

JHARKHAND UNIVERSITY OF TECHNOLOGY
Jharkhand, Ranchi



Syllabus for

BACHELOR OF COMPUTER APPLICATION
(B.C.A) Programme

Third Semester

Subject Code	Course Type	Subject Name	Load Allocation			Marks distribution		Total Marks	Credit
			L	T	P	Internal Marks	External Marks		
3CR01	Core	Computer Networks	4	0	0	30	70	100	4
3CR02	Core	Programming in JAVA	4	0	0	30	70	100	4
3CR03	Core	Fundamentals of Statistics	4	0	0	30	70	100	4
3OE01	Elective-I	Open Elective – I	4	0	0	30	70	100	4
3SE01	Skill Enhancement	PC Assembly & Troubleshooting	3	0	0	30	70	100	3
3CR01-L	Computer Lab-1	JAVA Lab	0	0	2	25	25	50	2
3SE02-L	Skill Enhancement -2	PC Assembly & TroubleshootingLab	0	0	2	25	25	50	2
Semester Total			18	0	4	200	400	600	22

SEMESTER-III

Course Code: 3CR01

Course Name: Computer Networks

Detailed Contents	Contact hours
<p>Unit-I</p> <p>Data communications concepts: Digital and analog transmissions- Modem, parallel and serial transmission, synchronous and asynchronous communication. Modes of communication: Simplex, half duplex, full duplex. Types of Networks: LAN, MAN, WAN</p> <p>Network Topologies: Bus, Star, Ring, Mesh, Tree, Hybrid</p> <p>Communication Channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission.</p> <p>Communication Switching Techniques: Circuit Switching, Message Switching, Packet Switching.</p>	12 Hours
<p>Unit-II</p> <p>Network Reference Models: OSI Reference Model, TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Models. Transmission impairments – Attenuation, Distortion, Noise. Multiplexing – Frequency division, Time division, Wavelength division.</p> <p>Data Link Layer Design Issues: Services provided to the Network Layer, Framing, Error Control (error detection and correction code), Flow Control, Data Link Layer in the Internet (SLIP, PPP)</p>	11 Hours
<p>Unit-III</p> <p>MAC sub layer: CSMA/CD/CA, IEEE standards (IEEE802.3 Ethernet, Gigabit Ethernet, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring)</p> <p>Network Layer: Design Issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Congestion Control Policies, Leaky bucket and token bucket algorithm, Concept of Internetworking.</p>	12 Hours
<p>Unit-IV</p> <p>Transport Layer: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Introduction to TCP/UDP protocols.</p> <p>Session, Presentation and Application Layers: Session Layer – Design issues, remote procedure call. Presentation Layer – Design issues, Data</p>	12 Hours

compression techniques, Cryptography. Application Layer – Distributed application (client/server, peer to peer, cloud etc.), World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), HTTP as an application layer protocol.	
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Text Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

Reference Books:

1. Data Communication System, Black, Ulysse, Third Edition, PHI.
 2. Data and Computer Communications, Stalling, Ninth Edition, PHI.
 3. James F. Kurose and Keith W. Ross, “Computer Networking”, Pearson Education.
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Course Code: 3CR02
Course Name: Programming in JAVA

Detailed Contents	Contact hours
<p>Unit-I Introduction to Java Features of java JDK Environment & tools like(java, javac, applet viewer, javadoc, jdb) OOPs Concepts Class, Abstraction , Encapsulation, Inheritance, Polymorphism Difference between C++ and JAVA Structure of java program Data types ,Variables ,Operators , Keywords ,Naming Convention Decision Making (if, switch), Looping(for, while) Type Casting Array Creating an arrayTypes of Array - One Dimensional arrays - Two Dimensional array String - Arrays , Methods. - StringBuffer class</p>	12 Hours
<p>Unit-II Classes and Objects Creating Classes and objects Memory allocation for objects Constructor Implementation of Inheritance Simple, Multilevel, Interfaces, Abstract classes and methods Implementation of Polymorphism Method Overloading, MethodOverriding Nested and Inner classes. Modifiers and Access Control Packages Packages Concept Creating user defined packages Java Built in packages java.lang->math java.util->Random, Date, Hash table Wrapper classes</p>	12 Hours
<p>Unit-III Collection Collection Framework. Interfaces - Collection - List - Set – Sorted Set - Enumeration - Iterator – List Iterator Classes – Linked List – Array List - Vector –Hash Set – Tree Set – Hash table Working with maps Map interface Map classes – Hash Map – Tree Map</p>	8 Hours
<p>Unit-IV File and Exception Handling Exception types Using try catch and multiple catch Nested try, throw , throwsand finally Creating user defined Exceptions File Handling Stream Byte Stream Classes Character Stream Classes File IO basics File operations Creating file Reading file(character, byte) Writing file(character, byte)</p>	8 Hours
<p>Unit-V Applet, AWT and Swing Programming Applet Introduction Types applet Applet Life cycle - Creating applet - Applet tag Applet Classes - Color - Graphics - Font AWT Components and containerused in AWT Layout managers Listeners and Adapter classes Event Delegation model Swing Introduction to Swing Component and Container Classes</p>	12 Hours

