

KaziNazrul University



Curriculum for

B.Sc. (Program) with Computer Science

[Six Semesters Choice Based Credit System]

(With effect from 2016-2017 academic session)

Semester-I

Course Title: Computer Fundamentals and Programming in C

CONTACTS: 4L

CREDIT: 4

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Computer Fundamental:

Hardware: CPU, Primary and Secondary storage, I/O devices, Bus structure

Software: Systems and Application.

Generation of Computers: Super, Mainframe, Mini and Personal Computer.

Introduction to Programming Languages: Machine Language, Assembly Language, High Level Language.

Number representation: Weighted Codes, Non-weighted codes, Positional, Binary, Octal, Hexadecimal, Binary Coded Decimal (BCD), Conversion of bases. Complement notions. Binary Arithmetic, Binary Codes: Gray, Alphanumeric, ASCII, EBCDIC;

Fundamentals of Boolean algebra, Switches and Inverters, Functionally Complete Gates (AND, OR, NOT), NAND, NOR, Switching function and Boolean Function. De Morgan's Theorem.

Programming in C:

Introduction: Basic Structure, Character sets, Keywords, Identifiers, Constants, Variables, Data Types, Program Structure.

Operators: Arithmetic, Relational, Logical and Assignment; Increment, Decrement and Conditional, Operator Precedence and Associations; Expressions. Expression evaluation and type conversion. Formatted input and output.

Statements: Assignment, Initialization, String handling with arrays, String handling functions, Functions – Arguments passing, Return values and their types, recursion. Enumerated data types. Structures. Arrays of structures. Arrays within structures.

Pointers: Declaration and initialization, Accessing variables through pointer arithmetic, Pointers and arrays, String, Pointer to Structures, Dynamic Storage Allocation.

Text Book:

1. Digital Logic and Computer Design by M.Morris Mano, PHI
2. Modern Digital Electronics : R.P. Jain
3. Programming in C-B.S. Gottfried (Sahaum Series)
4. Programming in ANSI C- E. Balaguruswami (TMH)

Course Title: Programming in C Lab

CONTACTS: 4P

CREDIT: 2

Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)

Programming should be developed using C Language to implement the problems related to theoretical Paper.

Semester-II

Course Title: Data Structure

CONTACTS: 4L

CREDIT: 4

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Concepts of data types, Elementary Structure, Words and their interpretation; Arrays: Types, Memory representation, Address translation, Functions of single and multi dimensional arrays with examples; Linked Structures: Singly linked list; List Manipulation with Pointers: Examples involving insertion and deletion of elements; Stack and Queues: Definition, Representation, Uses and applications-Recursion, Applications of queues;

Trees: Definition, Quantitative Properties, Binary Tree, Tree traversals, Internal and external path lengths: Properties, Minimum and maximum path length of a binary tree, Importance.

Searching: Linear and binary search

Searching: Linear and binary search; Sorting: Terminology, Performance evaluation, Different sorting techniques (Bubble, Insertion, Selection, Heap)

Text Book:

1. Data Structure using C- A.M. Tanenbaum (PHI)
2. Data Structure by Liptsuitz, S. Outline Series
3. Data Structure by Ellis Horowitz, SartazSahani, Galgotia

Course Title: Data Structure Lab

CONTACTS: 4P

CREDIT: 2

Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)

Programming should be developed using C Language to implement different data structure problems.

Semester-III

Course Title: Operating System

CONTACTS: 5L+1T

CREDIT: 6

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Operating system as an extended machine and a resource manager, operating system concepts-process, files, shell, Operating system structure: monolithic system, layered systems, virtual machines, client server model. Idea of multiprogramming, multiprocessing, batch processing and time sharing. Realtime systems. Concurrent processes: Critical section problem, Semaphores & Synchronization. CPU scheduling: Scheduling concepts and algorithms. Memory management: Static & dynamic partitioning, Dynamic relocation, Paging & demand paging memory management, Virtual memory, Replacement algorithm, Segmented memory management, Thrashing. Device management: Scheduling concept and algorithm, spooling. Deadlock detection, prevention and avoidance. File management: File concept, access methods, allocation methods, Directory concept.

