

Interprocess Communication: Introduction to Message Passing, Race Condition, Critical Section Problem, Peterson's Solution, Semaphore, Classical Problems of Synchronization Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem.

Deadlock- System model, Resource types, Deadlock Problem, Deadlock Characterization, Methods for Deadlock Handling, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock Detection, Recovery from Deadlock.

UNIT IV — 7 HOURS

Memory Management: concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, memory allocation schemes- first fit, next fit, best fit, worst fit and quick fit.

Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging ,working set model, page fault frequency, thrashing, page replacement algorithms- optimal, FIFO, LRU; Bleady's anomaly; TLB (translation look aside buffer).

UNIT V — 8 HOURS

File Management: Concepts, Naming, Attributes, Operations, Types, Structure, File Organization & Access (Sequential, Direct ,Index Sequential) Methods, Memory Mapped Files, Directory Structures One Level, Two Level, Hierarchical/Tree, Acyclic Graph, General Graph, File System Mounting, File Sharing, Path Name, Directory Operations, Overview Of File System in Linux & Windows.

Input/output Subsystems- Concepts, Functions/Goals, Input/Output devices- Block And Character, Spooling, Disk Structure & Operation, Disk Attachment, Disk Storage Capacity, Disk Scheduling Algorithm- FCFS, SSTF, Scan Scheduling, C-Scan Schedule.

TEXTBOOKS:

1. Abraham Silberschatz, *Operating system concepts*, 10th Ed., John Willey & Sons. INC, 2018.
2. Andrew S. Tannanbaum, *Modern operating system*, 4th Ed., Pearson Education, 2014.

REFERENCE:

1. Achyut S Godbole, *Operating System*, 3rd Ed. TMH, 2017.
2. William Stalling, *Operating system*, 8th Ed., Pearson Education, 2014.
3. Vijay Shukla, *Operating System*, 3rd. Ed., Kataria & Sons, 2013.
4. Singhal & Shivratri, *Advanced Concept in Operating Systems*, 1st Ed., Tata Mc-Graw Hill, Education Ed., 2017.

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LIST OF PRACTICALS

1. Implement and update the BIOS settings of your PC.
2. If there are 5 printers are connected in a system each process to print will take different time to complete, and CPU will give a fixed time to each process after that deadline next process will enter in CPU. If a problem not completed in a given slot then that process will be reenter as per the FCFS, on rotation basis? Apply the scheduling on this?
3. Implement Non Preemptive Priority CPU Scheduling.
4. Implement Non Preemptive Shortest Job first CPU Scheduling.
5. If there are 5 different resources like 3 printer, 2 Scanner are connected to a system each taking different time to complete the task. Which scheduling is best and gives best performance of CPU?
6. Implement the scheduling for that where CPU give chance to complete those process first which comes first?
7. Implement Round-Robin CPU scheduling.
8. Write a program to implement Semaphore.
9. Find the solution for the situation where 5 faculties are sitting in a round table. There are 4 ball pens are placed on this table. At a time only one pen can be picked by one faculty to writing work. What will happen if all picked the pen for writing simultaneously?
10. Find the solution for dentist checkup clinic where only one chair and one dentist is available for treatment. And having n chairs to waiting for patient.
    - If there is no patient, then the doctor sleeps in his own chair.
    - When a patient arrives, he has to wake up the doctor.
    - If there are many patients and the doctor is doing treatment of him, then the remaining patients either wait if there are empty chairs in the waiting room or they leave if no chairs are empty.
11. Write a program for Memory Management Algorithms e.g. First Fit, Best Fit, Worst Fit.
12. Demonstrate Virtual memory Techniques like, LRU, FIFO etc.
13. Implement Shortest Seek Time First Disk Scheduling Algorithm.
14. Implement Scan Scheduling Disk Scheduling Algorithm.
15. Implement Circular Scan Disk Scheduling Algorithm.
16. Implement Look Disk Scheduling Algorithm.

