Semester-III

Theory Courses

Course Code	Title	Scheme of Examination				Hrs./Week		
		Duration (hrs)	IA	UE	Total Marks	L	T	P
ITE-321	Mathematics-III	3	40	60	100	3	1	0
ITE-322	Data Structures Using C	3	40	60	100	3	1	0
ITE-323	Object Oriented Programming	3	40	60	100	3	1	0
ITE-324	Signals & Systems	3	40	60	100	3	1	0
ITE-325	Digital Electronics	3	40	60	100	3	1	0
ITE-326	Operating Systems	3	40	60	100	3	1	0
Total			**240**	**360**	**600**			

Laboratory Courses

ITE-331	Data Structures Using C	2	25	25	50	0	0	2
ITE-332	Digital Electronics	2	25	25	50	0	0	2
ITE-333	Object Oriented Programming	2	25	25	50	0	0	2
Total			**75**	**75**	**150**			
Total (Theory + Lab)			**315**	**435**	**750**			

Semester III

Course Title: Mathematics-III **Max Marks: 100**
Course Code: ITE-321 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The course is designed to provide basic knowledge of special functions and transform to engineering students.

Unit-I

Series Solution and Special Functions-I: Validity of series solution of the type , Frobenius method, Legendre's differential equation, Legendre's polynomial, Rodrigue's Formula, generating function for , Recurrence formulae, Orthogonality of Legendre's polynomials, Fourier-Legendre Expansion of .

Unit-II

Integral Transform-I: Introduction, Laplace transform, Existence theorem, Properties and theorem of Laplace transform, Laplace transform of unit-step function, impulse function, periodic function and error functions, Inverse Laplace transform, Convolution theorem. Applications of Laplace transform in solving differential and integro-differential equations.

Unit-III

Integral Transform-II: Fourier integral, Fourier Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Inverse Fourier transform, Fourier Sine and Cosine transforms, Properties of Fourier transform, Inverse Fourier transform, Convolution theorem, Parseval's identities for Fourier transforms, Fourier transform of the derivatives of a function, Applications of F-transform to Boundary Value Problems.

Unit-IV

Statistics and Probability-I

Measurement of central tendency-Mean, Median, mode, standard Deviation(S.D), Methods for S.D(shortest methods), moment of variable, co-relation, methods for computing coefficients of co-relation(Shortcut method), regression analysis, definition of probability , laws of probability, conditional probability.

Unit-V

Statistics and Probability-II:

Introduction to random variable, discrete and continuous variables, discrete probability distribution, binomial distribution, Mean, standard Deviation and Moment Generating functions(MGF) of binomial distribution, Poisson's distribution-Mean, S.D and MGF of Poisson's distribution. Continuous probability distribution-Mean, S. D and MGF of continuous probability distribution.

Text Books:

1. **H. K. Das**, Advanced Engineering Mathematics.
2. **T.Veerarjan, "**Probability, statistics and random Processes" TMH

Reference Books:

1. **Babu Ram**," Engineering Mathematics" Pearson Publication.
2. **Schaum's Series Publication,** Discrete Mathematics.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions ,selecting one question from each unit.

Semester III

Course Title: Data Structures Using C **Max Marks: 100**
Course Code: ITE-322 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: To provide a good understanding of data structures and their implementation.

Unit-I

Review of Data Types and Concepts: Review of data types, Scalar types, Primitive types, Structures, Unions, Enumerated types, Records, Sparse Matrices, Recursion and its importance.

Unit-II

Expression and Linear Data Structure: Definition of a Data structure, ADT, Linear Data structures. Stack**:** Operations, Applications, implementation using linked list as well as arrays, Expressions and their conversions, Infix, Postfix & Prefix.
Queue**:** Types, Operations, Applications, implementation using linked list as well as arrays. Linked List**:** Types, Operations, Applications, Implementation.

Unit-III

Trees: Preliminaries, Trees, Forest, Binary Trees, Binary Search Tree ADT, Binary Search Trees: Conversion of Forest to Binary Tree, Binary Search Tree, AVL Trees, Tree Traversals, Priority Queues (Heaps), Model, Simple implementations ,Binary Heap.