Text Book:

1. Modern Operating Systems- A.S. Tanenbaum (PHI)
2. Operating System Concepts, A. Silberschatz, Peter B. Galvin, G. Gagne, 6th Edition, John Wiley Sons, Inc.

Course Title: Unix & Shell Programming Lab

Course Code: SEC-1

CONTACTS: 4P

CREDIT: 2

Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)

Overview of the UNIX Operating System General Purpose Utilities. Types of Shell (Bourne Shell, Cshell, Korn Shell), File system & Handling ordinary Files. Essential UNIX commands & vi editor. Shell programming writing.

Text Book:

1. UNIX Shell Programmig, Yashavant Kanetkar. BPB Publication.
2. Sumitabha, Das, Unix Concepts and Applications, Tata McGraw-Hill Education.

Semester-IV

Course Title: Database Management System

CONTACTS: 4L

CREDIT: 4

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Introduction: Basic Concept, Drawbacks of File Management; Advantages of DBMS; Layered Architecture of Database, Data Independence; Data Models; Schemas and Instances; Database Languages; Database Users, DBA; Data Dictionary; Functional Components of a DBMS.

ER Model: Entity, Attributes and Relationship; Structural Constraints; Keys (candidate, super, foreign, primary); Weak & strong Entity Set; ER Diagram; Specialization and Generalization; Constraints of Specialization and Generalization; Aggregation.

Relational Model: Basic Concepts of Relational Model; Relational Algebra.

SQL: DDL, DCL, DML commands, aggregate functions, create a database table, create relationships between database tables, modify and manage tables, queries.

Integrity Constraints: Domain Constraints, Referential Integrity.

Relational Database Design: Problems of Un-Normalized Database; Functional Dependencies, Derivation Rules, Closure of FD Set, Membership of a Dependency, Canonical Cover; Decomposition to 1NF, 2NF, 3NF or BCNF Using FDs; Lossless Join Decomposition & Dependency Preservation.

Text Book:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
3. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

Course Title: DBMS Lab

CONTACTS: 4P

CREDIT: 2

Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)

Related to Core course DBMS using SQL.

Text Book:

1. Ivan Bayross: SQL, PL/SQL The Programming Language Of Oracle, third edition.

Course Title: Web Technology Lab
Course Code: SEC-2

CONTACTS: 4P

CREDIT: 2

Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)

Introduction to Web Design: Introduction to hypertext markup language (html), document type definition, creating web pages, graphical elements, lists, hyperlinks, tables, web forms, inserting images, frames, animation.

Customized Features: Cascading style sheets (css) for text formatting and other manipulations.

JavaScript: Data types, operators, functions, control structures, events and event handling.

Text Book:

1. J. Jaworski, Mastering Javascript, BPB Publications, 1999.
2. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
3. T. A. Powell, Complete Reference HTML (Third Edition),TMH, 2002.

Semester-V

Skill enhancement Course (Any One)

Course Title: Fundamentals of Information & Communication Technology

CREDIT: 2

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: SEC-3 (i)

CONTACTS: 2L

Unit-I : Introduction to information technology : Data, Information, Software/ Hardware, Computer component, Communication device and s/w and h/w tools.

Unit-II: Fundamentals of Internet : Networking Concepts, PAN, LAN, MAN, WAN, Internet., Internet applications: Introduction to Social Networking: twitter, Linkedin, facebook, instagram, skype, google+, youtube, WhatsApp, etc. E-mail :Definition of E-mail , Email Addresses, Domain Names, Message Components, Message Composition.

Unit III: Communication model, data and signal, Shannon theorem, Signal to noise ratio, bit, baud. Modulation and Demodulation: FSK, ASK, PSK, QPSK.

