Department of Information Technology

Curriculum of B.Tech in Information Technology

(Applicable for 2018 Admission Batch onwards)

3rd Semester								
Sl No	**Paper Category**	**Paper Code**	**Theory**	**Contact Hours /Week**				**Credit Points**
				L	**T**	**P**	**Total**	
A. THEORY								
1	PC	IT301	Data Structure and Algorithm	3	0	0	3	3
2	BS	M(IT)301	Mathematics -III	3	0	0	3	3
3	BS	M(IT)302	Numerical Methods and Statistics	3	0	0	3	3
4	BS	PH301	Physics-II	3	0	0	3	3
5	ES	EC(IT)303	Analog and Digital Electronics	3	0	0	3	3
Total no. of Theory							**15**	**15**
B. PRACTICAL								
6	PC	IT391	Data Structure Lab	0	0	3	3	1.5
7	BS	M(IT)392	Numerical Methods and Statistics Lab	0	0	3	3	1.5
8	BS	PH391	Physics II Lab	0	0	3	3	1.5
9	ES	EC(IT)393	Analog and Digital Electronics Lab	0	0	3	3	1.5
Total no. of Theory							**12**	**6**
C. SESSIONAL								
10	HS	HU381	Technical Report Writing & Language Practice	0	0	3	3	1.5
D. PROJECT*								
11	**Project Code**		**Project Name**	**Contact Hours /Week**				**Credit Points**
	IT351		Data Structure and Algorithm	1				0.5
	M(IT)351		Mathematics -III	1				0.5
	M(IT)352		Numerical Methods and Statistics	1				0.5
	PH351		Physics-II	1				0.5
	EC(IT)353		Analog and Digital Electronics	1				0.5
***Total of Project** (Student would select any four projects (Total Credit: 0.5*4=2))				**4**				**2**
Total no. of Theory Practical, Sessional and Project				**34**				**24.5**

3RD SEMESTER

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : DATA STRUCTURE AND ALGORITHM
SUBJECT CODE : IT301
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite:
Basic Mathematics, Programming language

Course Objective:
The objective of the course is to provide knowledge of various data structures and algorithms; to introduce difference techniques for analyzing the efficiency of computer algorithms and provide efficient methods for storage, retrieval and accessing data in a systematic manner and explore the world of searching, sorting, traversal and graph tree algorithm along with demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists and trees.

Course Outcome
After completion of this course student will be able to

IT301.1: Use different kinds of data structures which are suited to different kinds of applications, and some are highly specialized to specific tasks.

IT301.2: Manage large amounts of data efficiently, such as large databases and internet indexing services.

IT301.3: Use efficient data structures which are a key to designing efficient algorithms.

IT301.4: Use some formal design methods and programming languages which emphasize on data structures, rather than algorithms, as the key organizing factor in software design.

IT301.5: Store and retrieve data stored in both main memory and in secondary memory.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
IT301.1	3	2		1			1					
IT301.2	3	3	2	3								
IT301.3	3		3									
IT301.4		3		2								
IT301.5		3		2								

Course Contents:

MODULE –I : [8L]
Introduction : Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type. Algorithms and programs, basic idea of pseudo-code. Algorithm efficiency and analysis, time and space analysis of algorithms – order notations. Array : Different representations – row major, column major. Sparse matrix - its implementation and usage. Array representation of polynomials. Linked List : Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.

MODULE –II: [5L]
[Stack and Queue : Stack and its implementations (using array, using linked list), applications. Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications. Recursion : Principles of recursion – use of stack, differences between recursion and iteration, tail recursion. Applications - The Tower of Hanoi, Eight Queens Puzzle.
MODULE –III : [12L]

Trees : Basic terminologies, forest, tree representation (using array, using linked list). Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree. Binary search tree-operations (creation, insertion, deletion, searching). Height balanced binary tree – AVL tree (insertion, deletion with examples only). B- Trees – operations (insertion, deletion with examples only). Huffman tree.

