Syllabus for

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

MIT University of Meghalaya

Course Structure

First Semester

Subject Code	Course Type	Subject Name	Load Allocation			Marks distribution		Total Marks	Credit
			L	T	P	Internal Marks	External Marks		
1CR01	Core	Mathematics-I	4	0	0	30	70	100	4
1CR02	Core	Fundamentals of Computer and IT	4	0	0	30	70	100	4
1CR03	Core	Problem Solving using C/C++	4	0	0	30	70	100	4
1CR04	Core	Digital Electronics	4	0	0	30	70	100	4
1AE01	Ability Enhancement	English	3	0	0	30	70	100	3
1CR01-L	Computer Lab-1	Programming Lab C/C++	0	0	2	25	25	50	2
1AE01-L	Ability Enhancement Lab	Language Lab	0	0	2	25	25	50	2
Semester Total			19	0	4	200	400	600	23

SEMESTER-I

Course Code: 1CR01

Course Name: Mathematics-I

Detailed contents	Contact hours
Unit-I Set Introduction, Objectives, Representation of Sets (Roster Method, Set Builder Method), Types of Sets (Null Set, Singleton Set, Finite Set, Infinite Set, Equal Set, Equivalent Set, Disjoint Set, Subset, Proper Subset, Power Set, Universal Set) and Operation with Sets (Union of Set, Intersection of Set, Difference of Set, Symmetric Difference of Set) Universal Sets, Complement of a Set.	12 hours
Unit-II Logic Statement, Connectives, Basic Logic Operations (Conjunction, Disjunction, Negation) Logical Equivalence/Equivalent Statements, Tautologies and Contradictions.	10 hours
Unit -III Matrices Introduction, Types of Matrix (Row Matrix, Column Matrix, Rectangular Matrix, Square Matrix, Diagonal Matrix, Scalar Matrix, Unit Matrix, Null Matrix, Comparable Matrix, Equal Matrix), Scalar Multiplication, Negative of Matrix, Addition of Matrix, Difference of two Matrix, Multiplication of Matrices, Transpose of a Matrix.	12 hours

Unit-IV Progressions Introduction, Arithmetic Progression, Sum of Finite number of quantities in A.P, Arithmetic Means, Geometric Progression, Geometric Mean.	10 hours

Text Books:

1. Discrete Mathematics and Its Applications by Kenneth H. Rosen, Mc Graw Hill, 6thEdition.
2. College Mathematics, Schaum's Series, TMH.

Reference Books:

1. Elementary Mathematics, Dr. RD Sharma
2. Comprehensive Mathematics, Parmanand Gupta
3. Elements of Mathematics, ML Bhargava

Course Code: 1CR02
Course Name: Fundamentals of Computer and IT

Detailed Contents	Contact hours
Unit-I **Human Computer Interface** Concepts of Hardware and Software; Data and Information. **Functional Units of Computer System:** CPU, registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. **Devices:** Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter. **Memory:** Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks. **Data Representation:** Bit, Byte, Binary, Decimal, Hexadecimal, and Octal Systems, Conversions and Binary Arithmetic (Addition/ Subtraction/ Multiplication) Applications of IT.	12
Unit-II **Concept of Computing, Types of Languages:** Machine, assembly and High level Language; Operating system as user interface, utility programs. **Word processing:** Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.	10

Unit-III **Spreadsheet:** Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs. **Presentation Graphics Software:** Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.	10
Unit-IV **Electronic Payment System:** Secure Electronic Transaction, Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card E-Money, Bit Coins and Crypto currency, Electronic Fund Transfer (EFT), Unified Payment Interface (UPI), Immediate Payment System (IMPS), Digital Signature and Certification Authority. Introduction to Bluetooth, Cloud Computing, Big Data, Data Mining, Mobile Computing and Embedded Systems and Internet of Things (IoT)	12

Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, PearsonEducation
2. Computer Fundamentals, A. Goel, 2010, Pearson Education.
3. Fundamentals of Computers, P. K.Sinha & P. Sinha, 2007, BPB Publishers.

Reference Books:

1. "Introduction to Computers", Peter Norton
2. Computers Today, D. H. Sanders, McGraw Hill.
3. "Computers", Larry long & Nancy long, Twelfth edition, Prentice Hall.

Course Code: 1CR03
Course Name: Problem Solving using C

Detailed Contents	Contact hours
Unit-I **Logic Development:** Data Representation, Flowcharts, Problem Analysis, Decision Trees/Tables, Pseudo code and algorithms. Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants. **Operations and Expressions:** Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions.	11 Hours

Unit-II **Data Input and Output:** formatted & unformatted input output. **Control Statements:** While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.	10 Hours

Unit-III **Functions**: Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion. **Arrays**: Defining, processing arrays, passing arrays to a function, multi–dimensional arrays. **Strings**: String declaration, string functions and string manipulation Program Structure Storage Class: Automatic, external and static variables.	11 Hours
Unit-IV **Structures & Unions:** Defining and processing a structure, user defined data types, structures and pointers, passing structures to functions, unions.	06 Hours
Unit-V **Pointers:** Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, Pointers and Arrays **File Handling:** File Operations, Processing a Data File	06 Hours

Text Books:

1. Programming in ANSI C, E. Balagurusami, Fourth Edition, Tata McGraw Hill.
2. Programming in C, Third Edition, Stephen G Kochan, Pearson.
3. The C Programming Language, Kernighan & Richie, Second Edition, PHIPublication.

Reference Books:

1. Object Oriented Programming, Lafore R, Third Edition, Galgotia Publications
2. Let us C, Yashvant P Kanetkar, Seventh Edition, BPB Publications, New Delhi.
3. Programming in C, Byron S. Gottfried, Second Edition, McGraw Hills.
4. Problem Solving and Programming in C, R.S. Salaria, Second Edition

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Course Code: 1CR04
Course Name: Digital Electronics

Detailed Contents	Contact hours

Unit-I Introduction to network theorems and AC fundamentals: Ohm's law: Statement, explanation. Kirchhoff's law: Statement & explanation of KCL and KVL. Mesh/loop analysis (up to 2 loops) and node voltage method, Numerical problems. Delta/star and star/Delta transformation: No derivation for Interco version equations, introduction of network, port of network (one port network, two port network), unilateral network, bilateral network, linear network. Need for application of network theorems. (DC Circuits only). Superposition theorem: statement, (only with TWO voltage sources) steps to apply the theorem explanation by considering a simple resistive network and problems. Thevenin's theorem: Statement, (Only with ONE voltage source) Steps to apply the theorem, explanation by considering a simple resistive networking and problems. Norton's theorem: Statement, (Only with ONE voltage source)	12 Hours
steps to apply the theorem, explanation by considering a simple resistive network and problems. Maximum power transfer theorem: Statement, explanation of theorem by considering a simple resisting network, expression for maximum power deliver (P L (max) =Vth2/4Rth) (no derivation), graph of Vs Pl, numerical problems and applications. Reciprocity theorem, Statement, explanation using resistive network with dc source and numerical problems. AC Fundamentals: Representation of ac sine wave, instantaneous value, peak value, peak to peak value, average value, r.m.s value cycle, time period, frequency. (No derivations, only mention the expressions) Representation of non sinusoidal waves.	
Unit-II Semiconductor Devices: Introduction, atomic structure, energy level, energy band diagram in solids, classification of conductors, insulators and semiconductors. Semiconductor, properties, crystal structure of semiconductor, types – intrinsic and extrinsic semiconductor. Intrinsic semiconductor: Crystal structure (Ge& Si), thermal generated charges (electron and holes) carriers the effect temp on their motion. Extrinsic semiconductor: Doping, donor acceptor impurities, c-type, p-type semiconductor, majority and minority carriers, their currents, concept of immobile ions. Semiconductor devices : PN junction diode, formation of pn junction layer, potential barrier, energy level diagram of pn junction, Biasing of pn junction, behaviour of pn junction under forward and reverse biasing, break down in pn junction, avalanche and zener break down. Diode characteristics; V-I characteristic, forward and reverse bias, diode parameters, bulk resistance, knee voltage, static and dynamic resistance, PIV. Application of diode; As a rectifier, as logic gate, as a switch, etc. Rectifier, types, Half wave Full wave. Half wave rectifier: Circuit, working, wave forms and expression for ripple factor and efficiency (no derivation), advantages & disadvantages. Bridge wave rectifier: Circuit, working, wave forms and expressions for ripple factor and efficiently (no derivation), advantages & disadvantages. Logic families: Scale of integration, Digital IC's, classifications, DTL, TTL, ECL, MOS, CMOS, Mention of features: speed of operation, power dissipation, propagation delay, fan-in, fan-out.	12 Hours