Text Book:

1. Introduction to Computers (Seventh Edition) (Special Indian Edition) ,Peter Norton, TMH.
2. Foundations of Information Technology, D.S. Yadav, New Age International.
3. Data and Communication-W. Stallings, PHI.

Course Title: System Analysis & Design

CREDIT: 2

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: SEC-3 (ii)

CONTACTS: 2L

Unit I: System, System component, System Analysis, Business system concepts, System Development Life Cycle, Waterfall model (various phase).

Unit II: Planning: data gathering techniques, feasibility studies, cost benefit analysis

Design and Modeling: logical and physical design, flow charts, structured charts, DFD and ERD, form design, user interface design Modularity: module specification concepts, coupling and cohesion , System testing, Maintenance: evaluation, type of maintenance , validation, maintenance issues.

Unit III: Case study (online shopping/online admission/Library management)

Text Book:

1. Systems Analysis and Design, Kendall, Prentice Hall, 2013.
2. Systems Analysis and Design, Alan Dennis, Wiley Publishing.

Discipline Specific Electives-I(Any One)

Course Title: Objective Oriented Programming with C++

CREDIT: 4

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-I(i)

CONTACTS: 4L

Introduction: Principles of Object-Oriented-Programming (OOP), comparison of procedural programming and OOP, Advantages of OOP, Overview of OOP using C++.

Classes and Objects: Declaration of classes and objects, Objects as function arguments, Arrays of objects, returning objects from function, structures and classes, Friend function.

Constructors and Destructors: Constructors, Basic constructors, parameterized constructors, Constructors with default argument, dynamic initialization of objects, copy constructors, dynamic constructors, destructors, constraints on constructors and destructors.

Polymorphism-Function Overloading.

Operator Overloading: Overloading unary operators and binary operators using member functions and friend functions, multiple overloading, comparison operators, conversion between objects and basic types, conversion between objects of different classes, constraints on type conversion.

Derived Classes and Inheritance: Derived classes and base classes, defining a derived class, accessing base class member, derived class constructors, overriding the member function, class hierarchies, Inheritance – public, protected and private access specifiers, access combinations and usage of access specifiers, Different types of Inheritance.

Pointers: Pointers to objects, Virtual functions, Abstract classes.

Streams: Stream classes, stream class hierarchy, stream manipulators, string streams, character stream classes.

Text Book:

1. Object Oriented Programming through C++, E. Balagurusamy, TMH.
2. Object Oriented Programming in Turbo C++, Lafore Robert, Galgotia Publications.

Course Title: Programming in C++ Lab

CREDIT: 2

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-I(i) Lab

CONTACTS: 4P

Programming should be developed using C++ Language to implement the problems related to theoretical Paper.

Course Title: Computer Graphics

CREDIT: 4

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-I(ii)

CONTACTS: 4L

Computer Graphics Basics: Basic elements of Computer graphics, Cathode Ray Tube, Raster Scan, Application of Computer Graphics. Architecture of Raster and Random scan display devices, input/output devices.

Output Primitives: Points and Lines, Line Generation Algorithm (DDA Algorithm, Bresenham's Line Generation, Mid-Point Algorithm), Line Function, Circle-Generating Algorithms (Bresenham's Algorithm and Midpoint Circle Algorithm), Properties of Circles, Ellipse-Generating Algorithms, Midpoint Ellipse Algorithm, Properties of Ellipses. Filled-Area Primitives, Scan-Line Polygon Fill Algorithm Inside-Outside Tests, Scan-Line Fill of Curved Boundary, Areas Boundary-Fill Algorithm, Flood-Fill Algorithm, Fill-Area Functions.

Two-Dimensional Geometric Transformations: Basic Transformations Translation Rotation Scaling, Matrix Representations and Homogeneous Coordinates, Composite Transformations, General Pivot-Point Rotation, General Fixed-Point Scaling, General Scaling Directions, Concatenation Properties, General

Composite Transformations and Computational Efficiency ,Other Transformations – Reflection,Shear, Transformations Between Coordinate Systems.