Graphs : Graph definitions and Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list. Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications. Minimal spanning tree – Prim's algorithm

MODULE – IV: [10L]

Sorting Algorithms : Internal sorting and external sorting Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap), radix sort. Tree Sort technique .Searching : Sequential search, binary search, interpolation search. Hashing : Hashing functions, collision resolution techniques

Text Books:

1. Data Structures Using C, by Reema Thereja, OXFORD Publications
2. Data Structures and Algorithms Using C by Amitava Nag and Joyti Prakash Singh, VIKASH Publication
3. Data Structures by S. Lipschutz.

Reference Books:

1. Data Structures Using C, by E. Balagurusamy E. Mc graw Hill)
2. Data Structures Using C and C++, by Moshe J. Augenstein, Aaron M. Tenenbaum

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : MATHEMATICS –III
SUBJECT CODE : M(IT)301
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite:
The students to whom this course will be offered must have the concept of (10+2) standard set theory, calculus, basic probability.

Course Objective:
The objective of this course is to disseminate the prospective engineers with the knowledge of Graph Theory and Algebraic structure. It also aims to equip the students with concepts and tools of probability distribution as an intermediate to the advanced level of applications that they would find useful in their disciplines.

Course Outcome
After completion of this course student will be able to

M(IT)301.1: Recall the distinctive characteristics of probability distribution, abstract algebra, and graph theory.

M(IT)301.2: Demonstrate the theoretical working of probability distribution, abstract algebra, and graph theory.

M(IT)301.3: Compute the probability of real world uncertain phenomena by indentifying probability distribution that fits the phenomena.

M(IT)301.4: Construct the shortest path and minimal spanning tree from a given graph using the algorithms of graph theory.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M(IT)301.1	3	1	1									1
M(IT)301.2	3	2	1									1
M(IT)301.3	3	2	2									1
M(IT)301.4	3	2	2									1

Course Contents:

MODULE I [10L] : Probability Distributions
Random Variable: Discrete and Continuous (definition & examples); Probability Distribution (definition & examples); Probability Mass Function, Probability Density Function and Distribution Function for a single random variable only (definition, properties & related problems); Expectation, Variance and Standard Deviation for a single random variable only (definition, properties & related problems); Binomial Distribution, Poisson Distribution, Binomial Approximation to Poisson Distribution and Normal Distribution (problems only), Mean, Variance and Standard Deviation of Binomial, Poisson and Normal Distribution (problems only).

MODULE II [9L] : Algebraic Structures

Group (definition), Lagrange's theorem, Subgroup, Normal subgroup, Cyclic group, Permutation group, Symmetric group (S3).

MODULE III [14L] : Graph Theory

Basics of Graph Theory and related theorems and problems; Digraphs; Weighted Graph; Connected and Disconnected graph; Bipartite Graph; Complement of a Graph; Regular Graph; Complete Graph; Walk, Path, Circuit, Euler Graph; Cut Set and Cut Vertices; Adjacency and Incidence Matrices of a graph (digraph); Isomorphism.

Basics of Tree and related theorems, Binary Tree, Spanning Tree, Minimal Spanning Tree, Dijkstra's algorithm, Kruskal's Algorithm, Prim's Algorithm.

Planar and Dual Graphs; Euler formula for connected planar graph.

Project Domains:

1. Study of physical processes through Graph theory.
2. Study of uncertainty in real world phenomena using probability distribution.
3. Application of Abstract Algebra in engineering problems.

Text Books:

1. Das, N.G. Probability and Statistics; The McGraw Hill Companies.
2. Gupta, S. C. and Kapoor, V. K. Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
3. Deo, N. Graph Theory with Applications to Engineering and Computer Science, Prentice Hall.
4. Mapa, S. K. Higher algebra: Abstract and Linear, Levant, 2011.
5. Chakraborty, S. K. and Sarkar, B. K. Discrete Mathematics, OXFORD University Press.

Reference Books:

1. Chandrasekaran, N. and Umaparvathi, M. Discrete Mathematics, PHI
2. Lipschutz, S. Theory and Problems of Probability (Schaum's Outline Series), McGraw Hill Book. Co.
3. Spiegel, M. R. Theory and Problems of Probability and Statistics (Schaum's Outline Series), McGraw Hill Book Co.
4. Grewal, B. S. Higher Engineering Mathematics, Khanna Pub.
5. Kreyzig, E. Advanced Engineering Mathematics, John Wiley and Sons.
6. Sharma, J.K. Discrete Mathematics, Macmillan.
7. Spiegel, M. R., Schiller, J.J. and Srinivasan, R.A. Probability and Statistics (Schaum's Outline Series), TMH.
8. Wilson: Introduction to graph theory, Pearson Education.