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BTCS402N	DCC	Software Engineering and Project Management	60	20	20	30	20	3	0	2	4

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COURSE OBJECTIVES:

The student will have ability to:

1. Get the knowledge of basic software engineering methods and practices.
2. Define software requirements and requirement engineering.
3. Apply approaches for various design and their principle.
4. Explore testing in various domain.
5. Development of significant teamwork and project based experience.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Compare various software process models and identify where these models are applicable.
2. Define and analyze software project management, the framework and the dimensions of software project management.
3. Comprehend System modeling using UML.
4. Identify software testing strategies by using testing tools.
5. Analyze software risks and risk management strategies.

SYLLABUS

UNIT I — 10 HOURS

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process. Agile development-Agile Process, Extreme Programming.

UNIT II — 9 HOURS

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioral models, data models, object models, structured methods.

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UNIT III — 8 HOURS

Design Engineering: Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements.

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, Use Case Diagrams, Class Diagrams, Interaction Diagrams, State chart Diagrams, Activity Diagrams, Package Diagrams, Component Diagrams, Deployment Diagrams.

UNIT IV — 7 HOURS

Software Implementation: Structured coding Techniques, Coding Styles, Standards and Guidelines, Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, Object oriented software, Web Apps-validation testing, system testing, the art of debugging.

UNIT V — 8 HOURS

Metrics for Process and Products: Software measurement, metrics for software quality. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Maintenance: Software Maintenance - Software Supportability – Reengineering - Business Process Reengineering - Software Reengineering - Reverse Engineering – Restructuring - Forward Engineering - Economics of Reengineering.

TEXTBOOKS:

1. Roger S. Pressman, *Software Engineering - A practitioner's Approach*, 6th Ed., McGraw Hill International Edition.
2. James F. Peters, Witold Pedrycz, *Software Engineering - an Engineering approach*, John Wiley.

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REFERENCE:

1. Waman S Jawadekar, *Software Engineering principles and practice*, The McGraw-Hill Companies.
2. Meiler page-Jones, *Fundamentals of object-oriented design using UML*, Pearson Education.
3. Rajib Mall, *Fundamentals of Software Engineering*, Second Ed., PHI Learning.
4. Sommerville, *Software Engineering*, 7th Ed., Pearson Education.
5. Grady Booch, James Rambaugh, Ivar Jacobson, *The unified modeling language user guide*, Pearson Education.
6. Pankaj Jalote, *An Integrated Approach to Software Engineering*, Narosa Pub, 2005.
7. Richard H. Thayer, *Software Enginerring & Project Managements*, Willey India.

LIST OF PRACTICALS

1. Study and compare the SDLC models.
2. Prepare a SRS document in line with the IEEE recommended standards.
3. Study Requirement Engineering of project.
4. Study the UML drawing tools.
5. Draw the Entity relationship diagram of a project.
6. Draw the data flow diagrams at level 0 and level 1.
7. Draw use case diagram in argo UML.
8. Draw activity diagram in argo UML.
9. Draw class diagram in argo UML.
10. Draw the component diagram in argo UML.
11. Draw sequence diagram in argo UML.
12. Draw collaboration diagram in argouml.
13. Use testing tool such as junit.
14. Using configuration management tool-libra.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE321M	DSE	Fundamentals of Information Theory and Coding	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To provide an insight into the concept of information in the context of communication theory and its significance in the design of communication receivers.
2. To explore in detail, the calculations of channel capacity to support error-free transmission and, commonly used source coding and channel coding algorithms.
3. To encourage and train to design coding schemes for data compression and error correction, and they will also get an overall perspective of how this impacts the design of an optimum communication receiver.
4. To give a detailed study about the cryptography and their algorithms.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Overview of Probability Theory, significance of “Information” with respect to Information Theory.
2. Derive equations for entropy, mutual information, and channel capacity for all kinds of channels.
3. Implement the various types of source coding algorithms and analyse their performance.
4. Explain various methods of generating and detecting different types of error correcting codes.
5. Design linear block codes and cyclic codes (encoding and decoding).
6. Implement and decode a sequence at the receiver using Trellis decoder and Viterbi decoder.
7. Understand and implement the concept of cryptography and various Algorithms.
8. Perform mathematical analysis of problems in Information Theory and Coding, Implementation and verification in Programming Language c/c++.