Unit-III Number Systems: Introduction to number systems – positional and non-positional, Base /Radix. Decimal number system-Definition, digits, radix/base, Binary number system – Bit Byte, Conversions: Binary to Decimal and Decimal to Binary. Octal number systemConversion from Octal to Decimal to Octal, Octal to Binary and binary to Octal. Hexadecimal number system –Conversion : Decimal to Hex, Hex to decimal, Hex to Binary, Binary to Hex, Octal to Hex, Hex to Octal, Binary, arithmetic –binary addition, subtraction, multiplication and division (only Integer part). 1's and 2's compliment: 2's complement subtraction. Binary code: BCD numbers, 8421 code, 2421 code- examples and applications. Gray code –Conversions-Gray to binary and Binary to Gray, application of gray code (Mention only). Excess-3 code – self complimenting property and applications. Definition and nature of ASCII code. Introduction to error detection and correction code, parity check. Boolean algebra:-Laws and theorems. AND, OR, NOT Laws, Commutative law, associative law, distributive law, Duality theorem. Demorgan's theorems-Statements, proof using truth tables; Simplification of Boolean expressions using Boolean laws. Definition of product term, sum term, minterm, maxterm, SOP, standard POS and Standard POS. Conversion of Boolean expression to Standard SOP and Standard POS forms. Karnaugh maps-Definition of Karnaugh map, K- map for 2, 3 and 4 variables. Conversion of truth tables into k-map grouping of cells, redundant groups and don't care conditions Karnaugh map technique to solve 3	12 Hours
variable and 4 variable expressions. Simplification of 3 and 4 variable Boolean expression using K-maps (SOP only)	
Unit-IV Logic Gates: AND Gate: Definition, symbol truth table, timing diagram, Pin diagram of IC 7408. OR Gate: Definition, symbol, truth table, timing diagram of IC 7432. NOT Gate: Definition symbol, truth table, timing diagram, Pin diagram of IC 7404. NAND Gate: Definition, symbol, truth table, Pin diagram of IC 7400, NOR Gate: Definition, symbol, truth table, timing diagram, Pin diagram of IC 7402. Exclusive OR Gate: Definition, symbol, truth table, timing diagram. Combinational logic circuits: Definition, applications. Half Adder: Symbol, Logic circuits using XOR and basic gates, Truth table, Full Adder: Symbol, Logic circuits using XOR and basic gates, Truth table, Half Subtractor: Symbol, Logic circuits using XOR and basic gates, Truth table. Full Subtractor: Symbol, Logic circuits using XOR and basic gates, Truth table. Adder –Subtractor; Logic circuit, Pin diagram IC 7483, IC 7486. Parallel Adder: 4 –bit parallel binary adder, BCD adder, IC 7483 NAND –NOR implementation of Adders.	12 Hours
Unit - V Sequential Circuits: Importance of clock in digital circuit and introduction to flip flop. Flip –flop-difference between latch and flip-flop. Qualitative study of level and edge triggering. RS latch /unlocked, symbol and truth table. RS flip-flop using NAND gate, symbol, truth table and timing diagram. D flip –flop – Symbol, truth table, Realization of JK flip –flop using NAND gates, working, and timing diagram. Race around condition, present and clear inputs, pin diagram of IC 74112. T flip flop-Logic symbol, JK flip flop as a T flip –flop truth table and timing diagram. Master slave flip flop; Logic circuit, truth table and timing diagram, advantage of M/S flip-flop, pin diagram of IC 7473 IC 7476. Registers: Definition, types of registers-Serial in serial out, serial in parallel out, Parallel in serial out, Parallel in parallel our shift register (Block diagram representation for each), truth table, timing diagram and speed comparison.	12 Hours

Text Books:

1) Thomas L.Floyd ,''Digital Fundamentals", Peason Education Inc, New Delhi, 2003

Reference Books:

1) Morris Mano, "Digital Design", 5Th Edition, Prentice Hall, 2013
2) R.P.Jain, "Modern Digital Electronics", 3rd Edition, Tata Mc Graw Hill, 2003.
3) Bignell and Donovan, "Digital Electronics", 5th Edition, Thomson Publication, 2007

Course Code: 1AE01

Course Name: English

Detailed Contents	Contact hours
Unit1- 1 (Introduction) Theory of Communication Types and modes of Communication	10 Hours
Unit-II (Language of Communication) Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication	10 Hours
Unit-III (Reading and Understanding) Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation	11 Hours
Unit-IV (Writing Skills) Documenting Report Writing Making notes Letter writing	12 Hours
Unit - V Translation(from Hindi to English and vice-versa) **Precis writing /Paraphrasing** Literary/Knowledge Texts Paper writing skills	11 Hours

Text Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.

Reference Books:

1. *Language through Literature* (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
2. *On Writing Well*. William Zinsser. Harper Resource Book. 2001
3. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

Course Code: 1CR01-L
Course Name: Programming Lab C/C++

Instructions: Develop all programs in C programming language.

Assignments:

1.	WRITE A PROGRAM to display your name. Write another program to print message with inputted name.
2.	WRITE A PROGRAM to add two numbers.
	WRITE A PROGRAM to find the square of a given number.
3.	
4.	WRITE A PROGRAM to calculate the average of three real numbers.
5.	Write a program to Find ASCII Value of a Character
6.	WRITE A PROGRAM to Find the Size of int, float, double and char
7.	WRITE A PROGRAM to Compute Quotient and Remainder
8.	WRITE A PROGRAM to accept the values of two variables.
9.	WRITE A PROGRAM to find the simple interest, inputs are amount, period in years and rate of interest.
10.	Basic salary of an employee is input through the keyboard. The DA is 25% of the basic salary while the HRA is 15% of the basic salary. Provident Fund is deducted at the rate of 10% of the gross salary(BS+DA+HRA). WRITE A PROGRAM to calculate the net salary
11.	WRITE A PROGRAM to find area of a circle using PI as constant
15.	WRITE A PROGRAM to find the larger of two numbers.
16.	WRITE A PROGRAM to find greater of three numbers using Nested If.

17.	WRITE A PROGRAM to find whether the given number is even or odd.

18.	WRITE A PROGRAM to Generate Multiplication Table Using for loop
19.	WRITE A PROGRAM to Generate Multiplication Table Using while loop
20.	WRITE A PROGRAM to Make a Simple Calculator Using switch...case
21.	WRITE A PROGRAM to find whether the given number is a prime number.
22.	WRITE A PROGRAM using function to find the largest of three numbers
23.	WRITE A PROGRAM using function to print first 20 numbers and its squares.
24.	WRITE A PROGRAM to find the factorial of a given number.
25.	WRITE A PROGRAM to print the sum of two matrices
26.	WRITE A PROGRAM to Find the Length of a String
27.	WRITE A PROGRAM to Copy String using strcpy()
28.	WRITE A PROGRAM to compare a string
29.	WRITE A PROGRAM to reverse a string
30.	WRITE A PROGRAM to reverse a string
31.	WRITE A PROGRAM to multiply two numbers using pointers.
32.	WRITE A PROGRAM to display address of variable using pointers
33.	WRITE A PROGRAM to show the memory occupied by Structure and Union
34.	WRITE A PROGRAM to create Student I-Card using a Structure