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : NEMERICAL METHODS AND STATISTICS
SUBJECT CODE : M(IT)302
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3L
CREDITS : 3

Pre requisites:
The students to whom this course will be offered must have the concept of (10+2) standard number system, algebra and calculus.

Course Objective:
The purpose of this course is to provide basic understanding of the derivation and the use of the numerical methods along with the knowledge of finite precision arithmetic.

Course Outcomes:
On successful completion of the learning sessions of the course, the learner will be able to:

M(IT)302.1: Recall the distinctive principles of numerical analysis and the associated error measures.
M(IT)302.2: Understand the theoretical workings of numerical techniques.
M(IT)302.3: Apply numerical methods used to obtain approximate solutions to intractable mathematical problems such as interpolation, integration, the solution of linear and nonlinear equations, and the solution of ordinary differential equations.
M(IT)302.4: Select appropriate numerical methods to apply to various types of problems in engineering and science in consideration of the mathematical operations involved, accuracy requirements, and available computational resources.
M(IT)302.5: Interpret complex statistical findings using the understanding of inferential statistics.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
M(IT)302.1	3	1	1	-	-	-	-	-	-	-	-	1
M(IT)302.2	3	2	1	-	-	-	-	-	-	-	-	1
M(IT)302.3	3	2	2	-	-	-	-	-	-	-	-	1
M(IT)302.4	3	3	2	3	-	-	-	-	-	-	-	1
M(IT)302.5	3	3	2	3	-	-	-	-	-	-	-	1

Course Contents:

MODULE I [7L]: Error Analysis and Interpolation
Approximation in Numerical Computation: Truncation and rounding errors, Propagation of errors, Fixed and floating-point arithmetic.

Interpolation: Difference Operators: Forward and Backward, Shift Operator; Newton forward interpolation, Newton backward interpolation, Lagrange's Interpolation.

MODULE II [6L]: Numerical Solution of Linear and Non-linear Equations

Numerical Solution of a System of Linear Equations: Gauss elimination method, LU Factorization method, Gauss-Seidel iterative method.

Solution of Polynomial and Transcendental Equations: Bisection method, Regula-Falsi, Newton-Raphson method.

MODULE III[6L]: Numerical Integration and Numerical Solution of Differential Equation

Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.

Numerical solution of ordinary differential equation: Euler's method,Euler's modified method, Fourth order Runge-Kutta method.

MODULE III[14L]: Statistics

Basic Statistics: Basic statistics, measure of central tendency, mean, median, mode, dispersion, correlation coefficient and regression.

Sampling theory: Random sampling. Statistic and its Sampling distribution. Sampling distribution of sample mean and variance in random sampling from a normal distribution (statement only) and related problems.

Estimation of parameters: Unbiased and consistent estimators. Interval estimation. Maximum likelihood estimation of parameters (Binomial, Poisson).Confidence intervals and related problems

Project Domains:

1. Study on Numerical solution of ODE in Engineering Field.
2. Application of numerical methods for the relevant field.
3. Mathematical modelling.
4. Statistical analysis of data related to different Engineering fields.

Text Books:

1. Shishir Gupta &S.Dey, Numerical Methods, Mc. Grawhill Education Pvt. Ltd.
2. C.Xavier: C Language and Numerical Methods, New age International Publisher.
3. Dutta& Jana: Introductory Numerical Analysis. PHI Learning
4. J.B.Scarborough: Numerical Mathematical Analysis.Oxford and IBH Publishing
5. Jain, M. K., Iyengar, S. R. K. and Jain, R. K. Numerical Methods (Problems and Solution). New age International Publisher.
6. Prasun Nayek: Numerical Analysis, Asian Books
7. N. G. Das: Statistical Methods, TMH.
8. Sancheti , D. S. & Kapoor ,V.K. : Statistics Theory , Method & Application, Sultan chand & sons ,New Delhi

Reference Books:

1. Balagurusamy, E. Numerical Methods, Scitech. TMH.
2. Dutta, N. Computer Programming & Numerical Analysis, Universities Press.
3. Guha, S. and Srivastava, R. Numerical Methods, Oxford Universities Press.
4. Shastri, S. S. Numerical Analysis, PHI.
5. Mollah, S. A. Numerical Analysis, New Central Book Agency.
6. Numerical Methods for Mathematics ,Science&Engg., Mathews, PHI.
7. Rao, G. S. Numerical Analysis, New Age International.