SYLLABUS

UNIT I

Introduction of Information Theory: Introduction, Measure of information, Mark off statistical model for information source, Entropy, and information rate of mark off source. Mutual Information, Conditional and Joint Entropy.

UNIT II

Source Coding: Encoding of the source output, Shannon’s encoding algorithm, Communication Channels, Discrete communication channels, Continuous channels. Fundamental Limits on Performance: Source coding theorem, Huffman coding, Discrete memory less Channels, Channel Capacity.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE321M	DSE	Fundamentals of Information Theory and Coding	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT III

Channel: Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem Introduction. Introduction to Error Control Coding: Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding.

UNIT IV

Cyclic Codes: Binary Cycle Codes, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes. RS codes, Golay codes, shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes. Convolution Codes: Convolution Codes, Time domain approach. Transform domain approach.

UNIT V

Introduction to Cryptography: Symmetric Key and Asymmetric Key Cryptography, known Algorithms: DES, IDEA, PGP, RSA.

TEXTBOOKS:

1. R. Bose, *Information theory, coding and cryptography*, McGraw-Hill, 3rd Ed., 2016.
2. W. Stallings, *Cryptography and Network Security: Principles and Practice*, 4th Ed., Prentice Hall, 2006.

REFERENCE:

1. B. Schneier, *Applied Cryptography: Protocols, Algorithms and Source Code in C*, John Wiley & Sons, 2nd Ed., 1995.
2. *Digital Communications Glover and Grant*, Pearson Ed. 2nd Ed 2008.
3. K. N. HariBhat, D. Ganesh Rao, *Information Theory and Coding*, Cengage, 2017.
4. K. Sam Shanmugam, *Digital and analog communication systems*, Wiley, 1996.
5. Simon Haykin, *Digital communication*, Wiley, 2003.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE321M	**DSE**	**Fundamentals of Information Theory and Coding**	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

LIST OF PRACTICALS

Implement the following encoding algorithms using C/C++ programming Languages.

1. Source Coding Theorem -Lempel-Ziv etc.
2. Shannon's Encoding Algorithm.
3. Huffman Coding Algorithms.
4. Channel coding theorem.
5. Error Control Coding.
6. Error Detection and Correction code.
7. Linear Code and Block Code.
8. Binary Cyclic code.
9. BCH, RH, Cyclic Codes.
10. Apply cryptography concept to implement program to convert plain text to another form.
11. Implement various Algorithms DES, RSA, IDEA etc.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE322M	DSE	Principle of Programming Language	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To improve the background for choosing appropriate programming languages for certain classes of programming problems.
2. To be able in principle to program in an imperative (or procedural), an object-oriented, a functional, and a logical programming language.
3. To understand the significance of an implementation of a programming language in a compiler or interpreter.
4. To Increase the ability to learn new programming languages.
5. To Increase the capacity to express programming concepts and choose among alternative ways to express things.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Students will gain insight and develop understanding to the underlying principles and concepts of programming languages. Also Gain an overview of programming language translation process.
2. Students will be able to competent with analyzing programming language design issues related to data types, expressions and control structures.
3. Students will be able to describe the concept of sub-programming with the help of Functions. Also develop understanding with the parameter passing techniques and concept of function overloading.
4. Students will be able to analyze various memory management techniques as well as apply various concepts of object oriented programming.
5. Students will be able to develop understanding with the exception handling concept and gain knowledge of logical and functional programming.

