# RAJA MAHENDRA PRATAP SINGH UNIVERSITY ALIGARH



## According to

## National Education Policy- 2020

## Common Minimum Syllabus

## In

## Bachelor of Science (Vocational) Information Technology (B.Sc. (Voc.) IT)

## For

## Certificate/Diploma/Degree Course

| SYLLABUSDEVELOPEDBY | | | |
|---|---|---|---|
| SNo | NAME | DESIGNATION | DEPARTMENT | COLLEGE/UNIVERSITY |
| 1 | Prof. SHUBHNESH KR GOYAL | Professor | Mathematics | D.S.(P.G.) COLLEGE, ALIGARH |
| 2 | DR. KUMUD | Assistant Professor | Computer Application | D.S.(P.G.) COLLEGE, ALIGARH |
| 3 | MR. ANKIT UPADHYAY | Assistant Professor | Computer Application | D.S.(P.G.) COLLEGE, ALIGARH |

# SEMESTERWISE TITLES OF THE PAPER IN UG IT COURSE

| YEAR | SEMESTER | COURSE CODE | PAPERTITLE | THEORY/ PRACTICAL | CREDIT |
|------|----------|-------------|------------|-------------------|--------|
| First Year | I | IT-1001T | Fundamentals of Computer & IT Ethics | CORE | 4 |
| | | IT-1002T | C Language Programming | CORE | 4 |
| | | IT-1003T | Web Development using HTML, CSS & JavaScript | CORE | 2 |
| | | IT-1004T | Commercial Mathematics with basic reasoning | MINOR | 3 |
| | | IT-1005S | Business Communication and Soft Skills | SEC | 3 |
| | | IT-1006P | MS-Office, C Language Lab &Web Development Lab | CORE PRACTICAL | 2 |
| | | RF000101 | First Aid & Health | COCURRICULUR | 2 |

| YEAR | SEMESTER | COURSE CODE | PAPERTITLE | THEORY/ PRACTICAL | CREDIT |
|------|----------|-------------|------------|-------------------|--------|
| First Year | II | IT-2001T | Object Oriented Programming Using C++ | CORE | 4 |
| | | IT-2002T | Data Structure using 'C'/'C++' | CORE | 4 |
| | | IT-2003T | Digital Electronic Circuits | CORE | 2 |
| | | IT-2004T | Numerical Methods | MONOR | 3 |
| | | IT-2005S | Financial Accountancy | SEC | 3 |
| | | IT-2006P | C++ and Data Structure Lab | CORE PRACTICAL | 2 |
| | | RF000202 | Human Values and Environmental Studies | COCURRICULUR | 2 |

| SEMESTER WISE TITLES OF THE PAPER IN UG IT COURSE | | | | | |
|---|---|---|---|---|---|
| YEAR | SEMESTER | COURSE CODE | PAPERTITLE | THEORY/ PRACTICAL | CREDIT |
| Second Year | III | IT-3001T | Database Management System | CORE | 4 |
| | | IT-3002T | Operating System with Unix Operating System | CORE | 4 |
| | | IT-3003T | Software Engineering | CORE | 2 |
| | | IT-3004T | Statistics | MINOR | 3 |
| | | IT-3005S | Principle of Management | SEC | 3 |
| | | IT-3006P | DBMS And OS Lab | CORE PRACTICAL | 2 |
| | | RA000301 | Physical Education and Yoga | COCURRICULUR | 2 |

| SEMESTERWISETITLESOFTHEPAPERINUGITCOURSE | | | | | |
|---|---|---|---|---|---|
| YEAR | SEMESTER | COURSE CODE | PAPERTITLE | THEORY/ PRACTICAL | CREDIT |
| Second Year | IV | IT-4001T | Computer Network | CORE | 4 |
| | | IT-4002T | .NET PROGRAMMING with C# | CORE | 4 |
| | | IT-4003T | Design& Analysis of Algorithm | CORE | 2 |
| | | IT-4004T | Operation Research | MINOR | 3 |
| | | IT-4005P | (dot).Net Programming Lab | CORE PRACTICAL | 2 |
| | | IT-4006R | Minor Project | RESEACH PROJECT | 3 |
| | | RF000401 | Course in Local Language | COCURRICULUR | 2 |

# SEMESTERWISE TITLES OF THE PAPER IN UG IT COURSE

| YEAR | SEMESTER | COURSE CODE | PAPERTITLE | THEORY/ PRACTICAL | CREDIT |
|---|---|---|---|---|---|
| Third Year | V | IT-5001T | Computer Aided Engineering Graphics | CORE | 4 |
| | | IT-5002T | Cyber Security | CORE | 4 |
| | | IT-5003T | Introduction to Machine Learning using Python | CORE | 2 |
| | | IT-5004T | Fundamentals of Internet of Things (IOT) | CORE | 2 |
| | | IT-5005T | Introduction to Artificial Intelligence | CORE | 4 |
| | | IT-5006P | Computer Graphics Lab | PRACTICAL | 4 |
| YEAR | SEMESTER | COURSE CODE | PAPERTITLE | THEORY/ PRACTICAL | CREDIT |
| Third Year | VI | IT-6001IN | Internship | RESEARCH | 10 |
| | | IT-6002MP | Major Project | RESEARCH | 10 |