35.	WRITE A PROGRAM to read data from a file from a file
36.	WRITE A PROGRAM to save Employee details in a file using File Handling

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Course Code: 1AE01-L
Course Name: Language Lab

Assignments:

1.	Listening Skills • The student should be able to listen to s text read aloud in normal speed with focus on intonation. • After listening the student can fill-in-blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.
2.	Speaking Skill • Reading aloud of dialogues, texts, poems, speeches focusing on intonation. Self-introduction • Role plays on any two-situations. • Telephonic Conversations.
3.	Personality Development • Initiation • Physical Appearance • Audience Purpose
4.	Interpersonal Skills • Appropriate use of non-verbal skills in face to face communication
	[i.e. Viva –Voce, group –interviews, GDs and seminars.]
5.	Presenting in GD, Seminars and Conferences. • Leadership Quality • Time Management • Achieving the target

Second Semester

Subject Code	Course Type	Subject Name	Load Allocation			Marks distribution		Total Marks	Credit
			L	T	P	Internal Marks	External Marks		
2CR01	Core	Database Management System	4	0	0	30	70	100	4
2CR02	Core	Data Structures	4	0	0	30	70	100	4
2CR03	Core	Computer Networks	4	0	0	30	70	100	4
2CR04	Core	Math- II	4	0	0	30	70	100	4
2AE01	Ability Enhancement	Environmental Science	2	0	0	30	70	100	2
2CR01-L	Computer Lab-1	DBMS Lab	0	0	2	25	25	50	2

2CR02-L	Computer Lab-2	Data Structure Lab	0	0	2	25	25	50	2
Semester Total			18	0	4	200	400	600	22

SEMESTER-II

Course Code: 2CR01
Course Name: Database Management System

Detailed contents	Contact hours
Unit-I Introduction of DBMS, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS. Introduction to Data Models, Hierarchical, Network and Relational Model, Comparison of Network, Hierarchical and Relational Model, Entity Relationship Model.	10 Hours
Unit-II Relational Database, Relational Algebra and Calculus, SQL Fundamentals, DDL, DML, DCL, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Triggers.	12 Hours

Detailed Contents	Contact hours
Unit-III Introduction to Normalization, First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Domain-key normal form (DKNF).	12 Hours
Unit-IV Database Recovery, Concurrency Management, Database Security, Integrity and Control. Structure of a Distributed Database, Design of Distributed Databases.	10 Hours

Text Books:

1. "An Introduction to Database System", Bipin C. Desai, Galgotia Publications PvtLtd-New Delhi, Revised Edition, (2012).
2. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudharshan,Tata McGraw Hill, 6th Edition, (2013).

Reference Books:

1. "SQL, PL/SQL The Programming Language of Oracle", Ivan Bayross, BPBPublications, 4th Revised Edition (2009)
2. "An Introduction to Database Systems", C. J. Date, A. Kannan, S. Swamynathan, 8thEdition, Pearson Education, (2006).
3. Database Management Systems, Raghu Ramakrishnan, McGraw-Hill, Third Edition,2014.

Course Code: 2CR02
Course Name: Data Structures

Unit-I **Introduction to Data Structures:** Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm, Introduction and Definition of Data Structure, Classification of Data, Arrays, Various types of Data Structure, Static and Dynamic Memory Allocation, Function, Recursion. **Arrays, Pointers and Strings:** Introduction to Arrays, Definition, One Dimensional Array and Multi-Dimensional Arrays, Pointer, Pointer to Structure, various Programs for Array and Pointer. Strings. Introduction to Strings, Definition, Library Functions of Strings.	10 Hours
Unit-II **Stacks and Queue** Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack and Multiple Stacks. Implementation of Multiple Stack Queues, Introduction to Queue, Definition, Queue Implementation, Operations of Queue, Circular Queue, De-queue and Priority Queue.	8 Hours
Unit-III **Linked Lists and Trees** Introduction, Representation and Operations of Linked Lists, Singly Linked List, Doubly Linked List, Circular Linked List, And Circular Doubly Linked List. **Trees** Introduction to Tree, Tree Terminology Binary Tree, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Tree Traversal, Threaded Binary Tree, AVL Tree B Tree, B+ Tree.	14 Hours
Unit-IV **Graphs and Searching** **Graphs:** Introduction, Representation to Graphs, Graph Traversals Shortest Path Algorithms. **Searching:** Searching, Types of Searching,	8 Hours
Unit-V **Sorting and Hashing** **Sorting:** Searching, Types of Searching, Sorting, Types ofsorting like quick sort, bubble sort, merge sort, selection sort. **Hashing:** Hash Function, Types of Hash Functions, Collision, Collision Resolution Technique (CRT), Perfect Hashing	8 Hours

Course Code: 2CR03
Course Name: Computer Networks

Detailed Contents	Contact hours
Unit-I **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 **Network Topologies:** Bus, Star, Ring, Mesh, Tree, Hybrid **Communication Channels: Wired transmissions:** Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission. **Communication Switching Techniques**: Circuit Switching, Message Switching, Packet Switching.	12 Hours
Unit-II **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. **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)	10 Hours
Unit-III **MAC sub layer:** CSMA/CD/CA, IEEE standards (IEEE802.3 Ethernet, Gigabit Ethernet, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring) **Network Layer:** Design Issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Congestion Control Policies, Leaky bucket and token bucket algorithm, Concept of Internetworking.	12 Hours
Unit-IV **Transport Layer**: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Introduction to TCP/UDP protocols.	10 Hours

Unit-V **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.	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.
4. Douglas E. Comer, "Internetworking with TCP/IP", Volume-I, Prentice Hall,India.

Course Code: 2CR04
Course Name: Mathematics-II

Detailed Contents	Contact hours
Unit-I **SETS & RELATIONS** Definition -Operation on sets, Principal of Inclusion and Exclusion, Difference and symmetric difference of sets, Cartesian products and results related to Cartesian products. Relations- Types of relations, Equivalence relations.	14 Hours
Unit-II **CO-ORDINATE GEOMETRY:** Concept of limits, fundamental theorems on Limits(without proof), 3Dimensional geometry:-co-ordinates of points in space,results of points in space and lines in space,Equation of straight lines in space- vector form,Cartesian form.	14 Hours

Unit-III **PROBABILITY:** Introduction,Sample,Space and events, Conditional Probability, Independent events, Addition and Multiplication theorem on probability, Random variables,Mathematical Expectation, Theorems on Expectations, Variance of a variable in terms of Expectations.	14 Hours
UNIT IV **TRIGONOMETRY :** Trigonometric or Circular Functions,Conditional Identities involving the angles of a triangle, Trigonometric equations,Graphs of trigonometric functions.	14 Hours
UNIT V **FUNCTIONS:** Types of Functions-one to one, onto, into and inverse functions, composition of functions-inverse of composition of functions, Logarithmic and exponential functions,Factorial Functions,Fibonacci sequence.	13 Hours

Text Books:

1. Elements of Discrete Mathematics- C. L L IU
2. Discrete Mathematics- a)Semyour Lipschutz, Marc Lipson ,b) Vinay Kumar.