SYLLABUS

UNIT I — 8 HOURS

Preliminary Concepts: Reasons for Studying, Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Programming Paradigms – Imperative, Object Oriented, Functional Programming , Logic Programming.

UNIT II — 8 HOURS

Data Types: Introduction, Primitive, Character, User Defined, Record, Union, Pointer and Reference Types, Design and Implementation Uses Related to these Types. Names, Variable, Concept of Binding.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE322M	DSE	Principle of Programming Language	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT III — 8 HOURS

Expressions and Statements: Arithmetic Relational and Boolean Expressions, Short Circuit Evaluation Mixed Mode Assignment, Assignment Statements, Control Structures.

UNIT IV — 8 HOURS

Subprograms and Blocks: Fundamentals of Sub-Programs, Scope and Lifetime of Variable, Static and Dynamic Scope, Design Issues of Subprograms and Operations, Local Referencing Environments, Parameter Passing Methods, Overloaded Sub-Programs, Generic Sub-Programs.

UNIT V — 8 HOURS

Abstract Data Types: Abstractions and Encapsulation, Introductions to Data Abstraction, Static and Stack Based Storage Management. Heap Based Storage Management. Garbage Collection. Object Oriented Programming in Smalltalk, C++, Java, C#, Php, Perl.

TEXTBOOKS:

1. Robert .W. Sebesta, *Concepts of Programming Languages*, 10th Edition, Pearson Education, 2008.
2. D. A. Watt, *Programming Language Design Concepts*, Wiley dreamtech, rp-2007.

REFERENCE:

1. Louden and Lambart, *Programming Languages: Principles and Practices*, 3rd Ed., Cengage Learning, 2011.
2. Gabbrielli and Martini, *Programming Languages: Principles and Paradigms*, Springer, 2010.
3. Peter Sestoft, *Programming Language Concepts*, Springer, 2017.
4. A.B. Tucker, R.E. Noonan, *Programming Languages*, 2nd Ed., Tata McGraw Hill.
5. Terrance W Pratt, *Programming Languages: Design and Implementation*, Pearson Education.

LIST OF PRACTICALS

In order to understand the concepts of different programming languages, students must implement various programming components in C/C++/Java/Python, such as data structures, conditional statements, functions, and OOPs concepts.

1. Examine name and scope.
   - static variables in ‘C’
   - call resolution in Java.
2. Examine garbage and memory leak in C
   - Develop a mechanism to avoid /detect memory leak.
3. Examine assignment operation
   - assignment of arrays in Java

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BTDSE322M	**DSE**	**Principle of Programming Language**	60	20	20	30	20	2	0	2	**3**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

- assignment of lists in Python
- assignment of structures in C

4. Examine goto statement
   - scope of goto in 'c'
   - jump into/out of the block
   - non-localgoto.
5. Examine callbacks
   - callbacks in C
   - interface and inner classes in Java.
6. Examine closure
   - in python
   - in C
7. Examine functions.
   - Variable# of args in C
   - Variable #of args in Java
   - Variable # of args in Python
8. Examine functions
   - Tail recursion
   - Keyword parameter in python
   - Stack smashing in 'C'
9. Examine Generics

   Lists-linked lists, Array lists

   Sets-hash set
   - Pre set
   - Link hash set
   - Map
10. Examine Inheritance

    Overide in Java
    - Final in Java
    - Multiple inheritance in python
    - Downcasting in Java
11. Examine Java thread model / pthread / Python.
    - Racing
    - Synchronization
    - Interthread communication
    - Thread local storage.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE323M	DSE	Modern Computing Hardware	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To learn the concept of memory and its types along with HDD/SDD.
2. To learn the input/output components presents on the motherboard.
3. To learn different modes of power supply to the PC and it's troubleshooting.
4. To learn the concept of BIOS.
5. To learn the device drivers and peripherals attached to the PC board.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. To understand the hierarchy of the Memory used for PC and its applications.
2. To understand the use and working of I/O components.
3. To understand the principles behind the power supply and its usage.
4. To understand the BIOS concept and its configuration.
5. To understand the use and requirement of peripherals and their device drivers.