Two-Dimensional Viewing :Viewing Coordinate Reference Frame, Window-to-viewport Coordinate Transformation, Clipping Operations, Point Clipping, Line Clipping(Cohen-Sutherland Line Clippings, Cyrus-Beck Line Clipping Algorithm), Polygon Clipping (Sutherland Hodgman Algorithm),Text Clipping,Curve Clipping, Exterior Clipping.

Text Book:

1. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
2. D.P.Mukherjee,Fundamentals of Computer Graphics and Multi Media, PHI.

Course Title: GraphicsLab using C

CREDIT: 2

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-I(ii) Lab

CONTACTS: 4P

Programming should be developed using C Language to implement the problems related to theoretical Paper.

Discipline Specific Electives-II(Any One)

Course Title: Optimization Techniques

CREDIT: 6

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-II(i)

CONTACTS: 5L+1T

Introduction to Operational Research (OR): Origin & Development, Different Phases of OR study, Methodology of OR, Scope and Limitations of OR, Applications of OR.

Linear Programming: Linearly independent / dependent vectors, Basis, Convex sets, Extreme points. Graphical method. Simplex method, Artificial variable techniques- Two Phase Method; M-Charnes Method, Special cases in LPP.

Duality: Definition of the dual problem, Primal-dual relationships, Economic Interpretation of Duality, Dual simplex Method.

Transportation and assignment problems:Transportation type problem in standard L.P.form,Special features of transportation type problem, North-West Corner method,Matrix Minima method,Vogel's Approximation method, Mathematical formulation and solution of the assignment problem.

PERT/ CPM:Introduction, Phases of project scheduling, WorkBreakdownstructure,Network (Arrow Diagram), Numbering of Events (Fulkerson's Rule), Critical Part Method, Programme Evaluation and Review Technique (PERT), Cost Analysis and Crashing the Network, Project Cost, How the Networks (PERT/CPM) help Management?, Difficulties of Using Network Methods, Applications of Network Techniques.

Text Book:

1. G. Hadley: Linear Programming. Narosa, 2002 (reprint).
2. A. Ravindran, D. T. Phillips and James J. Solberg: Operations Research-Principles and Practice, John Wiley & Sons, 2005.
3. Hamdy A. Taha: Operations Research-An Introduction, Prentice Hall, 8th Edition, 2008.
4. F.S. Hillier. G.J. Lieberman: Introduction to Operations Research- Concepts and Cases, 9th Edition, Tata McGraw Hill. 2010.
5. Gupta and Hira, Introduction to Operations research, S. Chand & Company Ltd.
6. Chakravorty and Ghosh, Linear Programming, Moulik Library.

Course Title: Computer Organization**CREDIT: 6****Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)****Course Code: DSE-II(ii)****CONTACTS: 5L+1T**

Basic computer organization: Accumulator based CPU, disadvantages, Improvements, CPU registers (IR, PC, SP, MAR, MDR, AC), IAS computer, Von Neumann computer.

Instruction: Machine instruction, Assembly language instruction, micro instruction, Instruction Cycle, Instruction Format, 0, 1, 2, 3-address instruction, instruction types, instruction set completeness, Addressing modes, Numerical problems on Instruction format.

Stack organization: Implementation of Stack using Shift register, Application of stack in Organization.

Memory: Types of Memory (RAM, ROM, DRAM, SRAM, SAM), characteristic of memory.

Associative memory: Design and application.

Virtual memory: Concept, Mapping (Direct, Associative and Direct –associative mapping), Replacement algorithm (FIFO, LRU, LFU).

Cache memory: Concept of locality of reference, cache memory organization, Hit & miss, Write back & Write through Cache, Mapping (Direct, Associative and Set associative mapping), Numerical problems on cache mapping.

Bus Organization: Bus structure, I/O interfacing, tri-state logic, Address decoding (Absolute & Partial), Memory mapped I/O & I/O mapped I/O, Data transfer (Programmed I/O, Interrupt initiated I/O, DMA), Bus contention and bus arbitration.