Text Books:

1. Programming with JAVA – E Balagurusamy

Reference Books:

1. The Complete Reference – JAVA Herbert Schildt

Course Code: 3CR03
Course Name: Fundamentals of Statistics

Detailed Contents	Contact hours
<p>Unit I</p> <p>Statistics and Probability: Introduction to Statistics – Origin of Statistics, Features of Statistics, Scope of Statistics, Functions of Statics, Uses and importance of Statistics, Limitation of Statistics, Distrust of Statistics</p> <p>Collection of Data: Introduction to Collection of Data, Primary and Secondary Data, Methods of Collecting Primary Data, Methods of Secondary Data, Statistical Errors, Rounding off Data (Approximation).</p>	8 hours
<p>Unit II</p> <p>Classification of Data Frequency Distribution: Introduction Classification of Data, Objectives of Classification, Methods of Classification, Ways to Classify Numerical Data or Raw Data.</p> <p>Tabular, Diagrammatic and Graphic Presentation of Data: Introduction to Tabular Presentation of Data, Objectives of Tabulation, Components of a Statistical Table, General Rules for the Construction of a Table, Types of Tables, Introduction to Diagrammatic Presentation of Data, Advantage and Disadvantage of Diagrammatic Presentation, Types of Diagrams, Introduction to Graphic Presentation of Data, Advantage and Disadvantage of Graphic Presentation, Types of Graphs.</p>	12 hours
<p>Unit III</p> <p>Measures of Central tendency: Introduction to Central Tendency, Purpose and Functions of Average, Characteristics of a Good Average, Types of Averages, Meaning of Arithmetic Mean, Calculation of Arithmetic Mean, Merit and Demerits of Arithmetic Mean, Meaning of Median, Calculation of Median, Merit and Demerits of Median, Meaning of Mode, Calculation of Mode, Merit and Demerits of Mode, Harmonic Mean- Properties- Merit and Demerits.</p>	12 hours
<p>Unit IV</p> <p>Measures of Dispersion: Meaning of Dispersion, Objectives of Dispersion, Properties of a good Measure of Dispersion, Methods of Measuring Dispersion, Range Introduction, Calculation of Range , Merit and Demerits of Range</p>	8 hours
<p>Unit V</p>	

Mean Deviation, Calculation of Mean Deviation , Merit and Demerits of Mean Deviation, Standard Deviation Meaning, Calculation of Standard Deviation , Merit and Demerits of Standard Deviation, Coefficient of Variation, Calculation of Coefficient Variance, Merit and Demerits of Coefficient of Variation.	8 hours
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Text Books:

1. Statistics and Data Analysis, A.Abebe, J. Daniels, J.W.Mckean, December 2000.
2. Introduction to Statistics, David M. Lane.

Reference Books:

1. Bhattacharya,G.K. and Johnson, R.A.(19977), Statistical Concepts and Methods,New York, John Wiley & Sons.

Course Code: 3OE01

Course Name: Open Elective –I (Operating System)

<p>UNIT-I Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.</p>	12 hours
<p>UNIT-II Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non-preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.</p>	12 hours
<p>UNIT-III Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance</p>	8 hours
<p>UNIT-IV Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.</p>	8 hours
<p>UNIT-V Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.</p>	8 hours

Text Books:

1. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. AddisonWesley.

2. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
3. Tanenbaum, Modern Operating Systems, PHI.