SYLLABUS

UNIT I — 8 HOURS

Hardware Organization: Motherboards, Chipset and Controllers, Types of processors (Intel Core i3/ i5 /i7 /i9 & AMD) and their compatibility with motherboards, USB Ports, HDMI, DVI, Interconnection between units, Graphic cards.

UNIT II — 6 HOURS

Memory& Storage Devices: Introduction to memory, classification of Memory and its use, Overview Memory chips and Modules, and its working principle and Trouble shooting of Memory.DVD & Blue-Ray Disk, Hard Disk Drives, Solid-State Drives, USB Flash Drives.

UNIT III — 4 HOURS

Power Supply: Working of SMPS, On-Line/Off-Line/Line-Interactive/uninterrupted power supplies (UPS), CMOS, Lithium-ion battery, basic principle of working their importance and maintenance.

UNIT IV — 4 HOURS

Basic Input/output System: Concept of BIOS. Function of BIOS, software interrupts, testing and initialization, configuring the system.

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE323M	DSE	Modern Computing Hardware	60	20	20	30	20	2	0	2	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V 6 HOURS

Peripherals & Device Drivers: Input devices: Wireless Keyboard & Mouse, Light-Pen, Touch Screen, HD web camera, Barcode Reader, Output devices: Touch Screen Monitor, 3D Printer, Projector, Software drivers for various devices and their role.

TEXTBOOKS:

1. Craig Zacker & John Rourtre, *PC Hardware- The complete reference*, 1st Ed., TMH, 2017
2. Stephen Bigelow, Bigelow's, *Troubleshooting, Maintaining & Repairing PCs*, 5th Ed., McGraw Hill Education, 2017

REFERENCE:

1. Vikas Gupta, *Comdex Hardware and Networking Course Kit: Revised & Upgraded*, Dreamtech Press, 2014.
2. Dan Gookin, *Troubleshooting and Maintaining Your PC All–in–One For Dummies*, 3rd Ed., John Wiley & Sons, 2017.
3. Robert Bruce Thompson, Barbara Fritchman Thompson, *Building the Perfect PC*, 3rd Ed., O′Reilly, 2010.
4. B. Govindarajalu, *IBM PC and CLONES: Hardware, Troubleshooting and Maintenance*, McGraw Hill Education, 2nd Ed., 2002.
5. Mike Meyers, *Introduction to PC Hardware and Troubleshooting*, 1st Ed., McGraw Hill Education, 2017.

LIST OF PRACTICALS

Note:-Students will prepare and give seminar (presentation) on assigned topic for evaluation.

1. Hardware Organization:
   - Assembling and disassembling a desktop computer.
   - Identifying major components on a motherboard (CPU socket, RAM slots, expansion slots, etc.).
   - Understanding different form factors (ATX, micro-ATX, mini-ITX) and their implications.
2. Memory and Storage Devices:
   - Installing RAM modules onto the motherboard.
   - Demonstrating the concept of virtual memory by adjusting page file settings in the operating system.
   - Installing and formatting various types of storage devices (HDD, SSD) and comparing their performance.
3. Power Supply:
   - Understanding power supply unit (PSU) ratings and connectors.
   - Testing the output voltage of a power supply unit using a multimeter.
   - Troubleshooting common power supply issues like voltage fluctuations or overheating.
4. Input Output System:
   - Exploring BIOS/UEFI settings and performing basic configurations (boot order, date/time settings, etc.).
   - Updating BIOS/UEFI firmware.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE323M	**DSE**	**Modern Computing Hardware**	60	20	20	30	20	2	0	2	**3**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

- Understanding the role of BIOS/UEFI in system initialization and hardware detection.