Reference Books:

1. Fundamentals of Statistics- S.C.Gupta
2. Business Mathematics- Thukral J.K

Course Code: 2AE01
Course Name: Environmental Science

Detailed Contents	Contact hours
Unit-I **Introduction to Environmental Studies** Multidisciplinary nature of Environmental Studies: Scope & ImportanceNeed for Public Awareness	4 Hours

Unit-II **Ecosystems** Concept of an Ecosystem: Structure & functions of an ecosystem (Producers, Consumers& Decomposers) Energy Flow in an ecosystem: Food Chain, Food web and Ecological PyramidsCharacteristic features, structure & functions of following Ecosystems: • Forest Ecosystem • Aquatic Ecosystem (Ponds, Lakes, River & Ocean)	11 Hours
Unit-III **Natural Resources** Renewable & Non-renewable resources Forest Resources: Their uses, functions & values (Biodiversity conservation, role in climate change, medicines) & threats (Overexploitation, Deforestation, Timber extraction, Agriculture Pressure), Forest Conservation Act Water Resources: Their uses (Agriculture, Domestic & Industrial), functions & values,Overexploitation and Pollution of Ground & Surface water resources (Case study of Punjab), Water Conservation, Rainwater Harvesting, Land Resources: Land as a resource; Land degradation, soil erosion and desertification Energy Resources: Renewable & non-renewable energy resources, use of alternate energy resources (Solar, Wind, Biomass, Thermal), Urban problems related to Energy	14 Hours
UNIT IV **Biodiversity & its conservation** Types of Biodiversity: Species, Genetic & Ecosystem India as a mega biodiversity nation, Biodiversity hot spots and biogeographic regions ofIndia Examples of Endangered & Endemic species of India, Red data book	10 Hours
UNIT V **Environmental Pollution & Social Issues** Types, Causes, Effects & Control of Air, Water, Soil & Noise PollutionNuclear hazards and accidents & Health risks Global Climate Change: Global warming, Ozone depletion, Acid rain, Melting ofGlaciers & Ice caps, Rising sea levels Environmental disasters: Earthquakes, Floods, Cyclones, Landslides	10 Hours

UNIT VI **Field Work** Visit to a National Park, Biosphere Reserve, Wildlife Sanctuary Documentation & preparation of a Biodiversity (flora & fauna) register ofcampus/river/forest Visit to a local polluted site: Urban/Rural/Industrial/Agricultural Identification & Photography of resident or migratory birds, insects (butterflies)Public hearing on environmental issues in a village	8 Hours

Text Books:

1. Bharucha, E. Text Book for Environmental Studies. University Grants Commission, New Delhi.
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

Reference Books:

1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

Course Code: 2CR01-L
Course Name: Database Management Systems Laboratory

List of Experiments :	
1.	Used of CREATE, ALTER, RENAME and DROP statement in the database tables (relations)
2.	Used of INSERT INTO, DELETE and UPDATE statement in the database tables (relations)
3.	Use of simple select statement.
4.	Use of select query on two relations
5.	Use of nesting of queries.
6.	Use of aggregate functions.
7.	Use of substring comparison.
8.	Use of order by statement.
9.	Consider the following schema for a Library Database: BOOK (*Book_id, Title, Publisher_Name, Pub_Year*) BOOK_AUTHORS (Book_id, Author_*Name*) PUBLISHER (*Name, Address, Phone*) BOOK_COPIES (*Book_id, Branch_id, No-of_Copies*) BOOK_LENDING (*Book_id, Branch_id, Card_No, Date_Out, Due_Date*) LIBRARY_BRANCH (*Branch_id, Branch_Name, Address*) Write SQL queries to 1. Retrieve details of all books in the library_id, title, name of publisher, authors, number of copies in each branch, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books between Jan 2018 to Jun 2018 3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query. 5. Create a view of all books and its number of copies that are currently available in the Library.

10.	Consider the following schema for Order Database: SALESMAN (*Salesman_id, Name, City, Commission*) CUSTOMER (*Customer_id, Cust_Name, City, Grade, Salesman_id*) ORDERS (*Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id*) Write SQL queries to 1. Count the customers with grades above Amritsar's average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order of a day. 5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.
11.	Write a PL/SQL code to add two numbers and display the result. Read the numbers during run time.
12.	Write a PL/SQL code to find sum of first 10 natural numbers using while and for loop.
13.	Write a program to create a trigger which will convert the name of a student to upper case before inserting or updating the name column of student table.
14.	Write a PL/SQL block to count the number of rows affected by an update statement using SQL%ROWCOUNT
15.	Write a PL/SQL block to increase the salary of all doctors by 1000.

Course Code: 2CR02-L
Course Name: Data Structures Laboratory

Instructions: Programs may be developed in C/C++

List of assignments:

1	Program for using Dynamic Functions (malloc(), calloc(), realloc() and free()) functions.
2	Program to insert, delete and traverse an element from an array
3	Program to merge one dimensional arrays
4	Program for addition and subtraction of two matrices.
5	Program for implementing multiplication of two matrices
6	Implement linear search using one and two dimensional array.
7	Program for implementing selection sort.
8	Program for implementing insertion sort.
9	Program for implementing quick sort.
10	Program for implementing merge sort.
11	Program to calculate length of the string using user defined function.
12	Program to concatenate and compare two strings using user defined function.

13	Program for using the concept of pointer to string.
14	Program to reverse a sentence by recursion.
15	Program to delete all repeated words in string.
16	Program to find the number of vowels, consonants, digits and white space in a string.
17	Program to find the length of the longest repeating sequence in a string.
18	Program to find highest and lowest frequency character in a string.
19	Program for implementing Stack using array.
20	Program for implementing Stack using pointer.
21	Program for implementing multiple stack.
22	Program for converting infix to postfix form.
23	Program for implementing Queue using array.
24	Program for dynamic implementation of queue.
25	Program for implementing circular queue.
26	Program for implementing dequeue.
27	Program for implementing priority queue.
28	Program for implementing Singly Linked list.
29	Program for implementing Doubly Linked list.
30	Program for implementing Binary Search Tree.
31	Program for Breadth First Search (BFS) for graph traversal.
32	Program for Depth First Search (DFS) for graph traversal.

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
Unit-I **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 **Network Topologies:** Bus, Star, Ring, Mesh, Tree, Hybrid	12 Hours
Communication Channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission. **Communication Switching Techniques**: Circuit Switching, Message Switching, Packet Switching.	
Unit-II **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. **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)	11 Hours
Unit-III **MAC sub layer:** CSMA/CD/CA, IEEE standards (IEEE802.3 Ethernet, Gigabit Ethernet, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring) **Network Layer:** Design Issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Congestion Control Policies, Leaky bucket and token bucket algorithm, Concept of Internetworking.	12 Hours

Unit-IV **Transport Layer**: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Introduction to TCP/UDP protocols. **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.	12 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.

Course Code: 3CR02
Course Name: Programming in JAVA

Detailed Contents	Contact hours
Unit-I Introduction to Java Features of java JDK Environment & tools like(java, javac, appletviewer, 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 array Types of Array - One Dimensional arrays - Two Dimensional array String - Arrays , Methods. - StringBuffer class	12 Hours
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, Method Overriding 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, Hashtable Wrapper classes	12 Hours

Unit-III Collection Collection Framework. Interfaces - Collection - List - Set - SortedSet - Enumeration - Iterator - ListIterator Classes - LinkedList - ArrayList - Vector - HashSet - TreeSet - Hashtable Working with maps Map interface Map	8 Hours
classes - HashMap - TreeMap	
Unit-IV File and Exception Handling Exception types Using try catch and multiple catch Nested try, throw , throws and finally Creating user defined Exceptions File Handling Stream ByteStream Classes CharacterStream Classes File IO basics File operations Creating file Reading file(character, byte) Writing file (character, byte)	8 Hours

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 container used in AWT Layout managers Listeners and Adapter classes Event Delegation model Swing Introduction to Swing Component and Container Classes	12 Hours

Text Books:

1. Programming with JAVA - E Balgurusamy

Reference Books:

2. The Complete Reference – JAVA Herbert Schildt

Course Code: 3CR03
Course Name: Fundamentals of Statistics

Detailed Contents	Contact hours

Unit I Statistics and Probability: Introduction to Statistics – Origin of Statistics, Features of Statistics, Scope of Statistics, Functions ofStatics, Uses and importance of Statistics, Limitation of Statistics, Distrust of Statistics Collection of Data: Introduction to Collection of Data, Primaryand Secondary Data, Methods of Collecting Primary Data, Methods of Secondary Data, Statistical Errors, Rounding off Data (Approximation).	8 hours

Unit II Classification of Data Frequency Distribution: Introduction Classification of Data, Objectives of Classification, Methods of Classification, Ways to Classify Numerical Data or Raw Data. 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.	12 hours
Unit III 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.	12 hours
Unit IV Measures of Dispersion: Meaning of Dispersion, Objectives of Dispersion, Properties of a good Measure of Dispersion, Methods of Measuring Dispersion, Range Introduction, Calculation ofRange , Merit and Demerits of Range	8 hours
Unit V 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

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)

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.	12 hours
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.	12 hours
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	8 hours
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.	8 hours
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.	8 hours

Text Books:

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

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.