Reference Books:

1. H. M. Dietel, Operating Systems, Addison Wesley Longman.
 2. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
 3. Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.
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Course Code: 3OE01
Course Name: Open Elective –I (Data Mining)

<p>Unit I Introduction – Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse – A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining.</p>	12 hours
<p>Unit II Data pre-processing – Data cleaning – Data Integration and Transformation – Data Reduction – Discretization and concept hierarchy generation – Data mining primitives – Data mining Task</p>	12 hours
<p>Unit III Association Rule Mining – Mining single dimensional Boolean association rules from transactional databases –. Classification and prediction – Issues regarding classification and prediction – Bayesian classification- Classification by Back propagation – classification based on concepts from association rule mining</p>	8 hours
<p>Unit IV Cluster Analysis – A categorization of Major clustering methods - Partitioning methods- Hierarchical methods – Grid based methods -Model based clustering methods – Density – based methods</p>	8 hours
<p>Unit V Applications and Trends in Data Mining – Data mining system products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining-Mining Spatial Databases – Mining Time-series and sequence data – Mining the World wide web.</p>	8 hours

Text Book:

1. Jiwei Han, Michelen Kamber, Data Mining Concepts and Techniques, Morgan Kaufmann Publishers an Imprint of Elsevier, 2011.

Books for Reference:

1. Arun K.Pujari, Data Mining Techniques, Universities Press (India) Limited, 2011.
2. George M. Marakas, Modern Data warehousing, Mining and Visualization: Core Concepts, Printice Hall, First Edition, 2011.

Course Code: 3SE01

Course Name: PC Assembly & Troubleshooting

Unit I: Brief history of computer on the basis Hardware. Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices, different processors used for personal computers and notebook computers.	9 hours
Unit II: Perform installation, configuration, and upgrading of microcomputer/ computer: Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation replacement of motherboard, troubleshooting problems with memory.	8 hours
Unit III: Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems. Drivers: Meaning, role and types.	8 hours
Unit IV: Diagnose and troubleshooting of microcomputer/ computer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components. Booting and its types.	8 hours

Text Books:

1. PC Hardware: The Complete Reference, McGraw-Hills

Reference Books:

1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer
2. PC Hardware: A Beginner's Guide by Ron Gilster.

Course Code: 3SE02-L
Course Name: PC Assembly & Troubleshooting Lab

List of assignments:

1.	Assembling and De Assembling of Computer System
2.	Loading and configuration procedure of Microsoft Client O/S Win XP /Win 7 and Windows 8
3.	Installation of utility tools (Software)
4.	Installation of utility tools (Drivers)
5.	Firewall configuration, Antivirus/Internet security loading and configuration procedure
6.	Installation and configuration of I/O devices – Printers, Webcams, Scanners.
7.	Installation and configuration of I/O devices – Digital Camera, USB Wi-fi, USB BT, USB Storages, Projectors
8.	Multiple OS loading and trouble shooting

Text Books:

1. PC Hardware: The Complete Reference, McGraw-Hills

Reference Books:

1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer
PC Hardware: A Beginner's Guide by Ron Gilster
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Course Code: 3CR01-L
Course Name: JAVA

LabList of assignments:

1	Implementing Classes and Objects
2	Implementing String Functions
3	Implementing Interface Methods
4	Implementing Thread Methods
5	Implementing Packages
6	Implementing Class Methods

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Syllabus for

BACHELOR OF COMPUTER APPLICATION
(B.C.A) Programme

Fourth Semester

Subject Code	Course Type	Subject Name	Load Allocation			Marks distribution		Total Marks	Credit
			L	T	P	Internal Marks	External Marks		
4CR01	Core	Programming in Python	4	0	0	30	70	100	4
4CR02	Core	Software Engineering	4	0	0	30	70	100	4
4CR03	Core	Computer System Architecture	4	0	0	30	70	100	4
4OE01	Elective-II	Open Elective – II	4	0	0	30	70	100	4
4OE01	Elective- III	Open Elective – III	3	0	0	30	70	100	3
4CR01-L	Computer Lab-1	Python Lab	0	0	2	25	25	50	2
4OE02-L	Open Elective Lab- 2	Open Elective Lab-II/III	0	0	2	25	25	50	2
Semester Total			18	0	4	200	400	600	22

Open Elective – II

1. Computer Networks
2. Discrete Mathematics

Open Elective – III

1. Web technology
2. Computer Graphics

Course Code: 4CR01

Course Name: Programming in Python

Detailed Contents	Contact hours
<p>Unit-I</p> <p>Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages.</p> <p>Python Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command.</p> <p>Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators.</p>	12 Hours
<p>Unit-II</p> <p>Control Structures: Decision making statements, Python loops, Python control statements.</p> <p>Python Native Data Types: Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations).</p>	10 Hours
<p>Unit-III</p> <p>Python Functions: Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.</p> <p>Python Modules: Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, StandardModules, Python Packages.</p>	12 Hours
<p>Unit-IV</p> <p>Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.</p> <p>File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files in Python, directories in Python.</p> <p>Classes and Objects: The concept of OOPS in Python, Designing classes, Creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.</p>	10 Hours

Text Books:

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.

2. Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.

Reference Books:

1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
 2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.
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Course Code: 4CR02
Course Name: Software Engineering

Detailed Contents	Contact hours
Unit 1 The Nature of Software, Need of Software Engineering, Prescriptive Process Models, Specialized Process Models, The Unified Process.	10 Hours
Unit 2 Role of a system analyst, SRS, Properties of a good SRS document, functional and non-functional requirements, Decision tree and Decision table, Formal Requirements Specification, Software Cost Estimation.	10 Hours
Unit 3 Software design and its activities, Preliminary and detailed design activities, Characteristics of a good software design, Features of a design document, Cohesion and Coupling, Structured Analysis, Function Oriented Design, Object-Oriented Design.	12 Hours
Unit 4 Testing Fundamentals, Unit Testing, Integration Testing, Validation Testing, System Testing, Maintenance and Reengineering, Measures, Metrics, and Indicators, Software Measurement, Metrics for Requirements Model, Metrics for Design Model, Metrics for Testing, Metrics for Maintenance.	12 Hours

Text Books:

1. Software Engineering—A Practitioner’s Approach, Roger S.Pressman, Seventh Edition, McGrawHill, 2010.

Reference Books:

1. An Integrated Approach to Software Engineering, Pankaj Jalota, Third Edition, Narosa Publishing House, 2005
 2. Software Engineering, Ian Sommerville, Ninth Edition, Addison-Wesley, 2011
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Course Code: 4CR03
Course Name: Computer System Architecture

Detailed Contents	Contact hours
Unit 1 Basic computer organization and design, Instructions and instruction codes Timing and control Instruction cycle Register Types of register General purpose Special purpose registers Index registers Register transfer and micro operations Register transfer instructions Memory and memory function Bus Data transfer instructions Arithmetic logic micro- operations shift micro- operations Input/ Output and interrupts Memory reference instructions Memory interfacing Cache memory	10 Hours
Unit 2 General Register Organization Stacks organizations Instruction formats Addressing modes Data transfer and manipulation Program control Reduced computer Pipeline RISC CISC pipeline vector processing Array processing Arithmetic Algorithms Integer multiplication using shift and add Booth's algorithm Integer division Floating-point representations	10 Hours
Unit 3 Addition algorithms Subtraction algorithms Multiplication algorithms Divisor algorithms Floating point Arithmetic operations Decimal arithmetic operations	12 Hours
Unit 4 Peripheral devices Input/output interface ALU Asynchronous Data transfer Mode of transfer Priority interrupts Direct memory Address (DMA) Input/ Output processor (IOP)Serialcommunication Overview of Intel 8085 to Intel Pentium processors Basic microprocessors Architecture and interface Internal architecture External architecture memory and input/output interface	12 Hours
Unit 5 Assembly language Assembler Assembly level instructions Macro Use of macros in I/C instructions Program loops Programming arithmetic and logic subroutines Input-Outputprogramming	12 Hours

Text Books:

1. Computer Organization and Design: The Hardware/Software Interface” by David A Patterson and John L Hennessy
2. Computer Organization and Architecture: Designing for Performance” by William Stallings

Reference Books:

1. Computer Architecture & Organization” by Raj Kamal and Nicholas Carter

Course Code: 4OE01 (Open Elective – II)
Course Name: Computer Networks

Detailed Contents	Contact hours
<p>Unit-I</p> <p>Data communications concepts: Digital and analog transmissions-Modem, parallel and serial transmission, synchronous and asynchronous communication. Modes of communication: Simplex, half duplex, full duplex.</p> <p>Types of Networks: LAN, MAN, WAN</p> <p>Network Topologies: Bus, Star, Ring, Mesh, Tree, Hybrid</p> <p>Communication Channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission.</p> <p>Communication Switching Techniques: Circuit Switching, Message Switching, Packet Switching.</p>	12 Hours
<p>Unit-II</p> <p>Network Reference Models: OSI Reference Model, TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Models.</p> <p>Transmission impairments – Attenuation, Distortion, Noise. Multiplexing – Frequency division, Time division, Wavelength division.</p> <p>Data Link Layer Design Issues: Services provided to the Network Layer, Framing, Error Control (error detection and correction code), Flow Control, Data Link Layer in the Internet (SLIP, PPP)</p>	10 Hours
<p>Unit-III</p> <p>MAC sub layer: CSMA/CD/CA, IEEE standards (IEEE802.3 Ethernet, Gigabit Ethernet, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring)</p> <p>Network Layer: Design Issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Congestion Control Policies, Leaky bucket and token bucket algorithm, Concept of Internetworking.</p>	12 Hours
<p>Unit-IV</p> <p>Transport Layer: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Introduction to TCP/UDP protocols.</p> <p>Session, Presentation and Application Layers: Session Layer – Design issues, remote procedure call. Presentation Layer – Design issues, Data compression techniques, Cryptography. Application Layer – Distributed application (client/server, peer to peer, cloud etc.), World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), HTTP as an application layer protocol.</p>	10 Hours

Text Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

Reference Books:

1. Data Communication System, Black, Ulysse, Third Edition, PHI.
 2. Data and Computer Communications, Stalling, Ninth Edition, PHI.
 3. James F. Kurose and Keith W. Ross, "Computer Networking", PearsonEducation.
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Course Code: 4OE01 (Open Elective – II)
Course Name: Discrete Mathematics

Detailed Contents	Contact hours
<p>Unit-I Fundamental Sets and subsets, operation on sets, Sequences, division in the integers, matrices, Mathematical structure. Logic-proposition and logical operations, Conditional Statement, Methods of proof, Mathematical induction.</p>	12 Hours
<p>Unit-II Mathematical logic Statement and notation, connectivities, Normal Forms, The theory of Inference for the Statement calculus. The predicate calculus, Inference theory of the predicate calculus</p>	10 Hours
<p>Unit-III Counting Permutation, combinations, the pigeon hole principle, recurrence relations and digraphs-product sets and partitions, relations and Digraphs, paths in relations and digraphs, properties of relations, equivalence relations, computer representation of relations and Digraphs, manipulation of relations, transitive closure and warshall's algorithm. Functions- definition and introduction , function for computer science, permutation functions,</p>	06 Hours
<p>Unit-IV Graph Theory Basic concept of graph theory, Euler paths and circuits, Hamiltonian paths and circuits. Other relation and structure – partially Ordered sets, Lattices, Finite Boolean algebras, functions of Boolean algebras, Boolean function as Boolean polynomials. Tress - introduction, undirected trees, minimal spanning trees.</p>	06 Hours
<p>Unit-V Semi groups and groups Binary Operations revisited Semi groups, products and quotient s of Semi groups, groups, product s and quotients of groups. Introduction to compatibility Theory-Languages, Finite state Machines, semigroups, Machines and languages.</p>	10 Hours

Text Books:

1. Discrete Mathematics by Kevin Ferland

Reference Books:

1. Discrete Mathematics, authored by Dr. Anjana Gupta
 2. Discrete Mathematics and Its Applications by Kenneth Rosen
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Course Code: 4OE01 (Open Elective – III)
Course Name: Web technology