5. Peripherals and Device Drivers:
   - Installing and configuring peripheral devices (printers, scanners, webcams, etc.).
   - Updating device drivers for improved compatibility and performance.
   - Troubleshooting common peripheral device issues (driver conflicts, connectivity issues, etc.).
6. Troubleshooting and Maintenance:
   - Identifying and replacing faulty hardware components (RAM, CPU, GPU, etc.).
   - Using diagnostic tools (e.g., memtest86) to diagnose memory issues.
   - Performing routine maintenance tasks such as cleaning dust from fans and heat sinks.
7. Exploring and Understanding of CPU
   - Types of processor.

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			THEORY			PRACTICAL					
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BTIT301N	DCC	Computer Networks	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Understand the general overview of the concepts and fundamentals of computer networks.
2. Understand the various components required to build different networks.
3. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Understanding basic computer network technology.
2. Understand the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

SYLLABUS

UNIT I — 9 HOURS

Introduction: Importance of Computer Networks, Classifications & Types. Layered Architecture: Protocol hierarchy, Interfaces and Services, Connection Oriented & Connection less Services, ISO- OSI Reference Model, TCP/IP model overview, comparison of TCP/IP and ISO-OSI reference model.

UNIT II — 9 HOURS

Data Link Layer & MAC Sublayer: Need, Services Provided, Design issues, Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), CSMA, CSMA/CA, CSMA/CD.

UNIT III — 9 HOURS

Network Layer: Need, Services Provided, Design Issues, Routing Algorithms and types of Routing Algorithm, IPv4, IPv6, Classful and classless Addressing, Subnetting, Supernetting.

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
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BTIT301N	DCC	Computer Networks	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV — 10 HOURS

Transport Layer: Need, Design Issues, Multiplexing and Demultiplexing, transport layer services, UDP,UDP Header Format, Principles of reliable data transfer, TCP, Connection Management, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management, SCTP.

UNIT V — 8 HOURS

Session layer: Overview, Authentication, Session layer protocols.
Presentation layer: Overview, Data conversion, Encryption and Decryption, Presentation layer protocols (LPP, Telnet, X.25 packet Assembler/Disassembler).
Application Layer: Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, FTP.

TEXTBOOKS:

1. Andrew S Tanenbaum, *Computer Networks*, 6th Ed., Pearson Education, 2016.
2. Behrouz A. Forouzan, *TCP/IP-Protocol suite*, 4th Ed., McGraw-Hill, 2010.

REFERENCE:

1. William Stallings, *Data and Computer Communication*, 10th Ed., Pearson, 2014.
2. Comer, *Internet working with TCP/IP Volume one*, Addison-Wesley, 2015.
3. W. Richard Stevens, *TCP/IP Illustrated, Volume 1*, 2nd Ed., Addison-Wesley Professional Computing Series.

LIST OF PRACTICALS

1. Demonstrate Different Types of Network Equipment's.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. LAN installations and Configurations.
4. Experiment with basic Network configuration commands.
5. Write a program for error detection and correction technique.
6. Write a program for framing.
7. Write a program for routing algorithm.
8. Socket Programming.
9. Study about different network simulators.
10. Establish and simulate peer to peer network using packet tracer.
11. Simulate LAN using hub and switch and discuss pros and cons of hub.
12. Router configuration using packet tracer.

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BTCSMOB301N	SEC	Mobile App Development III - iOS	--	--	--	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To describe the basic tools and techniques to develop an iOS application.
2. To illustrate the fundamental concepts of application development for iOS with Swift programming language.
3. To design the user interface (UI) and user's interaction for iOS application.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Define key programming terms relevant to Swift and iOS programming.
2. Describe the process of creating an iOS application.
3. Demonstrate programming best practices in Swift.
4. Select the appropriate UI primitives, persistent storage, user interactions, to develop the working iOS application from the concept.

SYLLABUS

UNIT I — 10 HOURS

Introduction: Introduction to iOS, Mobile application development, Overview of iOS platform, setting up Xcode & tools, MVC design pattern.