CU Design: Hardwired and Micro-programmed CU design and their relative advantages & disadvantages.

Text Book:

1. M. Morris Mano, Computer System Architecture, Pearson.
2. John Hayes, Computer Architecture and Organization, McGrawHill.
3. William Stallings, Computer Organization and Architecture: Designing for Performance, Prentice Hall.

Discipline Specific Electives-III(Any One)**Course Title: Internet Technology****CREDIT: 6****Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)****Course Code: DSE-III (i)****CONTACTS: 5L+1T**

Introduction to Internet: Evolution of Internet, concept of Intranet and Internet, Applications of Internet, Types of Connectivity such as dial – up, leased, VSAT. etc., Internet Server and Clients module in various Operating Systems, TCP/IP, Introduction to RFC, Addressing in Internet – IP and Domains, major features of IP, IP datagram, major IP services, IP source routing, value of the transport layer, TCP, major features of TCP, passive and active operation, Internet Service Providers.

E-mail and List-servers: E-mail Networks, E-mail protocols(X.400, SMTP, UUCP), Format of an E-mail message , Description of E-mail Headers, E- mail contents and encoding, E-mail routing, List servers, E-mail clients, POP-3, IMAP-4.

File Transfer Protocol: Introduction to FTP, public domain Software, Types of FTP Servers, FTP clients, Common Commands.

Telnet: Telnet protocol, Server daemon, Telnet clients, Terminal emulation

Usenet and Internet Relay Chat Introduction to World Wide Web: Evolution of WWW, Basics Features, WWW Browsers, WWW servers, HTTP & URL's

WWW Browsers: Basic features, Bookmarks, history. Progress indicators, Personalization of Browsers, Printing displayed pages and forms, Saving Web pages, Netscape Communicators, Internet Explorer, Search and Downloads.

Text Book:

1. Data and Computer communication by William Stallings, 6th Edition, Pearson Education
2. Computer Networks by Tanenbaum, Pearson Education

Course Title: Animation & Multimedia**CREDIT: 6****Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)****Course Code: DSE-III(ii)****CONTACTS: 5L+1T**

Multimedia: Introduction to multimedia, components, uses of multimedia, multimedia applications, virtual reality.

Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.

Images: Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats.

Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

Video: How video works, analog video, digital video, video file formats, video shooting and editing.

Animation: Principle of animations, animation techniques, animation file formats.

Internet and Multimedia: www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia, software and Authoring tools.

Text Book:

1. Tay Vaughan, Multimedia: Making it work, TMH, Eighth edition, 2011
2. Ralf Steinmetz and Klara Naharstedt, Multimedia: Computing, Communications Applications, Pearson, 2012
3. Keyes, Multimedia Handbook, TMH, 2000.
4. K. Andleigh and K. Thakkar, Multimedia System Design, PHI, 2013.

Semester-VI

Skill enhancement Course (Any One)

Course Title: Visual Basic Lab

CREDIT: 2

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: SEC-4 (i)

CONTACTS: 4P

Simple applications development in Visual Basic environment.

Example: Simple input/output using Textbox, labels, inputbox, msgbox, command button.

Control logic using if then else, select case. Looping using do while, do until, for. Library functions, user-defined functions and subroutines, Problems on Strings. Arrays- data array and control array. Problems using list box, combo box, check box, option button, timer. Design and implement Pocket Calculator. Database connectivity using adodc and adodb.

Text Book:

1. Mastering VB 6.0, Evangelos Petroutsos, BPB Publication.

Course Title: PHP Programming Lab

CREDIT: 2

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: SEC-4 (i)

CONTACTS: 4P

HTML, Cascading Style Sheets (CSS).

PHP variables, constants, data types, operators, statements, functions, state management, string manipulation, regular expressions, file handling and data storage, PHP and MySQL Databases, Security. Templates Image Generation and Manipulation.