# PROPOSED STRUCTURE OF B.Sc. (Voc.) Information Technology
## SYLLABUS AS PER NEP-2020 GUIDELINES GENERAL OVERVIEW

| PROGRAMME | YEAR | SEMESTER (15Weeks) | PAPER | CREDIT | PERIODS (Per Week) | PERIODS (HOURS) Per Semester | PAPER TITLE |
|---|---|---|---|---|---|---|---|
| CERTIFICATE COURSE IN B.Sc. (Voc.) IT | FIRSTYEAR | SEMESTER–I | Paper-I | 4 | 4 | 4 X15=60 | Fundamental Of Computers & IT Ethics |
| | | | Paper-II | 4 | 4 | 4 X15=60 | C Language Programming |
| | | | Paper-III | 2 | 2 | 2 X15=30 | Web Development using HTML, CSS &JavaScript |
| | | | Paper-IV | 3 | 3 | 3 X15=45 | Commercial Mathematics with basic reasoning |
| | | | Paper-V | 3 | 3 | 3 X15=45 | Business Communication and Soft Skills |
| | | | Paper-VI (Practical) | 2 | 2 Lab Periods (4 Hours per Week) | 2x2x15=60 | MS-Office, C-Lab &Web Development Lab |
| CERTIFICATE COURSE IN B.Sc. (Voc.) IT | FIRSTYEAR | SEMESTER–II | Paper-I | 4 | 4 | 4 X15=60 | Object Oriented Programming Using C++ |
| | | | Paper-II | 4 | 4 | 4 X15=60 | Data Structure using 'C'/'C++' |
| | | | Paper-III | 2 | 2 | 2 X15=30 | Digital Electronic Circuits |
| | | | Paper-IV | 3 | 3 | 3 X15=45 | Numerical Methods |
| | | | Paper-V | 3 | 3 | 3 X15=45 | Financial Accountancy |
| | | | Paper-VI (Practical) | 2 | 2 Lab Periods (4 Hours per Week) | 2x1x15=30 | C++and Data Structure Lab |

| PROGRAMME | YEAR | SEMESTER (15Weeks) | PAPER | CREDIT | PERIODS (Per Week) | PERIODS (HOURS) Per Semester | PAPER TITLE |
|---|---|---|---|---|---|---|---|
| CERTIFICATE COURSE IN B.Sc. (Voc.) IT | SECONDYEAR | SEMESTER–III | Paper-I | 4 | 4 | 4 X15=60 | Database Management System |
| | | | Paper-II | 4 | 4 | 4 X15=60 | Operating System with Unix Operating System |
| | | | Paper-III | 2 | 2 | 2 X15=30 | Software Engineering |
| | | | Paper-IV | 3 | 3 | 3 X15=45 | Statistics |
| | | | Paper-V | 3 | 3 | 3 X15=45 | Principle of Management |
| | | | Paper-VI (Practical) | 2 | 2 Lab Periods (4 Hours per Week) | 2x2x15=60 | DBMS And OS Lab |
| CERTIFICATE COURSE IN IN B.Sc. (Voc.) IT | SECONDYEAR | SEMESTER–IV | Paper-I | 4 | 4 | 4 X15=60 | Computer Network |
| | | | Paper-II | 4 | 4 | 4 X15=60 | .NET PROGRAMMING with C# |
| | | | Paper-III | 2 | 2 | 2 X15=30 | Design & Analysis of Algorithm |
| | | | Paper-IV | 3 | 3 | 3 X15=45 | Operation Research |
| | | | Paper-V | 2 | 2 | 2 X2X15=60 | (dot). Net Programming Lab |
| | | | Paper-VI | 3 | 3 Lab Periods (6 Hours per Week) | 3X2x15=90 | Minor Project |

| PROGRAMME | YEAR | SEMESTER (15Weeks) | PAPER | CREDIT | PERIODS (Per Week) | PERIODS (HOURS) Per Semester | PAPER TITLE |
|---|---|---|---|---|---|---|---|
| CERTIFICATE COURSE IN B.Sc. (Voc.)IT | THIRDYEAR | SEMESTER–V | Paper-I | 4 | 4 | 4 X15=60 | Computer Aided Engineering Graphics |
| | | | Paper-II | 4 | 4 | 4 X15=60 | Cyber Security |
| | | | Paper-III | 2 | 4 | 2 X15=30 | Introduction to Machine Learning using python |
| | | | Paper-IV | 2 | 4 | 2 X15=30 | Fundamentals of Internet of Things (IOT) |
| | | | Paper-V | 4 | 4 | 4 X15=60 | Introduction to Artificial Intelligence |
| | | | Paper-VI (Practical) | 4 | 4 Lab Periods (8 Hours per Week) | 4x2x15=120 | Computer Graphics Lab |
| CERTIFICATE COURSE IN B.Sc. (Voc.) IT | THIRD YEAR | SEMESTER–VI | Paper-I | 10 | | 10x2 X15=300 | Internship |
| | | | Paper-II (Practical) | 10 | | 10x2 X15=300 | Major Project |