Course Code: 3OE01
Course Name: Open Elective –I (Data Mining)

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.	12 hours
Unit II Data pre-processing – Data cleaning – Data Integration and Transformation – Data Reduction – Discretization and concept hierarchy generation – Data mining primitives – Data mining Task	12 hours
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	8 hours
Unit IV Cluster Analysis – A categorization of Major clustering methods - Partitioning methods- Hierarchical methods – Grid based methods -Model based clustering methods – Density – based methods	8 hours
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.	8 hours

Text Book:

1. Jiwei Han, Michelien 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 & TroubleshootingLab

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 MessmerPC Hardware: A Beginner's Guide by Ron Gilster

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Course Code: 3CR01-L

Course Name: JAVA Lab

List 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

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 Matematics

Open Elective – III

1. Web technology
2. Computer Graphics

Course Code: 4CR01

Course Name: Programming in Python

Detailed Contents	Contact hours
Unit-I **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. **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. **Operators and Expressions:** Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators.	12 Hours

Unit-II **Control Structures:** Decision making statements, Python loops, Python control statements. **Python Native Data Types:** Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations).	10 Hours
Unit-III **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. **Python Modules:** Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, Standard Modules, Python Packages.	12 Hours
Unit-IV **Exception Handling:** Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python. **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. **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.	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.

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, SeventhEdition, 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

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)Serial communication 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-Output programming	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
Unit-I **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 **Network Topologies:** Bus, Star, Ring, Mesh, Tree, Hybrid **Communication Channels: Wired transmissions:** Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission. **Communication Switching Techniques**: Circuit Switching, Message Switching, Packet Switching.	12 Hours
Unit-II **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. **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)	10 Hours
Unit-III **MAC sub layer:** CSMA/CD/CA, IEEE standards (IEEE802.3 Ethernet, Gigabit Ethernet, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring) **Network Layer:** Design Issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Congestion Control Policies, Leaky bucket and token bucket algorithm, Concept of Internetworking.	12 Hours
Unit-IV **Transport Layer**: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Introduction to TCP/UDP protocols. **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.	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.

Course Code: 4OE01 (Open Elective – II)
Course Name: Discrete Mathematics

Detailed Contents	Contact hours
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.	12 Hours
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	10 Hours

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, maniu [pulatio n of relations, transitive closure and warshall's algorithm.Functions- definition and introduction , function for computer science, permutation functions, **Unit-IV** Graph Theory Basic concept of graph theory, euler paths and circuits,Hamiltonian paths and circuits. Other relation and structure – partaily Ordered sets,Lattices,Finite Boolean algebras, functions of Boolean algebras, Boolean function as Bollean polynomials. Tress - introduction ,undirected	12 Hours
trees, minimal spanning trees.	
Unit-V Semi groups and groups Binary Operations revisited, Semi groups, products and quotient s of Semigroups, groups, product s and quotients of groups. Introduction to compatibility Theory-Languages , Finite state Machines, semigroups,Machines and languages.	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
Unit-I **Internet Basics** Basic concepts, communicating on the internet, internet domains, internet server identities, establishing connectivity on the internet client IP address. **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.	8 Hours
Unit-II **Lists** Type of Lists (Unordered List (Bullets), Ordered Lists (Numbering), Definition Lists. **Adding Graphics To Html Documents** Using The Border Attribute, Using The Width And Height Attribute, Using The Align Attribute, Using The Alt Attribute. **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 **Linking Documents** Links (External Document References, Internal Document References), Image As Hyperlinks. **Frames** Introduction to Frames: The<FRAMESET> tag, The <FRAME> tag, Targeting Named Frames. DHTML: Cascading Style Sheets, Style Tag.	9 Hours
Unit-III **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 Reset (Button) Element, The Checkbox Element, The Radio Element, The Text Area Element, The Select and Option Element, The Multi Choice Select Lists Element).	8 Hours

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 EveryOne: 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
Unit-I **Introduction to Computer Graphics** Applications of Computer Graphics. Graphs and Types of Graphs **Input Devices:** Light Pens, Graphic Tablets, Joysticks, Track Ball, Data Glove, Digitizers, Image Scanner. **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. **Introduction Virtual Reality & Environments:** Applications in Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.	11 Hours
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.	11 Hours
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.	10 Hours
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.	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.

Fifth Semester

Subject Code	Course Type	Subject Name	Load Allocation			Marks distribution		Total Marks	Credit
			L	T	P	Internal Marks	External Marks		
5CR01	Core	Dot Net Programming	3	0	0	30	70	100	4
5OE02	Elective- IV	Open Elective – IV	4	0	0	30	70	100	4
5OE03	Elective- V	Open Elective – V	4	0	0	30	70	100	4
5SK01	Skill Enhancement	Programming in PHP	4	0	0	30	70	100	3
5AE01	Ability Enhancement	Mini Project	0	0	2	25	25	50	2
5CR01-L	Computer Lab-1	Dot Net Lab	0	0	2	25	25	50	2
5SE02-L	Skill EnhancementLab- 2	PHP Lab	0	0	2	25	25	50	2
Semester Total			18	0	4	195	355	550	21

Open Elective – IV

1. Internet of Things
2. Artificial Intelligence

Open Elective – V

1. Multimedia & E-Commerce
2. Computer Network Security

Course Code: 5CR01
Course Name: Dot Net Programming

Objective: To gain knowledge about the methodologies behind VB.Net and ASP.Net and helps the students to develop Dot Net based application using ADO.NET and SQL Managed Provider-OLEDB Managed Provider.

Unit I

Introduction to . NET Framework, Introducing VB.NET: New Object Oriented Capabilities- Inheritance- Parameterized Constructors- Overriding- Overloading- Shared Members- Events- Exception Handling-.NET Framework Class Hierarchy-The System Namespace. File I/O: Using the System.IO Hierarchy- Streaming text in and out of Text Files- Object Serialization and Deserialization.

Unit II

Introduction to ADO.NET: Comparison between ADO & ADO.NET—The difference between Connection Model & Disconnected Model – difference between the DataSet and RecordSet- The Dataset Model. Accessing Data using ADO.NET: dataset-DataAdapterDataRelation. The two Managed Providers: SQL Managed Provider-OLEDB Managed Provider. The ADO.NET Object Model: OleDbConnection /SQLConnectionOleDbCommand/SQLCommand-OleDbDataReader/SQLDataReaderOleDbDataAdapter/SQLDataAdapter-The DataSet.

Using the Binding Manager to bind controls to the data - Working with Master-Detail relationship.

Unit III

Differences between ASP and ASP.NET. ASP.NET Web Forms: The code behind Web Form-Separations of content & Business logic-Life Cycle of a Web Form Page-Stages in Web Form Processing.

Unit IV

ASP.NET Server Controls. Web Forms Server Controls Recommendation: Validation Controls-Controls that incorporate logic to validate user inputs like a required field, between ranges, or pattern matching. ASP.NET Data Access: Data Binding Server Controls-Viewing Data Collections in a Grid. ASP.NET Caching Mechanism for caching Dynamic response data. Page Output Caching.

Unit V

WebServices: Introduction to webservice-Architecture of Web service: Universal Discovery Description and Integration-Web Service Description Language –Accessing webservice using different Clients.

Recommended Text Books:

1. Chris Ullman, John Kauffman, Beginning ASP.NET
2. ADO.NET Professional, Wrox Publication
3. Alex Homer, Dave Sussman, Professional ASP.NET
4. .NET Framework, OREILY Publication.