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : PHYSICS-II
SUBJECT CODE : PH301
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite:
Knowledge of Physics up B.Tech 1st year Physics-I course

Course Objective:
The Physics-II course will provide the exposure to the physics of materials that are applied in digital circuitry, storage devices; exposure to the physics of quantum logic gate operation and quantum computation; an insight into the science & technology of next generation; foundations of electromagnetic theory and communication systems; concept of fundamental particles and associated applications in semiconductors

Course Outcome
After completion of this course student will be able to

PH301.1:	Define ➢ understand and explain electrostatics, magnetostatics and electromagnetic theory. ➢ operator formalism in Quantum Mechanics. ➢ categories of storage devices. ➢ materials at the low-dimensions. ➢ fundamental particles.
PH301.2:	Apply the knowledge of ➢ Vector space & Heisenberg representation in developing knowledge of quantum bit Quantum bit and its representation as a two level system to design quantum logic gates. ➢ Schrödinger equation in problems of junction diode, tunnel diode. ➢ Magnetism and semiconductors in data storage. ➢ Electromagnetic theory in communication and networking. ➢ Poisson's equations in various electronic systems. ➢ Fermi levels in intrinsic and extrinsic semiconductors.
PH301.3:	Analyze ➢ Role of superposition principle in generation of large number of Qubits. ➢ The principle of display devices. ➢ Which type of magnetic materials to be used for data storage purpose. ➢ Role of quantum confinement in inducing novel feature of a nano material. ➢ Change in electric and magnetic fields in various symmetrical bodies. ➢ Quantum gates and quantum circuits.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH301.1	3	1										1
PH301.2	3	2										2
PH301.3	2	3										1

- **Course Contents**

Module 1: Quantum Mechanics-II, Quantum Computation and Communication [12L]
Quantum Mechanics-II
Formulation of quantum mechanics and Basic postulates; Operator correspondence- Measurements in Quantum Mechanics- Eigen value, Eigen function, superposition principle, orthogonality of wave function, expectation value. Commutator. Time dependent Schrödinger's equation, formulation of time independent Schrödinger's equation by method of separation of variables, Schrödinger's equation as energy eigen value equation, Application of Schrödinger equation – Particle in an infinite square well potential (1-D and 3-D potential well; Discussion on degenerate levels), 1D finite barrier problem and concept of quantum tunnelling (solve only $E<V_0$).

Quantum Computation and Communication
The idea of n- dimensional vector space, use of 'bra-ket' notation, matrix representation of bra &kets; basis, Hilbert space; Pauli matrices. Idea of qubit and examples of single qubit logic gates- Classical bits, qubit as a two level system; Bloch vector, Pauli gate, Hadamard gate, Phase shift gate, Quantum circuits related to Quantum gates.

Module 2: Statistical Mechanics [6L]
Basics of Statistical Mechanics: Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, MB, BE, FD, statistics (Qualitative discussions)- physical significance, conception of bosons, fermions, classical limits of quantum statistics, Fermi distribution at zero & non-zero temperature, Concept of Fermi level.
Applications of Statistical Mechanics: Qualitative study: Fermi level in metals, total energy at absolute zero and total number of particles. Fermi level for intrinsic and extrinsic semiconductors (pictorial representations on temperature dependence and doping concentration viz. p type, n-type).

Module 3: Storage and display devices [3L]
Different storage and display devices-Magnetic storage materials, Hard disc (examples related to computers compared with semiconductor storage viz. Pendrive), Operation and application of CRT, Liquid crystal display (LCD), LED, Plasma display, Thin film transistor display).

Module 4 : Concept of Polarisation [3L]
Definition, Plane of polarization, Plane of vibration, Malus Law, Fundamental concepts of plane, circular & elliptical polarizations (only qualitative idea) with examples, Brewster's law, Double refraction : Ordinary & Extra ordinary rays, Nicol's prism, Engineering applications in E.M.Theory, Numerical problems.