# Bachelor of Science Vocational (Information Technology)



# Detailed Syllabus

# Of

# Information Technology

# Course

| Program: Certificate<br>Class: B.Sc. (Voc.) IT | Year: First | Semester: First |
|---|---|---|
| **Subject:** Fundamentals of Computer & IT Ethics | | |
| **Course Code: IT-1001T** | **Course Title:** Fundamentals of Computer & IT Ethics | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |

**Fundamentals of Computer & IT Ethics**

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction to computers: ,Characteristics of Computers, Basic Applications of Computer. Generation of Computers, Software and hardware, Types of Computers. computer Memory: primary and secondary memory, Working of CPU, Making computers faster and better now and in the future.  Storage systems, Its characteristics, types of storage systems, Number System (Binary, Decimal, Octal, Hexadecimal number system), Binary Arithmetic, BCD Code, ASCII Code, EBCDIC Code, Gray Code. | 15 |
| II | Programming Concept: Flow charts and algorithms. Data communications concepts, transmission media; network concepts such as network types, network topologies and TCP/IP; Hardware essentials for a computer network; Computer network applications, typical applications within an organisation, e.g. financial, inventory and personnel management. | 15 |
| III | Operating Systems, Windows, DOS etc. Application software, role and functions of commonly available applications such as Word Processing: MS Word, Opening Documents in word, ruler, toolbar, Interface, Shortcuts, Formatting Documents, etc.  spreadsheets, SPSS, data managers, presentation and publication software etc.<br>Internet, Multimedia, WWW, FTP, E-mail, Web pages. Corporate Networks. Concept of Network security and management. | 15 |
| IV | Introduction of Information Technology, Applications of IT, IT in business: Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), IT in education: E-learning platforms IT in healthcare: Electronic Health Records (EHR), Emerging technologies: Cloud computing, Artificial Intelligence | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: First |
|---|---|---|
| Subject:   C- Programming Language | | |
| Course Code: IT-1002T | Course Title: C Programming Language | |
| Credit: 4 | Core Compulsory / Elective | |
| Max. Marks : 25 + 75 | Min. Passing Marks: 33 (With 25 mandatories in External Examination) | |
| Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0 | | |
| C- Programming Language | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise, operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments, Conditional Branching: Applying if and switch statements, nesting if and else, use of break and default with switch. | 15 |
| II | Functions allow you to break down complex programs into smaller, manageable parts. In this module, you'll learn how to: Declare and define functions , Pass arguments to functions, Return values from functions, Understand function prototypes, Organize your code using modules. | 15 |
| III | Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures, Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, usage of self referential structures in linked list (no implementation) Enumeration data type. | 15 |
| IV | Open, read, write, and close files, Handle file pointers, Work with text and binary files, Implement file input/output operations. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: First |
|---|---|---|
| **Subject: Web Development using HTML, CSS & JavaScript** | | |
| **Course Code: IT-1003T** | **Course Title: Web Development using HTML, CSS & JavaScript** | |
| **Credit: 2** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 2 – 0 - 0** | | |
| **Web Development using HTML, CSS & JavaScript** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Basics in Web Design: Brief History of Internet, What is World Wide Web, URL, Domain What is Web Page and a Website, Internet Browser. Introduction to web programming, Introduction to HTML, HTML Basic Formatting Tags, HTML-Grouping Using Div Span,HTML Lists, HTML Images, HTML Hyperlink, HTML Tables, HTML iFrame, HTML Form, HTML Headers, HTML Miscellaneous: Meta tags and depreciated tags of HTML along with XHTML and attributes. | 15 |
| II | Concepts like CSS Syntax, CSS Properties, CSS Versions, and its history, CSS Styling (Background, Text Format, Controlling Fonts), CSS Id and Class, Creating page Layout and Site Designs. What is JavaScript, Java "vs" JavaScript, Variables, Datatypes, Functions, Loops, Decision Making, Form Validation, Control Structure, Events Handling, Using Browser Objects. Object Oriented in JavaScript. Introduction to AJAX: AJAX, RIA & WEB 2.0. The XML HTTP Request Object. Using AJAX in Web Applications. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: First |
|---|---|---|
| **Subject:  Commercial Mathematics with basic reasoning** | | |
| **Course Code: IT-1004T** | **Course Title: Commercial Mathematics with basic reasoning** | |
| **Credit: 3** | **MINOR Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0** | | |
| **Commercial Mathematics with basic reasoning** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| **I** | **Quantitative Ability:** Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds & Indices, Percentages, Problems on Numbers | **15** |
| **II** | **Business Mathematics:** Ration, Proportion, percentage, Profit and Loss, Simple Interest, Compound Interest, Discount, Linear Inequalities, Time Value of Money, Sets, Functions and Relations. | **15** |
| **III** | Number Series, Coding and Decoding and Odd Man Out Direction Tests, Seating Arrangements, Blood Relations, Probability, Calendars, Clocks | **15** |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: First |
|---|---|---|
| **Subject: Business Communication and Soft Skills** | | |
| **Course Code: IT-1005T** | **Course Title: Business Communication and Soft Skills** | |
| **Credit: 3** | **Skill Enhancement Course** | |
| **Max. Marks : 100** | **Min. Passing Marks: 40** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0** | | |
| **Business Communication and Soft Skills** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Details in business communication – Introduction, Meaning of communication, Role of communication in Business, Basic elements of the communication process, level of communication, forms, models and media of communication, verbal and non-verbal communication – functions and types. Barriers of effective communication, 7C's of Communication. | 15 |
| II | Writing skill: precise, technical/business letter, organisation of writing material, poster presentation, writing technical document, preparing software user manual, necessary part required to prepare a project documentation, Expression: Practical communication skill development, business presentation with multimedia, speaking skill, prepared speech, extempore speech | 15 |
| III | Information Technology for Communication: Word Processor – Telex – Facsimile (Fax) – E-mail – Voice mail –Internet – Multimedia – Teleconferencing – Mobile Phone Conversation – Video Conferencing – SMS – Telephone Answering Machine – Advantages and limitations of these types. Business Letters & Reports: Need and functions of business letters – Planning & layout of business letter – Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: Second |