Interface Builder Basics: Common system views, Interface Builder Storyboards, project options, default project, create a new project with label and a greet function.

UNIT II — 9 HOURS

Introduction to UI Kit: Common system views configuration, Label(UI Label),Image view, Text view, Scroll view, Table view, Toolbars(UI Toolbar), Navigation bars, tab bars, Controls, Button, Segmented controls, Sliders, Switches, Date pickers, UI Kit User Interface Catalog, Displaying data: Content mode, Unexpected Clipping.

UNIT III — 8 HOURS

Auto Layout and Stack Views: Layout for multiple sizes, Why Auto Layout?, Create alignment constraints, create size constraints, Resolve constraint issues, Safe area layout guide ,resolve constraint warnings, Constraints between siblings, Stack views, stack view attributes, Size classes.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSMOB301N	SEC	Mobile App Development III - iOS	--	--	--	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV **7 HOURS**

App Anatomy and Life Cycle: App life Cycle, break down the delegate, Protocols methods: Did Finish Launching, Will Resign Active, Did Enter Background, Will Enter Foreground, Did Become Active, Will Terminate.

View Controller life Cycle: view Did Load, view Will appear , view Did appear, view Will Disappear.

UNIT V **8 HOURS**

User Interactivity and Advanced UI Concepts: Gestures, Extensions, Delegation, Protocols, Closures, Handling Touches.

Basic iOS Animations: Timer, view based animations, UI dynamics , Alerts, Actions Sheets, Notifications, Segues.

Persistence and Documents: User defaults, Core data, property list, Archiving and Codable, File system, File Manager & CloudKit, Working with the web.

TEXTBOOKS:

1. Matthew Mathias, John Gallagher, Swift Programming: The Big Nerd Ranch Guide 2nd edition, 2015.
2. Matt Neuberg , iOS 12 Programming Fundamentals with Swift, OReilly; 5th edition.

REFERENCE:

1. App Development with Swift (as available on iBook Store)
2. Paris Buttfield-Addison, Jonathon Manning , Tim Nugent Learning Swift: Building Apps for macOS, iOS, and Beyond, O'Reilly Media, Inc., 3rd ed, 2018.
3. Jon Hoffman, Mastering Swift 4, Packt Publishing Limited ,4thedition,2017.
4. Vandad Nahavandipoor. iOS 11 Swift Programming Cookbook, O'Reilly Media, 2017
5. S. Yamacli, Beginner's Guide to iOS 11 App Development Using Swift 4: Xcode, Swift and App Design Fundamentals, (1e), USA: CreateSpace Independent Publishing Platform, 2017.

ShriVaishnavVidyapeethVishwavidyalaya, Indore

ShriVaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Tech Computer Science and Engineering-Mobile Applications-Apple Authorized Training Center

SEMESTER-III(2024-2028)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCSMOB301N	SEC	Mobile App Development III - iOS	--	--	--	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

LIST OF PRACTICALS

1. Create a Hello world App.
2. Create an App Using Labels and Buttons.
3. Create a Calculator App using Text views, Labels and Buttons to perform different mathematical operations.
4. Create an App to demonstrate Image Viwer.
5. Create an App to demonstrate Scroll view.
6. Create an App to demonstrate Tableview.
7. Create an App to demonstrate Toolbar.
8. Create an App to demonstrate Slider.
9. Create an App to demonstrate Switches.
10. Create an App to demonstrate Date Picker.
11. Create an App Using Auto Layout.
12. Create an App Using Constraints.
13. Create an App to demonstrate Lifecycle of an App.
14. Create an App to demonstrate View Controller Lifecycle.
15. Create an App to demonstrate User Interactivity and Advanced UI Concepts.
16. Create different apps using Timer, Alerts, Actions Sheets and Notifications.
17. Create different apps using view-based animations, UI dynamics and Segues.
18. Create different apps using File system, File Manager & Cloud Kit.
19. Design and Implement an App.