Reference books:

1. Crouch, ASP.NET and VB.NET Web Programming, Pearson Education
2. Richard Blair, Mathew Renolds, Beginning VB.NET 2003, 3rd edition, Wrox Publication
3. Bill Evjen, Billy, Hollis, et al, Professional VB.NET 2003, 3rd edition, Wrox Publication
4. Deitel and Deitel, Visual Basic.NET How to Program, Pearson Education,2nd edition Greg Buczek, ASP.NET Developer's Guide, Tata McGraw-Hill, 2002.

Course Code: 5OE02
Course Name: Internet of Things

Pre-Requisite: Basic understanding of electronics and microprocessors. Course Objectives: 1. The Internet of Things (IoT) is aimed at enabling the interconnection and integration of the physical world and the cyber space. 2. To learn about SoC architectures, programming Raspberry Pi and implementation of internet of things and protocols.

Expected Learning Outcomes:

1. Enable learners to understand System On Chip Architectures.
2. Introduction and preparing Raspberry Pi with hardware and installation.
3. Learn physical interfaces and electronics of Raspberry Pi and program them using practical‟s
4. Learn how to design IoT based prototypes.

Unit 1

System on Chip (SoC) and Internet of Things (IoT) Overview - System on Chip: What is System on chip? Structure of System on Chip. - SoC products: Field Programmable Gate Array (FPGA), General Purpose Graphics Processing Units (GPU), Accelerated Processing Unit (APU), Compute Units. -The IoT paradigm giving overview of IoT supported Hardware platforms such as: Raspberry pi, SoC on ARM 8 Processors, Arduino and Intel

Galileo boards. -Network Fundamentals: Wired Networking(Router, Switches), Wireless Networking(Access Points) -Introduction to Raspberry Pi: Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. -Raspberry Pi Boot: Learn how this

small SoC boots without BIOS. Configuring boot sequences and hardware. -Introduction to IoT: What is IoT? IoT examples, Simple IoT LED Program. -IoT and Protocols -IoT Security: HTTP, UPnp, CoAP, MQTT, XMPP. -IoT Service as a Platform: Clayster, Thinger.io, SenseIoT, carriots and Node RED. -IoT Security and Interoperability: Risks, Modes of Attacks, Tools for Security and Interoperability.

Unit 2

Programming Raspberry Pi Raspberry Pi and Linux: About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands Programing interfaces: Introduction to Node.js, Python. Raspberry Pi Interfaces: UART, GPIO, I2C, SPI Useful Implementations: Cross Compilation, Pulse Width Modulation, SPI for Camera.

Unit 3

Case Study & advanced IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino)

Unit 4

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

TEXT BOOKS:

1. 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann
4. Internet of Things : A hands- on Approach by Arshdeep Bahga, Vijay Madisetti
5. IoT Programming: A Simple and Fast Way of Learning IOT by David Etter

REFERENCES:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning
2. Internet of Things (A Hands-on-Approach) , Vijay Madisetti , Arshdeep Bahga
3. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
4. “Mobile Computing,” Tata McGraw Hill, Asoke K Talukder and Roopa R Yavagal, 2010.

Course Code: 5OE02
Course Name: Artificial Intelligence

Unit I

Introduction: Intelligent Agents, Agents and environments, Good behaviour, The nature of environments, structure of agents, Problem Solving, problem solving agents, example problems, searching for solutions, uniformed search strategies, avoiding repeated states, searching with partial information.

Unit II

Searching Technique: Informed search and exploration, Informed search strategies, heuristic function, local search algorithms and optimistic problems, local search in

continuous spaces, online search agents and unknown environments, Constraint satisfaction problems (CSP), Backtracking search and Local search for CSP, Structure of problems, Adversarial Search, Games, Optimal decisions in games, Alpha, Beta Pruning, imperfect real-time decision.

Unit III

Knowledge Representation: First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects.

Unit IV

Learning: Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

Unit V

Applications: Communication ,Communication as action, Formal grammar for a fragment of English, Syntactic analysis, Augmented grammars, Semantic interpretation, Ambiguity and disambiguation, Discourse understanding, Grammar induction, Probabilistic language processing, Probabilistic language models, Information retrieval, Information Extraction, Machine Translation.

TEXT BOOK

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, 2004

Course Code: 5OE03
Course Name: Multimedia And E-Commerce

UNIT–I

Multimedia: Needs and areas of use, Development platforms for multimedia – DOS, Windows, Linux. Identifying Multimedia elements – Text, Images, Sound, Animation and Video. Text – Concepts of plain & formatted text, RTF & HTML texts, Conversion to and from of various text formats, Text compression principles, Source Encoder and Destination Decoder. Images – Importance of graphics in multimedia, Vector and Raster graphics, image capturing methods – scanner, digital camera etc. various attributes of Images – size, color, depth etc, Various Image file format – BMP, DIB, EPS, CIF, PEX, PIC, JPG, TGA, PNG and TIF format – their features and limitations.

UNIT–II

Animation: Basics of animation, Principle and use of animation in multimedia, Effect of

resolutions, pixel depth, Images size on quality and storage. Overview of 2-D and 3-D animation techniques and software. Animation on the Web – features and limitations, Software for animation.

UNIT III:

INTRODUCTION (14 Hrs) Meaning, Concepts, Features, Functions, Categories of E-Commerce, Scope, Advantages and Limitation of E-Commerce, E-Commerce practices v/s Traditional practices, E-Commerce and the Trade Cycle.

UNIT IV:

FUNDAMENTAL OF E-COMMERCE (14 Hrs) Types of e-commerce- B2B, B2C, C2C, and P2P, B2B service provider, e-distributor, Procurement, Importance of E-Commerce, Internet and its role in e-commerce, procedure of registering Internet domain, Tools and Services of Internet.

UNIT V:

E-COMMERCE IN INDIA (13 Hrs) State of e-commerce in India, Problems and Opportunities in e-commerce in India, Legal Issues, Future of e-commerce, Applications in E-Commerce: E-commerce applications in Manufacturing, Wholesale, Retail and Service sector.

TEXT BOOKS

1. Multimedia: Making It Work (4 th Edition) – by Tay Vaughan, Tata Mcgraw Hills.
2. Fundamentals of Multimedia – Ze-Nian Li and Mark S. Drew, Pearson Prentice Hall.
3. Daniel Amor: "E Business R(Evolution)" Pearson Edude.
4. Krishnamurthy: "E-Commerce Management" Vikas Publishing House.

Course Code: 5OE03
Course Name: Computer Network Security

UNIT-I

Introduction: Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

UNIT-II

Network Security: Authentication Application: Kerberos, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

UNIT-III

IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load combining Security Associations, Key Management.

UNIT-IV

Web Security: Requirement, Secure Sockets Layer, Transport Layer Security, and Secure Electronic Transactions.

UNIT-V

Network Management Security: Overview of SNMP Architecutre-SMMPVI1 Communication Facility, SNMPV3.

UNIT-VI

System Security: Intruders, Viruses and Related Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management

Reference Books:

1. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000.
2. W.Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000.

Course Code: 5SK01
Course Name: Programming In PHP

Objective To understand the concepts of PHP and MySQL.

UNIT-I 12 hours Introduction: What is PHP? – History of PHP – Installing PHP – Language Basics: Lexical Structure – Data types – What's a Variable?– PHP variable and value types – Using PHP Variables – Expression and Operators – #Flow Control statements#.

UNIT-II 12 hours Functions: Calling a function – Defining a function – Introduction to Strings – Comparing Strings – Manipulating and Searching strings – #Arrays: Types of Arrays# – Array functions – Storing data in Arrays.

UNIT-III 12 hours Form Handling – Form Validation – $_GET variable – $_ POST variable – $_REQUEST variable – Creating the Form –#Creating the Upload script# – Using your File system: File paths and permissions – Displaying directory contents – Working with fopen( ) and fclose( ).

UNIT-IV 12 hours Using Cookies: What are Cookies? – Setting Cookies – Using Cookie variables – Session Basics: What's a session? – Understanding Session variables – Managing User preferences with Sessions – Graphics: Drawing functions – #Creating and Drawing images#.