Unit-IV

Graphs: Definitions, Graphs, Representation of Graphs: Adjacency Matrix, Path Matrix, Operations on Graphs, Traversing a graph: BFS and DFS, Shortest Path Algorithms: Dijkstra's Algorithm and Warshall's Algorithm, Minimum Spanning Tree, Kruskal's Algorithm and Prim's Algorithm.

Unit-V

Searching and Sorting: Searching: Sequential search, Binary search, Hashing, General Idea, Hash Function, Separate Chaining, Open Addressing, Linear Probing.
Sorting: Bubble sort, Insertion Sort, Selection sort, Heap sort, Merge sort, Quick sort, External Sorting.

Text Books:

1. **Tanenbaum A. S.**, Data Structure Using C, Dorling Kindersley Publisher.
2. **Ellis Horowitz and Satraj Sahni**, An Introduction to Data Structures, Computer Science Press, Rockville MA 1984.
3. **M. A. Weiss**, "Data Structures and Algorithm Analysis in C", 2nd ed, Pearson Education Asia.

Reference Books:

1. **E. Horowitz and S. Shani** Fundamentals of Data Structures in C, Galgotia Pub. 1999.
2. **Richard F. Gilberg, Behrouz A. Forouzan**, Data Structures: A Pseudocode Approach with C, Thomson Cole, 1998.
3. **Hopcroft A. J. E. & Ullman J. D.,** Data Structures and Algorithms, Pearson Education Asia, 1983.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

Semester III

Course Title: Object Oriented Programming **Max Marks: 100**
Course Code: ITE-323 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: To provide a good understanding of Object Oriented Programming Language and its implementation with C++.

Unit-I

Concepts of Object-Oriented Programming: Object Oriented Programming Paradigm, Basic concepts of OOP's, Benefits of OOPS, Introduction to object oriented analysis and design, Design steps, Design example, Object oriented languages, Comparison of structured and object-oriented programming languages.

Unit-II

Expressions, Control Structures, Arrays, Pointers and Functions: Data Types, Operators, expressions and control structures. Arrays, Storage of arrays in memory, Initializing Arrays, Multi-Dimensional Arrays, Strings, Pointers, accessing array elements through pointers, Arrays of pointers, Pointers to pointers, Void Pointers, Functions, Arguments, Passing Pointers as Function Arguments.

Unit-III

Classes and Objects: Classes and objects, access specifies in C++, constructors, destructors, Inline Functions, Friend Functions.
Polymorphism: Function Overloading, Operator Overloading, Type Conversions in C++. Dynamic memory allocation in C++.

Unit-IV

Inheritance: Inheritance, single Inheritance, Multiple Inheritance, Multi level inheritance, hierarchical inheritance, hybrid inheritance, Virtual base classes, Virtual functions, function overriding .
Generic programming with templates: Class templates, Function Templates.

Unit-V

Exception Handling and Files: Exceptions, Types of Exceptions, throwing and catching exceptions. Streams and Files: Opening and closing a file, File Pointers and their Manipulations, sequential Input and Output Operations, multi-file Programs, Command Line Arguments.

Text Books:

1. **Robert Lafore,** Object Oriented Programming in Turbo C++, Galgotia Publications.
2. **Balagurusamy E,** Object Oriented Programming with C++, Tata McGraw Hill.

Reference Books:

1. **Bjarne Strustrup,** The C++ programming Language, Addison Wesley.
2. **Booch,** Object Oriented Analysis and Design with Applications, Addison Wesley.
3. **Chair H. Pappas & William H. Murray**, Complete Reference Visual C++, TMH

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions selecting at least one question from each unit.

Semester III

Course Title: Signals & Systems **Max Marks: 100**
Course Code: ITE-324 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this course is to study and analyze the characteristics of continuous, discrete signals and systems**.**

Unit-I

Introduction: Definitions of a signal and a system, classification of signals, basic Operations on signals, elementary signals, Systems viewed as Interconnections of operations, properties of systems.

Unit-II

Time-domain representations for LTI systems–1: Convolution, impulse response representation, Convolution Sum and Convolution Integral. Properties of impulse response representation.