Text Book:

1. HTML 5 Black Book: Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery, Kogent Learning Solutions Inc.
2. Web Development in PHP, MYSQL, Javascript, HTML & CSS: Step-by-Step Web Project, Riaz Ahmed, Createspace Independent Pub.

Discipline Specific Electives-IV(Any One)

Course Title: Core JAVA

CREDIT: 4

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-IV(i)

CONTACTS: 4L

Introduction: JAVA as internet language. A first simple program. Entering the program, Compiling the program, control statements, using blocks of code, lexical issues-white space, identifiers, literals, comments, separators, The Java keyword- The java class libraries, data types, variables and arrays, the simple types, integers-byte, short, int, long, floating point types-float, double, characters, Booleans. A closer look at literals-integer literals, floating point literals, Boolean literals, character literals, string

literals, variables – declaring a variable, dynamic initialization, the scope and lifetime of variables, type conversion and casting – java's automatic conversions, casting incompatible types, automatic type promotion in expressions, the type promotion rules, arrays-one dimensional arrays, multidimensional arrays, alternative array declaration syntax. Operators-assignment operators, increment and decrement, the bitwise operators, relational operators, Boolean logical operators, the assignment operator, the ?operator, operator precedence, using parentheses, control statements-Java's selection statements, if, switch, iteration statements-while, do-while, for, some for loop variations, nested loops, jump statements-using break, using continue, return.

Introduction Classes: class fundamentals, the general form of a class, a simple class, declaring objects, a closer look at new, assigning object reference variables, introducing methods, adding a method, the box class, returning a value, adding a method to the box class, constructors, parameterized constructors, the this keyword, instance variable hiding, garbagecollection, the finalize method, a stack class, a closer look at methods and classes, overloading methods, overloading constructors. Using object as parameters, argument passing, returning objects, introducing access control, understanding static, introducing final, arrays revised., exploring the string class, using command line arguments, inheritance, inheritance basics, a more practical example, a superclass variable can reference a subclass object, using super, using super to call superclass constructors, a second use for super, creating a multilevel hierarchy, when constructor are called, method overriding, dynamic method dispatch, overridden methods, applying methods overriding, using abstract classes, using final with inheritance, using final to prevent overriding, using final to prevent inheritance, the object class.

Package and interfaces: Defining a package, understanding class path, a short package example, access protection, an access example, importing packages- interface-defining an interface, implementing interfaces, applying interfaces, variables in interfaces, interface can be extended.

Exception Handling: Exception fundamentals, exception types, uncaught exceptions, using try and catch, displaying a description of an exception, multiple catch clauses, nested try statements, throw, throws, finally, java's built-in exceptions-creating you own exception subclasses, using exceptions, multithreaded programming.

Threads: The java's thread model, thread priorities, synchronization, message, the thread class and the runnable interface, the main thread, creating a thread, implementing runnable, extending thread, closing an approach, creating multiple thread, thread priorities, synchronization, using synchronized methods, the synchronized statement, inter-thread communication, using multithreading.

Stream classes: The predefined streams, reading console input, writing console output, reading and writing files, the transient and volatile modifiers, using instance of native methods, problem with native methods.

String handling: The string constructor, string length, special string operations-string literals, string concatenation, string concatenation with other data types, string conversion, character extraction, string comparison, searching strings, modifying a string-data conversion using string buffer constructors.

Wrappers: Number, double and float, integer and long, character, Boolean, process, runtime, memory management, executing other programs, system-using current time limits to time, program execution, using array copy, environment properties, object, using clone and the cloneable interface, class, class loader, math-transcendental functions, exponential functions, rounding functions, miscellaneous math methods, classes, input stream, output stream file input stream, file output stream.

Text Book:

1. E. Balaguruswamy, Programming with Java, 4th Edition, McGraw Hill.2009.
2. John R. Hubbard, "Programming with JAVA, Schaum's Series, 2nd Edition, 2004.
3. Herbert Schildt, The Complete Reference Java 2, TMH

Course Title: Programming in JAVA Lab

CREDIT: 2

Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)

Course Code: DSE-IV(i) Lab

CONTACTS: 4P

Programming should be developed using JAVA Language to implement the problems related to theoretical Paper.