UNIT-V 12 hours Installing and Configuring M ySQL – Establishing a connection and poking around – Creating a database table – Inserting data into the table – #Selecting and displaying data3

Text Book Julie Meloni and Matt Telles, PHP 6, Course Technology, CENGAGE Learning, India Edition, 2008. UNIT I : Chapters - 3, 5 UNIT II: Chapter 6 UNIT III: Chapters – 9,10 UNIT IV: Chapters 16, 17 UNIT V:Chapters 1,11,12,13,14 Books for Reference Kevin Tatroe, Peter MacIntyre and RasmusLerdorf, Programming PHP, O'REILLY media , 3rd edition, 2013. SEMESTER – VI :COR

Course Code: 5AE01
Course Name: Mint Project

COURSE OBJECTIVES:

To introduce the students to the methodology of solving a problem and preparing a report• using the steps of software engineering.

LEARNING OUTCOMES:

Student understand the methodology of solving a problem and submit a report on• completion of the same.

Creation of a Database and performing the operations given below using a Menu Driven Program to perform

a) Insertion

b) Deletion
c) Modification
d) Generating a simple Report for the following

PHP LAB(5CR01-L)

1. Write a PHP program to find the factorial of a number. 2 hours
2. Write a PHP program using Conditional Statements. 2 hours

3. Write a PHP program to find the maximum value in a given multi dimensional array. 2 hours 4. Write a PHP program to find the GCD of two numbers using user-defined functions. 2 hours
5. Design a simple web page to generate multiplication table for a given number using PHP. 3 hours
6. Design a web page that should compute one's age on a given date using PHP. 2 hours
7. Write a PHP program to download a file from the server. 2 hours
8. Write a PHP program to store the current date and time in a COOKIE and display the 'Last Visited' date and time on the web page. 2 hours
9. Write a PHP program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page. 3 hours
10. Write a PHP program to draw the human face. 3hours
11. Write a PHP program to design a simple calculator. 4 hours
12. Design an authentication web page in PHP with MySQL to check username and password. 3hours

NET PROGRAMMING LAB(5CR02-L)

1. Dynamic Polymorphism
2. Exception Handling
3. File Handling
4. Serialization
5. Array list
6. Fetch data from database using disconnected architecture
7. Fetch data from database using data binding and navigation
8. Fetch data from database using active connection
9. Login page
10. Display number of bits
11. Register page
12. Combo box
13. Output caching
14. Fetch data from XML
15. Web service to perform calculations
16. Client application connected to web services to perform calculation
17. Web service to display data structure
18. Web application using web service data

Sixth Semester

Subject Code	Course Type	Subject Name	Load Allocation			Marks distribution		Total Marks	Credit
			L	T	P	Internal Marks	External Marks		
5OE01	Elective- VI	Open Elective – VI	3	0	0	30	70	100	4
5OR02	Elective- VII	Open Elective – VII	4	0	0	30	70	100	4
5OE01	Skill Enhancement	Android Programming	4	0	0	30	70	100	3
5SE01	Ability Enhancement	Mentoring and Professional Development	0	0	2	25	25	50	2
5CR01-L	Skill Enhancement Lab- 2	Android Programming Lab	0	0	2	25	25	50	2
5CR02-L	Skill Enhancement Lab- 3	Project Work	0	0	2	25	25	50	2
Semester Total			18	0	4	165	285	450	17

Open Elective – VI

1. Organization Behaviour
2. Principles of Management

Open Elective – VII

1. Business Communication
2. Unix and Shell Programming

Course Code: 5OE01
Course Name: Organization Behaviour

Module-1 OB: Learning objectives, Definition & Meaning, Why to study OB, An OB model, New challenges for OB Manager LEARNING: Nature of learning, How learning occurs, Learning & OB Case Study Analysis

Module-2 PERSONALITY: Meaning & Definition, Determinants of Personality, Personality Traits, Personality & OB PERCEPTION: Meaning & Definition, Perceptual process, Importance of Perception in OB MOTIVATION: Nature & Importance, Herzberg's Two Factor theory, Maslow's Need Hierarchy theory, Alderfer's ERG theory Case Study Analysis

Module-3 COMMUNICATION: Importance, Types, Barriers to communication, Communication as a tool for improving Interpersonal Effectiveness GROUPS IN ORGANISATION: Nature, Types, Why do people join groups, Group Cohesiveness & Group Decision Making- managerial Implications, Effective Team Building LEADERSHIP: Leadership & management, Theories of leadership- Trait theory, Behavioural Theory, Contingency Theory, Leadership & Followership, How to be an Effective Leader CONFLICT: Nature of Conflict & Conflict Resolution TRANSACTIONAL ANALYSIS: An Introduction to Transactional Analysis Case

Study Analysis

Module-4 ORGANISATIONAL CULTURE: Meaning & Definition, Culture & Organisational Effectiveness HUMAN RESOURCE MANAGEMENT: Introduction to HRM, Selection, Orientation ,Training & Development, Performance Appraisal, Incentives ORGANISATIONAL CHANGE: Importance of Change, Planned Change & OB Techniques INTERNATIONAL OB: An Introduction to Individual & Interpersonal Behaviour in Global Perspectives Case Study Analysis.

Referential Books: 1. Organizational Behavior Text, Cases and Games- By K.Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005) 2.Organizational Behavior Human Behavior at Work By J.W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition (2007) 3 Organizational Behavior - By Fred Luthans 4 Organizational Behavior - By Super Robbins

Course Code: 5OE01
Course Name: Principles of Management

UNIT – I Management: Meaning & concept, Management principles (Fayol & Taylor), Management process (in brief), Managerial levels, Roles & skills of a manager, Management Theories (Classical, Neo classical, Behavioral, Systems & Contingency)

UNIT – II: Planning: Meaning, Purpose & process, Decision making: Concept & process, Organizing: Process, Departmentation, Authority & Responsibility relationships, Decentralization. Staffing: Nature & Importance

UNIT-III Staffing: Concept, nature & importance of staffing. Directing: Motivation: concept & theories (Maslow's, Herzberg Two factor, McGregor's theory X & Y) , Leadership: Concepts & styles. Controlling: Nature, Importance, significance & Process of control.

UNIT – IV Managing People - Meaning, Need of understanding human behavior in organization, Models of OB, Major concepts in OB (elementary)- Personality, Learning, Perception & Attitude Building.

UNIT – V Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management.

Reference Books: 1. Essential of Management – Horold Koontz and Iteinz Weibrich- McGraw-Hill's International 2. Management Theory & Practice – J.N.Chandan 3. Essential of Business Administration – K.Aswathapa, Himalaya Publishing House 4. Principles & practice of management – Dr. L.M.Prasad,, Sultan Chand & Sons – New Delhi 5. Business Organization & Management – Dr. Y.K.Bhushan 6. Management: Concept and Strategies by J.S. Chandan, Vikas Publishing 7. Principles of Management, By Tripathi, Reddy Tata McGraw Hill 8. Business organization and Management by Talloo, Tata McGraw Hill

Course Code: 5OR02
Course Name: Business Communication

UNIT-I Means of Communication: Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication

UNIT-II Types of Communication: Oral Communication: Meaning, nature and scope – Principle of effective oral communication – Techniques of effective speech – Media of oral communication (Face-to-face conversation – Teleconferences – Press Conference – Demonstration – Radio Recording – Dictaphone – Meetings – Rumour – Demonstration and Dramatisation – Public address system – Grapevine – Group Discussion – Oral report – Closed circuit TV). The art of listening – Principles of good listening.

UNIT-III Written Communication Purpose of writing, Clarity in Writing, Pricinciple of Effective writing, Writing Techniques, Electronic Writing Process.

UNIT-IV 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.