Unit-III

Fourier representation for signals–1: Fourier representation for signals –: Discrete and continuous Fourier transforms (derivations of transforms are excluded) and their properties. Frequency response of LTI systems, Fourier transform representation of periodic signals, Fourier transform representation of discrete time signals

Unit-IV

Laplace Transforms–1: Introduction, Laplace transform, properties of ROC, properties of Laplace transforms, inversion of Laplace transforms. Transform

analysis of LTI Systems, unilateral Laplace Transform and its application to solve differential equations. Block diagram representation in S-Domain.

Unit-V

The Z Transform: Z-Transform, Region of convergence; Properties of the Z-transform; inversion of Laplace transforms. Transform analysis of LTI Systems, Unilateral Z-transform and its application to difference equations with zero and non-zero initial condition. Block diagram representation in Z-Domain.

Text Books:

1. **Simon Haykin and Barry Van Veen** "Signals and Systems", John Wiley & Sons, 2001.Reprint 2002.
2. **B. P. Lathi,** "Linear Systems and Signals", Oxford University Press, 2005.

Reference Books:

1. **V. Oppenheim Alan, S. Alan, Willsky & Nawab Hamid A.,** Signals and Systems, PHI, 2nd Ed., 1997
2. **H. P Hsu, R. Ranjan,** "Signals and Systems", Scham's outlines, TMH, 2006.
3. **Ganesh Rao and Satish Tunga,** Signals and Systems, Sanguine Technical Publishers, 2004.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

Semester III

Course Title: Digital Electronics **Max Marks: 100**
Course Code: ITE-325 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this subject is to enable the students to know basic concepts of digital electronics design and build digital hardware.

Unit-I

Review of number systems, BCD, Excess-3, Gray and Alphanumeric codes. Review of Boolean algebra, De-Morgan's Theorems, Standard Forms of Boolean Expressions, Minimization-Techniques: K-MAPS, VEM Technique, Q-M (Tabulation) method.

Unit-II

Logic Gates & families: TTL, MOS, CMOS, Bi-CMOS; Performance parameters of IC families: input and output loading, fan-in, fan-out, tri-state, current drive, voltage

levels, noise margins, power-speed tradeoff; Unused inputs; Interfacing between logic families.

Unit-III

Combinational Logic Circuits: Problem formulation and design of Basic Combinational Logic Circuits, Combinational Logic Using Universal Gates. Basic Adders, ALU, Parity-Checkers and Generators, Comparators, Decoders, Encoders, Code Converters, Multiplexer (Data Selector), De-multiplexers

Unit-IV

Sequential Circuits: Latches, Flip-flops (SR, JK, T, D, Master/Slave FF,) Edge-Triggered Flip-Flops, Flip-Flop Operating Characteristics, Basic Flip-Flop Applications, Asynchronous Counter Operation, Synchronous Counter Operation, Up/Down Synchronous Counters.

Unit-V

Shift registers & Memories, Shift Register Functions, Serial In - Serial Out Shift Registers, Serial In-Parallel Out Shift Registers, Parallel In - Serial Out Shift Registers, Parallel In-Parallel Out Shift Registers, Bidirectional Shift Registers, Basics of Semiconductor Memories, Random-Access Memories (ROM), Read Only Memories (ROMs), Programmable ROM's (PROMs and EPROM's), PAL, PLA.

Text Books:

1. **Morris Mano**, Digital Logic Design, TMH.
1. **Kumar Anand**, Digital Logic Design, PHI.

References Books:

1. **Thomas L. F.**, Digital Fundamentals, Prentice Hall, Inc, 4th Edition 1997.
2. **Tocci R. J.** & **Widner**, Digital Systems: Principles and Applications, PHI.
3. **Gothman**, Fundamentals of Digital Electronics, PHI.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.

Semester III

Course Title: Operating System **Max Marks: 100**
Course Code: ITE-326 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment:40**

Objective: To provide good knowledge of basic concepts of Operating System.

Unit-I

Introduction: Operating System and Function, Evolution of Operating System, Batch Systems, Time Sharing and Real Time System, System Protection and Methods.
Operating System Structure**:** System Components, System Structure.