Module 5: Electricity and Magnetism [8L]
Electrostatics: Gauss's law in integral form and conversion into differential form, Equation of continuity, Extend to Poisson's & Laplace's equation, Application to parallel plate, spherical and cylindrical capacitors.
Magnetostatics: Lorentz force (concept in Hall effect), force on a small current element placed in a magnetic field. Biot-Savart law- non existence of magnetic monopole, Ampere's circuital law, Magnetic vector and scalar potential.
Electro-magnetism &Electromagnetic theory: Faraday's law, Concept of displacement current, Maxwell's field equations with physical significance, wave equation in free space, transverse nature of electromagnetic wave.

Module 6: Physics of Nanomaterials [3L]
Reduction of dimensionality, properties of nanomaterials, Quantum wells (two dimensional), Quantum wires (one dimensional), Quantum dots (zero dimensional); Application of nanomaterials (CNT, grapheme, electronic, environment, medical).

Text Books

1. Electricity and Magnetism (In Si Units): Berkeley Physics Course - Vol.2,
2. Principles of Engineering Physics Vol 1 and Vol 2; by Md. N. Khan and S. Panigrahi, Pub: 3. Cambridge Univ. press
3. Introduction to Quantum MechanicsS. N. Ghoshal (Calcutta Book House)
4. Introduction to solid state physics-Kittel (TMH)
5. Nanostructure and Nanomaterials, B.K. Parthasarathy

Reference Books

1. Edward M Purcell Introduction to Electrodynamics Griffiths David J. The Feynman Lectures on Physics. 2 (2nd ed.).,
2. Feynman, Richard P Addison-Wesley. ISBN 978-0-8053- 9065-0
3. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
4. Advanced Quantum Mechanics-J. J. Sakurai (TMH)
5. Quantum Computation and Quantum Information(10th Anniversary Edition)- Nielsen
6. Chuang (Cambridge University Press)
7. Solid State Physics- Ali Omar (Pearson Eduction)
8. Solid state physics- S. O. Pillai
9. Solid State Physics-A. J. Dekker (Prentice-Hall India)
10. Introduction to Nanotechnology, B.K. Parthasarathy
11. Nanomaterials Handbook (Advanced Materials and Technologies)- YuryGogotsi (Editor)

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : ANALOG AND DIGITAL ELECTRONICS
SUBJECT CODE : EC(IT)303
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite:
Mathematics, Physics, Basic Electronics.

Course Objective:
The objective of the course is to prepare students to perform the analysis and design of various digital and analog electronic circuits.

Course Outcome
After completion of this course student will be able to

EC(IT)303.1: Understand basic analog and digital electronics, including semiconductor properties, operational amplifiers, combinational and sequential logic and analog-to-digital digital-to-analog conversion techniques
EC(IT)303.2: Identify different symbols, working principles of basic Digital electronics circuits for data processing application
EC(IT)303.3: Analyze the characteristics of basic digital circuits
EC(IT)303.4: Design analog amplifiers, combinational logic devices and sequential logic devices like counters and registers

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC(IT)303.1	2					2						1
EC(IT)303.2	2											1
EC(IT)303.3		2		3								
EC(IT)303.4		2	3	2	1	1	2					

Course Contents

MODULE I [10L] :

Analog Electronics: Recapitulation of P-N diodes, BJT, FET , Feedback and OPAMP, Power Amplifiers – Class A, B, AB and C - basic concepts, power, efficiency calculation; Phase Shift, Wein Bridge oscillators; Astable & Monostable Multivibrators, 555 Timer and Multivibrators ; Schimtt Trigger circuit.

MODULE II [9L] :

Introduction to Number Systems: Binary, Octal and Hexadecimal representation and their conversions; BCD, ASCII, EBDIC, Gray codes and their conversions; Signed binary number representation with 1's and 2's complement methods , Binary arithmetic; Boolean algebra; Various logic gates; Representation in SOP and POS forms; Minimization of logic expressions by algebraic method, K-MAP method and Quin Mc-Clusky Method.

MODULE III [5L] :

Combinational Circuits: Adder and Substractor; Applications and circuits of Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator and Checker.