UNIT-V Drafting of business letters: Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters – Circular letters Application for employment and resume

UNIT-VI 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 of communication

Reference Books :

1) Business Communication – K.K.Sinha – Galgotia Publishing Company, New Delhi.
2) Media and Communication Management – C.S. Rayudu – Hikalaya Publishing House, Bombay.
3) Essentials of Business Communication – Rajendra Pal and J.S. Korlhalli- Sultan Chand & Sons, New Delhi.
4) Business Communication (Principles, Methods and Techniques) Nirmal Singh – Deep & Deep Publications Pvt. Ltd, Delhi.
5) Business Communication – Dr.S.V.Kadvekar, Prin.Dr.C.N.Rawal and Prof.Ravindra Kothavade- Diamond Publications, Pune.
6) Business Correspondence and Report Writing – R.C. Sharma, Krishna Mohan – Tata McGraw-Hill Publishing Company Limited, New Delhi.

Course Code: 5OR02
Course Name: Unix And Shell Programming

Course Objectives: This course will enable students to: • Learn basic commands to interact with UNIX System and VI editor. • Understand the history, origin, features and architecture of UNIX Operating System. • The usage of various commands in UNIX environment. • Develop the ability to evaluate regular expressions and use them for pattern matching. • Apply essential facets of SHELL programming in order to solve the SHELL script problems.

Module - I INTRODUCTION: The UNIX operating system, Linux and GNU, The UNIX architecture, features of UNIX, POSIX and Single UNIX specification, Internal and External commands, Command structure, man browsing and manual pages on-line. File System: The parent – child relationship, the HOME variable, pwd, cd, mkdir, absolute pathname, relative pathname. 08 Hours Mod

Module – II Vi editor: Basics, input mode, saving text and quitting, searching for a pattern (| and ?), substitution- search and replace(:s). Basic file attributes: ls: listing directory contents, the UNIX file system, ls –l, -d option, file ownership, file permissions, chmod, directory permissions, changing file ownership. More file attributes: File systems and inodes, hard links, symbolic links and ln, the directory, umask, modification and access times, find.

Module – III Process basics: ps: process status, system processes(-e or –a), mechanism of process creation, process states and zombies, running jobs in background, nice:job execution, job control. Simple filters: pr, head, tail, cut, paste, sort, uniq, tr. Filters using regular expressions – grep and sed: grep, Basic Regular Expressions (BRE), Extended Regular Expressions (ERE) and egrep.

Module – IV Simple filters: sed: the stream editor, line addressing using multiple instructions (-E and -F) context addressing, writing selected lines to a file (w), text editing, substitution (s), basic regular expression revisited. The shell: The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables.

Module – V Essential shell programming: Shell scripts, read using command line arguments, exit and exit status of command, the logical operators and ||, the if conditional, using test and {} to evaluate expression. The case conditional, expr, $0, while, for, debugging.

Text Book: 1. Sumitabha Das: "UNIX – Concepts and Applications", (Chapters 1,2,4,6-9,11-14,17,19), Tata McGraw Hill, Noida, 4th Edition, 15th Reprint, 2011, ISBN-13: 978-0-07-063546-3. Reference Books: 1. Behrouz A. Forouzan and Richard F. Gilberg: "UNIX and Shell programming", Cengage Learning, India, 1st Edition, 2005, ISBN: 81-35-0325-9. 2. M G Venkatesh Murthy: "UNIX and Shell programming", Pearson Education, Delhi, 1st Edition, 2005, ISBN: 81-7758-745-5.

Course Code: 5OR02
Course Name: Android Programming

Unit 1
Introduction: What is Android?, Android Architecture, Setting Android Environment, Android SDK Manager & required Packages, Using Android Studio, Android Virtual Device(AVD), Creating First Android Application, Package Structure

Unit 2
Introduction to Gradle, Running the Application, Views, Layouts and more. Introduction to Views: TextView, EditText View, RadioButton and CheckBox View, Button View, ImageView and ImageButton View, Toast, Notifications.

Unit 3
Introduction to Layouts/ViewGroups: Linear Layout, Relative Layout, Tabular Layout, Hierarchical Layout Arrangements, Adapter and Adapter View, Using ListView and GridView, SQLite Database.

Unit 4
Spinner in Android, Working with Spinners, Margin and Padding, Working with EditText and TextView, RadioGroup, RadioButton and CheckBox, AutoCompleteTextView in Android, Android Core and Projects.

Unit 5
Location Based Services: Sending Email, Sending SMS, Phone Calls Activity in Android, Intents in Android, Introduction to Fragments, Working with Fragments

Suggested Readings: Android Programming for Beginners by John Horton Publisher: Packt Publishing• Learn Java for Android Development (2nd edition) by Jeff Friesen Publisher: Apress• Android application development for java programmers. By James C. Sheusi.• Publisher: Cengage Learning, 2013. Beginning Android Programming with Android Studio, Fourth Edition by Jerome F.• DiMarzio Publisher: John Wiley & Sons Android Programming: The Big Nerd Ranch Guide by Kristin Marsicano , Chris• Stewart , Bill Phillips Publisher: Big Nerd Ranch Guides

Course Code: 5SE01
Course Name: Mentoring And Professional Development

Guidelines regarding Mentoring and Professional Development The objective of mentoring will be development of: • Overall Personality • Aptitude (Technical and General) • General Awareness (Current Affairs and GK) • Communication Skills • Presentation Skills The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Part A (Class Activities)
1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B (Outdoor Activities)

1. Sports/NSS/NCC
2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

Course Code: 5CR01-L
Course Name: Android Programming

COURSE OBJECTIVES: To build programming logic and thereby developing skills in Programming.• To help students in learning the basics of android studio.• To aid students in understanding how to use the android studio and use the databases
.
LEARNING OUTCOMES: Enable to build programming logic and thereby developing skills in Programming.• Enables the students to develop their own applications.• Enable students to develop the skills to become entrepreneurs.

PART-A
1. Create an android application to demonstrate any five types of textboxes.
2. Create an android application to demonstrate Checkboxes.
3. Create an android application to demonstrate radio buttons.
4. Create an android application to demonstrate ImageView.
5. Create an android application to demonstrate ScrollView.
6. Create an android application to demonstrate ListView.
7. Create an android application to demonstrate GridView.

PART-B
1. Create an android application to demonstrate page navigation.
2. Create an android application to demonstrate any three types of layouts.
3. Create a simple calculator application.
4. Create an android application to demonstrate MapView.
5. Create an android application to demonstrate registration form.
6. Create an android application to demonstrate login form by connecting to the database.
7. Create an android application to retrieve a data from the database and display it.

Course Code: 5CR02-L
Course Name: Project Work

Practical Training and Project Work: 1. Project Work may be done individually or in groups(maximum three) in case of bigger projects. However if project is done in group each student must be given a responsibility for a distinct module and care should be taken to monitor the individual student. 2. Project Work can be carried out in the college or outside with prior permission of college. 3. The Student must submit a synopsis of the project report to the college for approval. The Project guide can accept the project or suggest modification for resubmission. Only on acceptance of draft project report the student should make the final copies. 4. The project report should be hand written.

Submission Copy: The Student should submit spiral bound copy of the project report. Format of the Project:

(a) Paper: The Report shall be typed on White Paper of A4 size.
(b) Final Submission: The Report to be submitted must be original.
(c) Typing: Font:- Times New Roman Heading:- 16 pt., Bold Subheading:- 14 pt, Bold Content:- 12 pt. Line Spacing:- 1.5 line. Typing Side :-One Side Font Color:- Black.
(d) Margins: The typing must be done in the following margin: Left : 0.75" Right: 0.75" Top: 1" Bottom: 1" Left Gutter: 0.5"
(e) Binding: The report shall be Spiral Bound.
(f) Title Cover: The Title cover should contain the following details: Top: Project Title in block capitals of 16pt. Centre: Name of project developer's and Guide name. Bottom: Name of the university, Year of submission all in block capitals of 14pt letters on separate lines with proper spacing and centering.
(g) Blank sheets: At the beginning and end of the report, two white blank papers should be provided, one for the Purpose of Binding and other to be left blank.
(h) Content:
I). Acknowledgement
II). Institute/College/Organization certificate where the project is being developed. 36

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