|---|---|---|
| **Subject: Object Oriented Programming Using C++** | | |
| **Course Code: IT-2001T** | **Course Title: Object Oriented Programming Using C++** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Object Oriented Programming Using C++** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | **Principles of Objective Oriented Programming:** Introduction to object-oriented programming, user defined types, Tokens, Keywords, Identifiers and Constants, Data Types, Type Compatibility, Variables, Operators in C++, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers. | 15 |
| II | **Functions in C++, Classes & Objects:** The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Function Overloading, Friend and Virtual Functions. Specifying a class, Member Functions, Arrays within a class, Static Member Functions, Arrays of Objects, Friendly Functions. Constructors, Parameterized Constructors, Copy Constructors, Dynamic Constructors, Destructors, Defining Operator Overloading, Overloading Operators, Rules for Overloading Operators, Type Conversions | 15 |
| III | **Pointers, Virtual Functions & Polymorphism,** Pointers, Declaration , Pointers to Objects, this pointer, Pointer to Derived Classes, Virtual Functions, Pointer operator, Address operator, Pointer arithmetic, Pointer to derived class, Introduction of Polymorphism, Types of polymorphism , Compile time Polymorphism: Function overloading, Revision of constructor overloading, Operator overloading: Rules for operator overloading, Overloading of unary and binary operators, Run time polymorphism: Virtual function, Rules for virtual function, Pure virtual function. | 15 |
| IV | **Working with Files, Exception handling :** Opening and Closing a File, File Modes, File Pointers, Input Output Operations, Updating a File, Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: Second |
|---|---|---|
| **Subject: Data Structure Using 'C'/'C++'** | | |
| **Course Code: IT-2002T** | **Course Title: Data Structure using 'C'/'C++'** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Data Structure Using 'C'/'C++'** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | **Fundamentals:** Introduction to Data Structures, Definition and importance of data structures. Classification of data structures (linear vs. non-linear, static vs. dynamic). Abstract Data Types (ADTs).C/C++ Programming Review: Basic syntax, control structures, and functions, Pointers and dynamic memory allocation. Structures and classes (for C++), Algorithm, Analysis: Time and space complexity, Big O notation, Best, average, and worst-case analysis. | 15 |
| II | **Linear Data Structures:** Arrays, Basic array operations (insertion, deletion, traversal), Multi-dimensional arrays, Dynamic arrays (using dynamic memory allocation), Stack operations (push, pop, peek), Applications of stacks (function calls, expression evaluation), Queues: Queue implementation using arrays and linked lists. Queue operations (enqueue, dequeue). Types of queues (circular queue, priority queue). Applications of queues (scheduling, buffering). Linked Lists: Singly linked lists, doubly linked lists, circular linked lists, Linked list operations (insertion, deletion, traversal, searching), Applications of linked lists, Stack implementation using arrays and linked lists, | 15 |
| III | **Non-Linear Data Structures:** Trees**,** Tree terminology (root, node, leaf, etc.), Binary trees, binary search trees (BST), Tree traversals (inorder, preorder, postorder), BST operations (insertion, deletion, searching), Balanced trees (AVL trees, red-black trees). Graph terminology (vertices, edges, directed vs. undirected). Graph representations (adjacency matrix, adjacency list). Graph traversals (breadth-first search (BFS), depth-first search (DFS)), Applications of graphs (network analysis, shortest path algorithms). | 15 |
| IV | **Sorting and Searching:** Bubble sort, insertion sort, selection sort, Merge sort, quicksort, Heap sort, Linear search, Binary search. Advanced Topics: Hash functions, Collision resolution techniques, Hash table implementation, Basic concepts of dynamic programming, Memorization and tabulation techniques. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: Second |
|---|---|---|
| **Subject: Digital Electronic Circuits** | | |
| **Course Code: IT-2003T** | **Course Title: Digital Electronic Circuits** | |
| **Credit: 2** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 2 – 0 - 0** | | |
| **Digital Electronic Circuits** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction to number systems, Binary to decimal conversion, Decimal to binary conversion, Octal numbers, Hexadecimal numbers, Excess-3 code,gray code. Logic gates, NOT, OR, AND, Universal NAND and NOR gates, EX-OR and EX-NOR gates, DeMorgan's Theorems, Universal building blocks (NOT, OR, AND) Binary addition and subtraction, 1's complement, 2's complement, Adders (half & full), Subtractor (half & full), Hamming Code,Parity Checkers. Boolean algebra, Sum of products method, Product of methods, Truth table of Karnaugh map, Pairs, Quads and Octet, Karnaugh map simplification, Digital Logic families and their parameters. Multiplexer and demultiplexers, 4X1 Multiplexer, 8X1 Multiplexer, 16X1 Multiplexer, 1X4 Demultiplexer, 1X8 De-multiplexer, Decoder, BCD-to-decimal decoder, Encoder. | 15 |
| II | Flip-flops, Types of flip-flop, RS (NAND and NOR) flip-flop, Edge triggered D flip-flop, Edge triggered T flip-flop, Edge triggered JK flip-flop, Master-Slave flip-flop, Triggering, propagation delay time, setup time, hold time. Memories, ROM, RAM, EPROM, EEPROM, Volatile and non-volatile – Static and dynamic RAM. Registers, Introduction- Modes of operation of register (SISO, SIPO, PISO and PIPO). Counters, Asynchronous counter, Synchronous counter, Ripple counters, MOD-7 ripple counter, Decade counter, 4 bit down counter, Up/down counter. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: Second |
|---|---|---|
| **Subject: Numerical Methods** | | |
| **Course Code: IT-2004T** | **Course Title: Numerical Methods** | |
| **Credit: 3** | **MINOR ELECTIVE** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0** | | |
| **Numerical Methods** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Errors and Nonlinear Equations: Error Analysis, Definition and sources of errors, propagation of errors, floating-point arithmetic, Solution of Nonlinear equations: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson method and its variants, General Iterative method. | 15 |
| II | System of Linear Equations: Gauss-Elimination, Gauss-Jordan, LU-Decomposition, Gauss-Jacobi and Gauss- Siedel methods to solve linear system of equations and Power method to find least and largest eigen values. | 15 |
| III | Interpolation & Differentiation and Integration: Differentiation using interpolation formulas, Integration using Newton-Cotes formulas: Trapezoidal rule, Simpson's rule, <br><br> Solution of Ordinary Differential Equations: Euler's method, modified Euler's method, Runge - Kutta Methods of second and fourth order to solve initial value problems. | 15 |