Course Title: Microprocessor**CREDIT: 4****Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)****Course Code: DSE-IV(ii)****CONTACTS: 4L**

Microprocessor architecture: Internal architecture, system bus architecture, memory and I/O interface.

Microprocessor programming: Register Organization, Instruction Formats, Addressing Modes, Instruction Cycle, Clock Cycles, Timing Diagrams, assembly language programming.

Interfacing: Memory address decoding, cache memory and cache controllers, I/O interface, keyboard, display, timer, Interrupt Handling, Methods of Interrupts, Interrupt Controller, DMA Controller, Video Controllers, communication interfaces.

Case Studies: 8085 and 8086 microprocessor.

Text Book:

1. Ramesh Gankar, "Microprocessor Architecture, Programming, and Applications with the 8085", PIP (India)

2. Barry B. Brey : The Intel Microprocessors : Architecture, Programming and Interfacing. Pearson Education, Sixth Edition, 2009.

3. Walter A. Triebel, Avtar Singh; The 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware, and Applications. PHI, Fourth Edition 2005.

Course Title: MicroprocessorLab**CREDIT: 2****Full Marks: 50 (Internal Assessment: 30, Final Exam: 20)****Course Code: DSE-IV(ii) Lab****CONTACTS: 4P**

Programming should be developed using 8085 assembly language to implement the problems related to theoretical Paper.

Discipline Specific Electives-V(Any One)**Course Title: Software Engineering****CREDIT: 6****Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)****Course Code: DSE-V(i)****CONTACTS: 5L+1T**

Introduction: Software engineering discipline – evolution and impact, Program vs S/W, Emergence of S/W engineering (Introduction to Control based design, Data structure oriented design, data flow oriented design, object oriented design).

Software life cycle: Usefulness, Life cycle Model -Classical water fall model, Iterative waterfall model, prototype model, spiral model, comparisons.

Software Requirement Specification: Role of system analyst, Need, Components and characteristic of SRS, Problems without a SRS, SRS document for Simple problems.

Software design: Cohesion & Coupling, S/W design Approach - Function oriented approach (DFD, Structure chart, Transformation of DFD into Structure chart), Object oriented approach (UML diagram, Use case model, class diagram, Interaction diagram)

Coding: Coding standards, Code review - Code walk through, Code Inspection, Clean room testing.

Testing: Unit Testing (Driver and Stub Module, Black box testing [Equivalence class Partitioning and Boundary value analysis], White box testing [Statement coverage, Edge/branch coverage, condition coverage, path coverage]), Integration Testing (Big bang, Top down, Bottom up, Mixed approach), Verification and Validation of Software.

Maintenance: Characteristics, Types (corrective, adaptive and perfective), Software maintenance process model (Reverse engineering cycle followed by forward engineering model).

Software Cost and Time estimation: Functions points, Issues in software cost estimation, Introduction to the Rayleigh curve, Algorithmic cost models (COCOMO).

Text Book:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach (7th Edition), McGraw-Hill, 2009.
2. Rajib Mall, Fundamentals of Software Engineering, PHI.

Course Title: Computer Networks

CREDIT: 6

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-V(ii)

CONTACTS: 5L+1T

Introduction: Communication systems, Analogue data, digital data, Communication channels, Synchronous data, Asynchronous data. Concepts of LAN, MAN and WAN. Modes of data transfer (simplex, half duplex, full duplex).

Multiplexing: FDM (Multiplexing and De-multiplexing Process, Applications), TDM (Time Slot and Frames, Interleaving, Bit Padding, Applications), WDM.

Transmission Media: Guided Media (Twisted Pair, Co-Axial Cable, Fiber Optics Cable); Unguided Media (Radio Waves, Microwaves, Infrared, Satellite Communication); NIC.

Switching: Circuit, Packet and Message Switching; Comparisons.