MODULE IV [6L] :

Sequential Circuits: Basic Flip-flop & Latch ; SR, JK, D, T and JK Master-slave Flip Flops Registers (SISO,SIPO,PIPO,PISO); Ring counter, Johnson counter ; Basic concept of Synchronous and Asynchronous counters ; Design of synchronous and asynchronous Mod N Counter.

MODULE V [2L] :

A/D and D/A conversion techniques: Basic concepts of R-2R , A/D and D/A; successive approximation ADC

MODULE VI [2L] :

Logic families: TTL, ECL, MOS and CMOS - basic concept

Text Books:

1. 'Digital Circuits and Design', Salivahanan, S. Arivazhagan, Vikas Publishers
2. 'Electronics Fundamentals and Applications', D. Chattopadhyay, P. C. Rakshit, New Age International Publishers

Reference Books:

1. 'Digital Design', M. Morris Mano, Pearson Education

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : DATA STRUCTURE LAB
SUBJECT CODE : IT391
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3P
CREDITS : 1.5

Perquisite:
Basic Mathematics, Programming language

Course Objective:
To develop the conceptual understanding for solving problems using data structures such as linear lists, stacks, queues, hashing, trees and graphs and writing programs for these solutions.

Course Outcome:
After completion of this course student will be able to

IT391.1: Understand the concept of dynamic memory management, data types, basic data structures, and complexity analysis.

IT391.2: Introduce the concept of data structures through ADT.

IT391.3: Choose the appropriate linear and non-linear data structure and algorithm design method for a specified application design.

IT391.4: Analyze the complexity of the problems.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
IT391.1	3	2	1									
IT391.2	2	3	1	3								
IT391.3	3	3	3	3	2				2			3
IT391.4	3	2	1	3	2							1

Course Content:

1. Experiments should include but not limited to Implementation of array operations:
2. Stack and Queues: adding, deleting, elements circular Queue: Adding& deleting elements
3. Merging Problem:
4. Evaluation of expressions operations on Multiple stacks & queues:
5. Implementation of linked list: inserting, deleting, inverting a linked list
6. Implementation of stacks and queues
7. Using linked lists: Polynomial addition, Polynomial multiplication

8. Sparse Matrices: Multiplication , addition
9. Recursive and Non Recursive traversal Trees
10. Threaded binary tree traversal. AVL tree implementation
11. Application of Trees. Application of sorting and searching algorithms
12. Hash tables implementation: searching, inserting and deleting, searching and sorting techniques.

Text Books:

1. Data Structures Using C, by Reema Thereja, OXFORD Publications
2. Data Structures and Algorithms Using C by Amitava Nag and Joyti Prakash Singh, VIKASH Publication
3. Data Structures by S. Lipschutz.

Reference Books:

1. Data Structures Using C, by E. Balagurusamy E. Mc graw Hill)
2. Data Structures Using C and C++, by Moshe J. Augenstein, Aaron M. Tenenbaum

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : NEMERICAL METHODS AND STATISTICS LAB
SUBJECT CODE : M(IT)392
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3
CREDITS : 1.5

Pre requisites: Any introductory course on programming language (example. C/ MATLAB).

Course Objective: The purpose of this course is to provide basic programming skills for solving the problems in numerical methods.

M(IT)392.1: Understand the theoretical workings of numerical techniques with the help of C/MATLAB
M(IT)392.2: Execute basic command and scripts in a mathematical programming language
M(IT)392.3: Apply the programming skills to solve the problems using multiple numerical approaches.
M(IT)392.4: Analyze if the results are reasonable, and then interpret and clearly communicate the results.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
M(IT)392.1	3	2	1									1
M(IT)392.2	3	2	2									1
M(IT)392.3	3	2	2									1
M(IT)392.4	3	3	2	3								1

Course Contents:

1. Assignments on Newton forward /backward, Lagrange's interpolation.
2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule
3. Assignments on numerical solution of a system of linear equations using Gauss elimination, Gauss Jacobi and Gauss-Seidel iterations.
4. Assignments on numerical solution of Algebraic Equation by Bisection method, Regula-Falsi method, Newton-Raphson method.
5. Assignments on ordinary differential equation: Euler's method, Euler's modified method, Runge-Kutta methods.
6. Simple problems as assignment on Measures of Central Tendency- mean, median, mode, Measures of Dispersion- variance, standard deviation. Problems related to engineering field.