| Program: Certificate Class: B.Sc. (Voc.) IT | Year: First | Semester: Second |
|---|---|---|
| **Subject: Financial Accountancy** | | |
| **Course Code: IT-2005T** | **Course Title: Financial Accountancy** | |
| **Credit: 3** | **Skill Enhancement Course** | |
| **Max. Marks : 100** | **Min. Passing Marks: 40** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0** | | |
| **Financial Accountancy** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Meaning and Scope of Accounting, Need for Accounting , Development of Accounting Nature and objectives, Book keeping and Accounting, Accounting Principles, Accounting Concepts and Conventions, Accounting Standards, International Accounting Standards. | 15 |
| II | **:** Books of Accounts: Double Entry System of Book keeping, Journal, Ledger posting, Trial Balance, Final Accounts, Preparation of Trading Account, Profit and Loss Account, Balance Sheet, Adjustments, closing stock, depreciation, bad debts and provision for bad debts, outstanding and prepaid expenses, advance and accrued income. | 15 |
| III | Income and Expenditure Account & Receipts and Payments Account: Nature, Preparation of Receipt and Payment Account and Income and Expenditure Account. Branch and Departmental Accounts: Meaning of Branches and Departments, Accounts of various types of branches, Departmental Accounts. Statement of Affairs Method and Conversion Method, preparation of final accounts. | 15 |

| Program: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Third |
|---|---|---|
| **Subject: Database Management System** | | |
| **Course Code: IT-3001T** | **Course Title: Database Management System** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Database Management System** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Data base System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Instances and Schemas, data Models, the ER Model, Relational Model, Other Models<br>Database Languages, DDL, DML, database Access for applications Programs, data base Users and Administrator, Transaction Management, data base Architecture, Storage Manager, the Query Processor, Data base design and ER diagrams, ER Model, Entities, Attributes and Entity sets, Relationships and Relationship sets, ER Design Issues, Concept Design, Conceptual Design for University Enterprise. Introduction to the Relational Model, Structure, Database Schema, Keys, Schema Diagrams. | 15 |
| II | Relational Query Languages, Relational Operations, Relational Algebra, Selection and projection set operations: Renaming, Joins, Division, Examples of Algebra overviews: Relational calculus, Tuple relational Calculus, Domain relational calculus. Overview of the SQL Query Language, Basic Structure of SQL Queries, Set Operations, Aggregate, Functions GROUPBY, HAVING, Nested Sub queries, Views, Triggers. | 15 |
| III | Normalization: Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms, dependency preservation, Boyee / Codd normal form.<br>Higher Normal Forms, Introduction, Multi-valued dependencies and fourth normal form, Join dependencies and Fifth normal form. | 15 |
| IV | Transaction Concept, Transaction State, Implementation of Atomicity and Durability Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Lock, Based Protocols, Timestamp Based Protocols, Validation, Based Protocols File organization: File organization, various kinds of indexes. Query Processing, Measures of query cost, Selection operation, Projection operation, Join operation, set operation and aggregate operation, Relational Query Optimization, Transacting SQL queries, Estimating the cost Equivalence Rules. | 15 |