Modems: DSL, Cable Modems.

Network Software: OSI and TCP/IP Models, Functions of each layer.

Data Link Layer: Error Detection and Correction (Parity, Checksum, CRC, Hamming Code); MAC Layer; Stop-And-Wait ARQ, Sliding Window Protocol, Selective Repeat ARQ, HDLC Protocol; ALOHA (Pure and Slotted), CSMA/CD Protocol, Polling; Token Passing; CDMA; Ethernet, Token Bus, Token Ring, ATM.

Network Layer: IP Addressing and Classes of IP Address; Subnet; Static and dynamic routing; ARP; IP; ICMP; unicast and multicast routing protocols;

Transport layer: process-to-process delivery; UDP; TCP; Congestion control protocols.

Connecting Devices: Repeaters, Hub, Bridges, Switch, Router and Gateway.

Application Layer: client server model; FTP, HTTP, SMTP, Telnet etc protocols.

Text Book:

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, 2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI, 2002
3. William Stallings: Data and Computer Communications, Eighth Edition, Pearson.

Discipline Specific Electives-VI(Any One)

Course Title: E-Commerce

CREDIT: 6

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-VI(i)

CONTACTS: 5L+1T

E-Business Framework: Definition of E-Business, Origin of E-Business, History of the Internet, E-Business Opportunities for Businesses, Working of E-Business, E-Business Vs the Traditional Business Mechanism, Advantages of E-Business, Disadvantages of E-Business, Main Goals of E-Business

E-commerce Infrastructure: Need for an Intelligent Website, technology Infrastructure Required, Basic Web Languages for Web Designing, Corporate Strategic Infrastructure Required, Miscellaneous Website Design Tips

Business Models: Evolution of Internet Business Models, Business Models in Practice, Business Model: The Six Components

Security In Electronic Business: Intranet and Extranet Security: Threats and Protection, Protection Methods, Data and Message Security, Firewalls

Encryption: Cryptography, Encryption, Digital Signature, Virtual Private Network

E-Payment Systems: B2B Electronic Payments, Third-Party Payment Processing, Electronic Payment Gateway–Security Standard for Electronic Payment System

E-Marketing: Challenges of Traditional Marketing, Retailing in E-Business Space, Internet Marketing, Advertisement and Display on the Internet, E-Business for Service Industry

Policy and Implementation: Legal and Ethical Policy Issues: Protection of Privacy and Intellectual Property, Strategy Planning for E-Business

Mobile Commerce: Overview of M-Commerce - Wireless Application Protocol (WAP), Generations of Mobile Wireless Technology, Components of Mobile Commerce, Networking Standards for Mobiles.

HTML: Document overview, Header elements, Section Headings, Block- oriented elements, Lists, Inline elements, Visual Mark-up, Hypertext links, Uniform Resource Locators, (URL's), Images, Forms, Tables, special characters.

Text Book:

1. E-commerce - Paul A. Murphy, THM.

Course Title: Intelligent System

CREDIT: 6

Full Marks: 50 (Internal Assessment: 10, Final Exam: 40)

Course Code: DSE-VI(ii)

CONTACTS: 5L+1T

Introduction: Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem.

Intelligent Agents: Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

Problem Solving: Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.

Search techniques: Solving problems by searching: problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.

Heuristic search strategies: Greedy best-first search, A* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.

Adversarial search: Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

Knowledge & reasoning: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.

Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

Representing knowledge using rules: Procedural versus declarative knowledge, logic programming, forward versus backward reasoning, matching, control knowledge.

Probabilistic reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.

Natural Language processing: Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing.

Learning: Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.

Expert Systems: Representing and using domain knowledge, expert system shells, knowledge acquisition. Basic knowledge of programming language like Prolog & Lisp.

Text Book:

1. Artificial Intelligence: A Modern Approach, Stuart Russel Peter Norvig, Pearson
2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
3. Logic & Prolog Programming, SarojKaushik, New Age International
4. Artificial Intelligence, Russel, Pearson