Implementation of numerical methods on computer through C/C++ and commercial Software Packages: Matlab / Scilab / Labview / Mathematical/NAG (Numerical Algorithms Group/Python.

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : PHYSICS-II LAB
SUBJECT CODE : PH391
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3P
CREDITS : 1.5

Perquisite:
Knowledge of Physics upto B.Tech Physics-I lab

Course Objective:
The Physics-II Lab course will provide the exposure to the physics of materials that are applied in digital circuitry, storage devices; exposure to the physics of quantum logic gate operation and quantum computation; an insight into the science & technology of next generation; foundations of electromagnetic theory and communication systems; concept of fundamental particles and associated applications in semiconductors

Course Outcomes:
At the end of the course students will be able to know to find out:

PH(IT)391.1: Examine the characteristics of analog electronic circuit devices such as BJTs and FETs, amplifiers
PH(IT)391.2: Make use of different basic logic gates and universal gates
PH(IT)391.3: Implement the combinational circuits in digital electronics using basic logic gates
PH(IT)391.4: Construct sequential circuits like registers and counters using flip-flops and basic gates

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH(IT)391.1	3	2										1
PH(IT)391.2	1	2		3								1
PH(IT)391.3	1	2							3			1
PH(IT)391.4	1	2								3		

Course Contents:

MODULE I : -Electricity Magnetism

1. Study of dipolar magnetic field behaviour.
2. Study of hysteresis curve of a ferromagnetic material using CRO.
3. Use of paramagnetic resonance and determination of Lande-g factor using ESR setup.
4. Measurement of Curie temperature of the given sample.
5. Determination of dielectric constant of given sample (frequency dependent).
6. Determination of Hall co-efficient of a semiconductor and measurement of Magneto resistance of a given semiconductor

MODULE II: -Quantum Mechanics-II

7. Determination of Stefan's radiation constant.
8. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells & measurement of maximum workable power.
9. Measurement of specific charge of electron using CRT.

10. Determination of band gap of a semiconductor.
In addition to regular 7 experiments it is **recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

Probable experiments beyond the syllabus:

1. Determination of thermal conductivity of a bad conductor by Lees and Chorlton's method.
2. Determination of thermal conductivity of a good conductor by Searle's mothod.
3. Study of I-V characteristics of a LED.
4. Study of I-V characteristics of a LDR
5. Study of transducer property: Determination of the thermo-electric power at a certain temperature of the given thermocouple.

Text Books

1. 1.Electricity and Magnetism (In Si Units): Berkeley Physics Course - Vol.2,
2. Principles of Engineering Physics Vol 1 and Vol 2; by Md. N. Khan and S. Panigrahi, Pub:
3. Cambridge Univ. press
4. Introduction to Quantum MechanicsS. N. Ghoshal (Calcutta Book House)
5. Introduction to solid state physics-Kittel (TMH)
6. Nanostructure and Nanomaterials, B.K. Parthasarathy

Reference Book s

1. Edward M Purcell Introduction to Electrodynamics Griffiths David J. The Feynman Lectures on Physics. 2 (2nd ed.).,
2. Feynman, Richard P Addison-Wesley. ISBN 978-0-8053- 9065-0
3. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
4. Advanced Quantum Mechanics-J. J. Sakurai (TMH)
5. Quantum Computation and Quantum Information(10th Anniversary Edition)- Nielsen

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : ANALOG & DIGITAL ELECTRONICS LAB
SUBJECT CODE : EC(IT)393
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3P
CREDITS : 1.5

Perquisite:
Mathematics, Basic Electronics, concepts of basic Electrical components.

Course Objective:
The objective of the course is to illustrate the students different electronic circuit and their application in practice.