Detailed Contents	Contact hours
<p>Unit-I</p> <p>Internet Basics Basic concepts, communicating on the internet, internet domains, internet server identities, establishing connectivity on the internet client IP address.</p> <p>Introduction To HTML Information Files Creation, Web Server, Web Client/Browser, Hyper Text Markup Language (HTML Tags, Paired Tags, Singular Tags), Commonly Used Html Commands (Document Head, Document Body), Title and Footer, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines). Basic Formatting Tags HTML Basic Tags, Text Formatting (Paragraph Breaks, Line Breaks), Emphasizing Material in a Web Page (Heading Styles, Drawing Lines), Text Styles (Bold, Italics, Underline), Other Text Effects (Centering (Text, Images etc.), Spacing (Indenting Text), HTML Color Coding.</p>	8 Hours
<p>Unit-II</p> <p>Lists Type of Lists (Unordered List (Bullets), Ordered Lists (Numbering), Definition Lists.</p> <p>Adding Graphics To Html Documents Using The Border Attribute, Using The Width And Height Attribute, Using The Align Attribute, Using The Alt Attribute.</p> <p>Tables Introduction (Header, Data rows, The Caption Tag), Using the Width and Border Attribute, Using the Cell padding Attribute, Using the Cell spacing Attribute, Using the BGCOLOR Attribute, Using the COLSPAN and ROWSPAN Attributes</p> <p>Linking Documents Links (External Document References, Internal Document References), Image As Hyperlinks.</p> <p>Frames Introduction to Frames: The <FRAMESET> tag, The <FRAME> tag, Targeting Named Frames. DHTML: Cascading Style Sheets, Style Tag.</p>	9 Hours
<p>Unit-III</p> <p>Forms Used by a Web Site The Form Object, The Form Object's Methods (The Text Element, The Password Element, The Button Element, The Submit (Button) Element, The</p>	8 Hours

Reset (Button)Element, The Checkbox Element, The Radio Element, The Text Area Element, The Select and Option Element, The Multi Choice Select Lists Element).	
Unit 4 Introduction to JavaScript JS Introduction, Where To, Output, Statements, Syntax, Comments, Variables, Operators, Arithmetic, Assignment, Data Types, Functions, Objects, Events, Strings, String Methods, Numbers, Number Methods, Arrays, Array Methods, Array Sort, Array Iteration, Dates, Date Formats, Date Get Methods, Date Set Methods, Math, Random, Booleans, Comparisons, Conditions, Switch, Loop For, Loop While, Break, Type Conversion, Bitwise, RegExp, Errors, Scope, Hoisting, Strict Mode, JSON, Forms, Forms API JS Functions, Function Definitions, Function Parameters, Function Invocation, Function Call, Function Apply, Function Closures	8 Hours

Text Books:

1. Internet for Every One: Alexis Leon, 1st Edition, Leon Techworld, Publication, 2009.
2. Greenlaw R; Heppe, “Fundamentals of Internet and WWW”, 2nd Edition, Tata McGraw-Hill, 2007.

Reference Books:

1. Raj Kamal, “Internet & Web Technologies”, edition Tata McGraw-Hill Education.2009.

Course Code: 4OE01 (Open Elective – III)
Course Name: Computer Graphics

Detailed contents	Contact hours
<p>Unit-I Introduction to Computer Graphics Applications of Computer Graphics. Graphs and Types of Graphs</p> <p>Input Devices: Light Pens, Graphic Tablets, Joysticks, Track Ball, Data Glove, Digitizers, Image Scanner.</p> <p>Video Display Devices: Refresh Cathode Ray Tube, Raster Scan displays, Random Scan displays, Color CRT - monitors and Color generating techniques (Shadow Mask, Beam Penetration), Flat-Panel Displays; 3-D Viewing Devices, Graphics monitors and workstations, Color Models (RGB and CMY), Lookup Table.</p> <p>Introduction Virtual Reality & Environments: Applications in Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.</p>	11 Hours
<p>Unit-II Scan-conversions Process and need of Scan Conversion, Scan conversion algorithms for Line, Circle and Ellipse using direct method, Bresenham's algorithms for line & circle and Midpoint Ellipse Algorithm along with their derivations, Area Filling Techniques, Flood Fill Techniques, Character Generation.</p>	11 Hours
<p>2 – Dimensional Graphics Cartesian and need of Homogeneous co-ordinate system, Geometric transformations (Translation, Scaling, Rotation, Reflection, Shearing), Viewing transformation and clipping (line, polygon and text) using Cohen-Sutherland, Sutherland Hodgeman and Liang Barsky algorithm for clipping.</p>	10 Hours
<p>Unit-IV 3 – Dimensional Graphics Introduction to 3-dimensional Graphics: Geometric Transformations (Translation, Scaling, Rotation), Mathematics of Projections (Parallel & Perspective). Color Shading. Introduction to Morphing techniques.</p>	12 Hours

Text Books:

1. D. Hearn and M.P. Baker, *Computer Graphics*, PHI New Delhi.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes., R.L Phillips, *Computer Graphics Principles & Practices*, Second Edition, Pearson Education, 2007

Reference Books:

1. R.A. Plastock and G. Kalley, *Computer Graphic*, McGraw Hill, 1986.