Unit-II

Concurrent Processes: Process concept, Principle of Concurrency, Semaphores and its types. Classical problems in Concurrency, Producer Consumer, Critical Section and readers' writers' problem, Inter Process Communication, Process Generation, Resident Monitors.

Unit-III

CPU Scheduling: Scheduling Concept, levels of Scheduling, Scheduling Algorithm, Multiprocessor Scheduling.
Deadlock**:** System Model, Deadlock Characterization, Prevention, Detection and Recovery.

Unit-IV

Memory Management: Multiprogramming with Fixed Partition and Variable Partition, Multiple Base Register, Paging, Demand Paging, Segmentation, Virtual Memory Concept, Allocation of Frames, Paged Replaced Algorithm, Thrashing, Cache Memory Concept.

Unit-V

I/O Management: I/O Devices and Organization of I/O Function, I/O Buffering, DISK I/O, and Operating System Design Issues.
File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing,

Text Books:

1. **Milenekovic**, Operating System Concepts, McGraw Hill
2. **Silverschwatz**, Operating System Concepts, Willey & Willey.

Reference Books:

1. **Dietel**, An introduction to operating system, Addision Wesley.
2. **Tannenbaum A. S.**, Operating system design and implementation, PHI

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions selecting at least one question from each unit.

Semester III

Course Title: Data Structures Using C **Max Marks: 50**
Course Code: ITE-331 **University Exam: 25**
Duration of Exam: 3 hours **Internal Assessment: 25**

List of Practicals with implementation in C:

1. Program to demonstrate concept of structures.
2. Program to implement single Linked List.
3. Program to implement Doubly Linked List.
4. Program to implement Stack using Linked List.
5. Program to implement Queue using Linked List.
6. Program to implement Stack using arrays.
7. Program to implement Queue using arrays.
8. Program to Create and Copy a Tree.
9. Program to implement Tree Traversal.
10. Program to implement Insert and Delete Operation on Trees.
11. Program to implement AVL Trees.
12. Program to implement Warshal's algorithm to find path matrix.
13. Program to implement Djikstra's algorithm.
14. Program to implement Binary Search.
15. Program to implement Bubble, Selection, Insertion, Heap, Merge and Quick Sort.

Note: This is only the suggested list of practical exercises. Instructor may add or change some practicals relevant to the course contents.

Semester III

Course Title: Digital Electronics **Max Marks: 50**
Course Code: ITE-332 **University Exam:25**
Duration of Exam: 3 hours **Internal Assessment: 25**

List of Experiments:

1. Study of pin diagram of various ICs and to test the logic gates and verify their truth tables.

2 Implementation of following with Logic Gates.

1.1 Half Adder.

1.2 Full Adder.

1.3 Half Subtractor.

1.4 Full Subtractor.

2. Implementation of Boolean functions using 74153 4:1 MUX.
3. Implementation of De-multiplexer, Decoder and Encoder.
4. To add two 4 bit binary numbers using IC 7483.
5. To verify the operation of different modes of shift register using IC 7495.
6. Design of BCD to 7 segment display using logical gates.

8. Simulations

8.1. Introduction to circuit maker and electronic work bench.

8.2. Implementation of experiments from Serial No. 1 to 8 through simulations.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

Semester III

Course Title: Object Oriented Programming **Max Marks: 50**
Course Code: ITE-333 **University Exam:25**
Duration of Exam: 3 hours **Internal Assessment: 25**

List of Experiments:

1. Program to break a number into it's factors
2. Program to find the prime numbers from the list
3. Program to overload <= and + operator
4. Program to get tomorrow’s date
5. Program to add two complex numbers using add as member function of class complex
6. Program to add 2 complex numbers using friend function
7. Program to overload unary operator
8. Program to demonstrate multiple inheritance
9. Program to demonstrate multilevel inheritance
10. Program to demonstrate containership
11. Program to demonstrate hybrid inheritance
12. Program to overloading member functions
13. Program to illustrate virtual base class
14. Program to find sum of array passing pointers to functions

15. Program to convert polar to rectangular coordinates using constructor in destination class
16. Program to concatenate 2 strings using inheritance
17. Program to perform operation on strings

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.