Course Outcomes:
At the end of the course students will be able to know to find out:

EC(IT)393.1: Examine the characteristics of analog electronic circuit devices such as BJTs and FETs, amplifiers
EC(IT)393.2: Make use of different basic logic gates and universal gates
EC(IT)393.3: Implement the combinational circuits in digital electronics using basic logic gates
EC(IT)393.4: Construct sequential circuits like registers and counters using flip-flops and basic gates

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC(IT)393.1				2								
EC(IT)393.2	2			2								1
EC(IT)393.3		2	2									
EC(IT)393.4		3	2			1						

Course Content:
1. Design of a Class A amplifier.
2. Design of a Phase-Shift Oscillator.
3. Design of a Schmitt Trigger using Opamp.
4. Design of a Multivibrator circuit using 555 timer.
5. Design of Half and Full adder and Half and Full Substractor
6. Construction of simple Decoder & Multiplexer circuits using logic gates
7. Realization of RS / JK / D flip flops using logic gates
8. Design of Shift Register using J-K / D Flip Flop.
9. Realization of Synchronous Up/Down counter.
10. Design of MOD- N Counter (Synchronous and Asynchronous).
11. Study of DAC and ADC.

STREAM : INFORMATION TECHNOLOGY
SUBJECT NAME : TECHNICAL REPORT WRITING AND LANGUAGE PRACTICE
SUBJECT CODE : HU381
YEAR : SECOND
SEMESTER : 3rd Semester
CONTACT HOURS : 3P
CREDITS : 1.5

Perquisite:
The course presupposes a high school level knowledge of English grammar, punctuation, and elementary to intermediate reading and writing skills.

Course Objective:
The basic objectives of this course are to impart professional communication skills in the globalized workplace context, to enable functional competence in reading and writing so as to create industry-ready personnel.

Course Outcomes:

After completion of this course student will be able to:-

HU381.1: Know about and employ communication in a globalized workplace scenario

HU381.2: Understand and apply reading skills and sub-skills.

HU381.3: Acquire a working knowledge of writing strategies, formats and templates of professional writing.

HU381.4: Apply and make use of the modalities of intercultural communication.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU381.1	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**-**	**2**
HU381.2	**2**	**3**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**3**	**-**	**3**
HU381.3	**1**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**3**
HU381.4	**-**	**-**	**-**	**-**	**-**	**3**	**3**			**3**	**-**	**3**

Course Contents:

Module 1 [2L+2P] : The Need for a Language Laboratory
(a) Introduction to the Language Lab
(b) Skill-building exercises in the lab

Module 2 [2L+3P] : Power Listening
(a)Taxonomy of Listening Skills & Sub-skills [Aural Skimming, Scanning, Listening for Details, Note taking, Evaluative Listening, Empathetic Listening, Paralinguistic and Kinesic Inferencing]
(b)Audio-based Lessons
(c) Repairing Listening 'Gaps' through Learner Feedback

Module 3 [2L+6P] : Speaking Skills
(a)The Need for Speaking: Content and Situation-based speaking
(b)Speaking Activities: [Just a Minute, Paired Role Play, Situational Speaking Exercises]

(c)The Pragmatics of Speaking—Pronunciation practice and learner feedback.

Module 4 [2L+6P] : Group Discussion
(a)Teaching GD Strategies
(b)In-house video viewing sessions
(c)Extended Practice and feedback

Module 5 [2L+6P] : Writing a Technical Report
(a)Organizational Needs for Reports and types
(b)Report Formats
(c)Report Writing Practice Sessions and Workshops

Module 6 [2L+3P] : SWOT Analysis
(a)SWOT Parameters
(b)Organizational SWOT
(c) Case Study

Module 7 [2L+6P] : Presentation
(a)Teaching Presentation as a Skill
(b)Speaking Strategies and Skills
(c)Media and Means of Presentation
(d)Extended Practice and Feedback

Module 8 [2L+3P] : Personal Interview
(a)Preparing for the Interview: Interview Basics, Dressing and Grooming, Q & A
(b)Mock Interview sessions and feedback

Reference Books:

1. Raymond Murphy. English Grammar in Use. 3rd Edn. CUP, 2001.
2. A. J Thomson and A. V. Martinet. A Practical English Grammar Oxford: OUP, 1980.
3. Michael Swan. Practical English Usage. Oxford: OUP, 1980.
4. Simeon Potter. Our Language. Oxford: OUP, 1950.
5. Pickett, Laster and Staples. Technical English: Writing, Reading & Speaking. 8th ed. London: Longman, 2001.
6. Ben Heasley and Liz Hamp-Lyons. Study Writing. Cambridge: CUP, 2006.