| Programme: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Third |
|---|---|---|
| **Subject: Operating System with Unix Operating System** | | |
| **Course Code: IT-3002T** | **Course Title: Operating System with Unix Operating System** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Operating System with Unix Operating System** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction: Concept of Operating Systems, Generations of Operating systems, Types of  pirating Systems, OS Services, System Calls, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System. | 15 |
| II | Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF. | 15 |
| III | Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery. Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, Fixed and variable partition, Internal and External fragmentation and Compaction; Paging: Principle of operation, Page allocation, Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory, Hardware and control structures, Locality of reference, Page fault, Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU). | 15 |
| IV | Unix/Linux Operating System: Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration. Case study: Linux, Windows Operating System. | 15 |

| Program: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Third |
|---|---|---|
| Subject: Software Engineering | | |
| Course Code: IT-3003T | Course Title: Software Engineering | |
| Credit: 2 | Core Compulsory / Elective | |
| Max. Marks : 25 + 75 | Min. Passing Marks: 33 (With 25 mandatories in External Examination) | |
| Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 2 – 0 - 0 | | |
| Software Engineering | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction to Software Engineering: Characteristics and components of Software, Software Crisis and Software Myths, Software Engineering Principles, Software Process Models: Waterfall Model, Prototyping Incremental Model, Spiral Model. <br> Software Requirements and Specification: Requirement Engineering Process, Requirement Elicitation Techniques (interview, questionnaire, etc.), Types of Requirements: Functional, Non-functional, Requirement Analysis and Modelling, Software Requirement Specification (SRS), Use Case Modelling, Context Diagrams, DFDs | 15 |
| II | Software Design: Design Principles and Concepts, Architectural Design, Component-Level Design, User Interface Design, Design Notations (UML Diagrams: Class, Sequence, Activity), Design Patterns (Introductory level). <br> Software Testing and Maintenance: Software Testing Fundamentals, Types of Testing: Unit Testing, Integration Testing, System Testing, Acceptance Testing, White-box and Black-box Testing Techniques, Test Case Design, Debugging Techniques, Software Maintenance and Types, Reengineering and Reverse Engineering. <br> Software Project Management and Advanced Topics: Project Planning and Scheduling, Cost Estimation Techniques (COCOMO, FP Analysis), Risk Management, Software Configuration Management, Software Quality Assurance (SQA), Software Metrics, DevOps Introduction and Continuous Integration/Delivery (CI/CD) | 15 |

| Program: Diploma<br>Class: B.Sc. (Voc.) IT | Year: Second | Semester: Third |
|---|---|---|
| Subject: Statistics | | |
| Course Code: IT-3004T | Course Title: Statistics | |
| Credit: 3 | MINOR ELECTIVE | |
| Max. Marks : 25 + 75 | Min. Passing Marks: 33 (With 25 mandatories in External Examination) | |
| Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0 | | |
| Statistics | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes. | 15 |
| II | Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, skewness and kurtosis, Sheppard's corrections.<br>Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves. | 15 |
| III | Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth- Marshall and Fisher's Ideal Index numbers. Errors in Index numbers. Chain index numbers, conversion of fixed based to chain based index numbers and vice-versa. Consumer price index numbers. Uses and limitations of index numbers. | 15 |

| Program: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Third |
|---|---|---|
| **Subject: Principle of Management** | | |
| **Course Code: IT-3005T** | **Course Title: Principle of Management** | |
| **Credit: 3** | **Skill Enhancement Course** | |
| **Max. Marks : 100** | **Min. Passing Marks: 40** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0** | | |
| **Principle of Management** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | **INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS:** Definition of Management, Science or Art, Manager Vs Entrepreneur, types of managers -managerial roles and skills, Evolution of Management, Scientific, human relations, system and contingency approaches, Types of Business organization, Sole proprietorship, partnership, company-public and private sector enterprises, Organization culture and Environment, Current trends and issues in Management. | 15 |
| II | **PLANNING:** Nature and purpose of planning, planning process, types of planning, objectives, setting objectives, policies, Planning premises, Strategic Management, Planning Tools and Techniques, Decision making steps and process. | 15 |
| III | **ORGANISING:** Nature and purpose, Formal and informal organization, organization chart, organization structure, types, Line and staff authority, departmentalization, delegation of authority, centralization and decentralization, Job Design, Human Resource Management, HR Planning, Recruitment, selection, Training and Development, Performance Management, Career planning and management. <br><br> **DIRECTING& CONTROLLING:** Foundations of individual and group behaviour, motivation, motivation theories, motivational techniques, job satisfaction, job enrichment, leadership, types and theories of leadership- communication, process of communication, barrier in communication, effective communication –communication and IT. <br> CONTROLLING: System and process of controlling, budgetary and non-budgetary control techniques, use of computers and IT in Management control, Productivity problems and management, control and performance, direct and preventive control, reporting. | 15 |

| Program: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Fourth |
|---|---|---|
| **Subject: Computer Network** | | |
| **Course Code: IT-4001T** | **Course Title: Computer Network** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Computer Network** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Computer Networks: Introduction to computer network, data communication, components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet. Reference Models - OSI and TCP/IP Model. | 15 |
| II | Network Models: Client/ server network and Peer-to-peer network, OSI, TCP/IP, layers and functionalities. | 15 |
| III | Transmission Media: Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation, Satellite. | 15 |
| IV | LAN Topologies: Ring, bus, star, mesh and tree topologies. Network Devices: NIC, repeaters, hub, bridge, switch, gateway and router. Multiple Access Protocols: ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet, Cryptography. | 15 |

| Programme: Certificate Class: B.Sc. (Voc.) IT | Year: Second | Semester: Fourth |
|---|---|---|
| Subject: .NET PROGRAMMING with C# | | |
| Course Code: IT-4002T | Course Title: .NET PROGRAMMING with C# | |
| Credit: 4 | Core Compulsory / Elective | |
| Max. Marks : 25 + 75 | Min. Passing Marks: 33 (With 25 mandatories in External Examination) | |
| Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0 | | |
| .NET PROGRAMMING with C# | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction to Three-Tier Architecture, overview of .NET Framework, Common Language Runtime(CLR), The .NET Framework Class Library, familiarization with visual studio .NET IDE, Design Window, Code Window, Server, Explorer, Toolbox, Docking Windows, Properties Explorer, Solution Explorer, Object Browser, Dynamic Help, Task List Explorer, Features of VS.NET, XML Editor, creating a Project, Add Reference, Build the Project, Debugging a Project | 151 |
| II | Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, Delegates and Events, indexes Attributes, versioning. | 15 |
| III | Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling. | 15 |
| IV | Web Services, Windows services, messaging, Reflection, COM and C#, localization. Distributed Application in C#, XML and C#, Unsafe Mode, Graphical Device Interface with C#. | 15 |

| Program: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Fourth |
|---|---|---|
| **Subject: Design & Analysis of Algorithm** | | |
| **Course Code: IT-4003T** | **Course Title: Design & Analysis of Algorithm** | |
| **Credit: 2** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 2 – 0 - 0** | | |
| **Design & Analysis of Algorithm** | | |
| **Unit** | **Topics** | **No of Lectures** |
| I | Basic Concepts of Algorithms: Definition of algorithm, Characteristic of algorithm, Complexity Analysis techniques, Asymptotic Notations (Growth of Functions). Master theorem, Substitution Method, Iteration Method.<br>Sorting: Insertion Sort, Selection Sort, Bubble Sort, Binary Search, Maximum & Minimum, Merge Sort, Quick Sort, Heap Sort. Greedy method: General method, Knapsack Problem, Huffman Codes. | 15 |
| II | Dynamic Programming: Matrix, Chain Multiplications, Longest Common Subsequence Backtracking: General method, N Queens Problem, Sum of subsets.<br>Analysis of Graph Algorithms: Elementary Graph Algorithms, Multistage Graphs, Basic Traversals and search techniques, techniques of graphs: BFS, DFS. Minimum Spanning Trees: Kruskal's & Prim's Algorithm, Single Source Shortest Path, Dijkstra's & Bellman Ford, All Pairs Shortest Path: Warshal Algorithm. | 15 |

| Program: Diploma Class: B.Sc. (Voc.) IT | Year: Second | Semester: Fourth |
|---|---|---|
| **Subject: Operation Research** | | |
| **Course Code: IT-4004T** | **Course Title: Operation Research** | |
| **Credit: 3** | **MINOR ELECTIVE** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 3 – 0 - 0** | | |
| **Operation Research** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Operations Research & Decision Making Environments Operations Research Uses, Scope and Applications of Operations Research in managerial decision making. Decision-making environments: Decision-making under certainty, uncertainty and risk situations, Decision tree approach and its applications. Linear Programming Problem: Mathematical formulations of LP Models for product-mix problems, graphical and simplex method of solving LP problems, duality. | **15** |
| II | Transportation problem: Various methods of finding Initial basic feasible solution North West Corner Method, Least Cost Method & VAM Method and optimal solution Stepping Stone & MODI Method<br><br>Assignment model & Game Theory Assignment model: Hungarian Algorithm and its applications, Maximization Assignment Problem. | **15** |
| III | Game Theory: Concept of game, Two-person zero-sum game, Pure and Mixed Strategy Games, Saddle Point, Odds Method; Dominance Method and Graphical Method for solving Mixed Strategy Game.<br><br>Sequencing Problem: Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, Two jobs and m - Machines Problems. | **15** |

| Program: Degree<br>Class: B.Sc. (Voc.) IT | Year: Third | Semester: Fifth |
|---|---|---|
| **Subject: Computer Aided Engineering Graphics** | | |
| **Course Code: IT-5001T** | **Course Title: Computer Aided Engineering Graphics** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Computer Aided Engineering Graphics** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | **Introduction:** Interactive Graphics , Advantages of Interactive Graphics, Uses of Computer Graphics, Conceptual Framework for Interactive Graphics: Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses**.** | **15** |
| II | Geometrical Transformation: Introduction, types of transformation, 2D Transformation: Homogeneous Coordinates and Matrix Representation of 2D Transformations, composition of 2D Transformations, the Window to Viewport Transformations, Introduction to 3D Transformations Matrix. | **15** |
| III | Hardcopy Technologies, Display Technologies, Raster Scan Display System, Video Controller, Random, Scan Display processor, Image Scanners, Line Clipping: Clipping Southland, Cohen Algorithm, Cyrus Beck Algorithm, Midpoint Subdivision Algorithm. | **15** |
| IV | **Introduction:** Photoshop Interface, Raster graphics & vector graphics, Image formats, Operations on image. Manipulation of Image: The marquee tool, the lasso tool, magic Wand tool, Inverting Selection, Layers, Brush tool, Eraser tool, Fill tool, Blur tool, Smudge tool, Sharpen tool, Dodge tool, Sponge tool, Darken tool. Transformation & Retouching: Free transform, Scaling, rotation, Skew, perspective, Wrap, Distort, Crop, Image size, Canvas size, Clone stamp tool, Healing brush tool, patch tool, red eye tool, history brush tool. Colour Correction: Colour swatch, image modes, color adjustments, color selection. Text: The text tool, editing text, formatting, line & spacing, wrap text, text effects. Effects: Blending modes, styles, filters, liquefy, Vanishing point. Drawing: The pen tool, Drawing shapes, managing paths, converting path to selection. | **15** |

| Program: Degree<br>Class: B.Sc. (Voc.) IT | Year: Third | Semester: Fifth |
|---|---|---|
| **Subject: Cyber Security** | | |
| **Course Code: IT-5002T** | **Course Title: Cyber Security** | |
| **Credit: 4** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 4 – 0 - 0** | | |
| **Cyber Security** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security. Cyber Security Safeguards-Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management. | 15 |
| II | Securing Web Application, Services and Servers: Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges. Intrusion Detection and Prevention Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection.<br><br>Cryptography and Network Security: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec. | 15 |
| III | **Cyberspace and the Law:** Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. | 15 |
| IV | **Social Media Overview and Security:** Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies. | 15 |

| Program: Degree Class: B.Sc. (Voc.) IT | Year: Third | Semester: Fifth |
|---|---|---|
| **Subject: Introduction to Machine Learning using Python** | | |
| **Course Code: IT-5003T** | **Course Title: Introduction to Machine Learning using Python** | |
| **Credit: 2** | **Core Compulsory / Elective** | |
| **Max. Marks : 25 + 75** | **Min. Passing Marks: 33 (With 25 mandatories in External Examination)** | |
| **Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 2 – 0 - 0** | | |
| **Introduction to Machine Learning using Python** | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Introduction to Python, Evolution of Python Language, Version History, Installation and setup, PVM, How to develop and run Python programs?Python Basics, Comments, Data or Constants, Variables, Data Types, Memory Management, print Method, keywords, import, Type Conversion, Taking input from user, Operators, Control Statements in Python, Decision Control Statements, if statement, if else statement, if elif else, nested if, match statement, Iterative control, while loop, break, continue, pass, for loop, else with loop, Nested loop, Functions and Recursion. | 15 |
| | Introduction to Machine Learning, varieties of machine learning, learning input/output functions, bia, sample application. Boolean functions and their classes, CNF, DNF, decision lists. Version spaces for learning, version graphs, learning search of a version space, candidate elimination methods | |
| | Neural Network: Neural Networks, threshold logic units, linear machines, networks of threshold learning units, Training of feed forward networks by back propagations, neural networks vs. knowledge-based systems | |
| II | Statistical Learning, Statistical Learning, background and general method, learning belief networks. Decision-trees, supervised learning of uni-variance decision trees, network equivalent of decision trees, over fitting and evaluation. Logic Programming, Inductive Logic Programming, notation and definitions, introducing recursive programs, inductive logic programming vs decision tree induction. | 15 |

| Program: Degree<br>Class: B.Sc. (Voc.) IT | Year: Third | Semester: Fifth |
|---|---|---|
| Subject: Fundamentals of Internet of Things (IOT) | | |
| Course Code: IT-5004T | Course Title: Fundamentals of Internet of Things (IOT) | |
| Credit: 2 | Core Compulsory / Elective | |
| Max. Marks : 25 + 75 | Min. Passing Marks: 33 (With 25 mandatories in External Examination) | |
| Total No. of Lectures- Tutorials – Practical (in hours per week) : L – T – P : 2 – 0 - 0 | | |
| Fundamentals of Internet of Things (IOT) | | |

| Unit | Topics | No of Lectures |
|---|---|---|
| I | Fundamentals of IoT- Overview of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.<br><br>IoT PROTOCOLS- IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Application Transport Methods: SCADA. | 15 |
| II | DESIGN AND DEVELOPMENT- Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details.<br>Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M, Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models. | 15 |