



GIET UNIVERSITY, GUNUPUR, ODISHA
School of Engineering & Technology
Department of Computer Science & Engineering

Detailed Syllabus
For
Graduate Programme
Regulation 2020



BACHELOR OF COMPUTER APPLICATIONS



GIET UNIVERSITY, GUNUPUR, ODISHA
School of Engineering & Technology
Department of Computer Science & Engineering

1st Semester [First Year]

Category	Course Particulars		Credit Particulars				Evaluation							Credits
	CourseCode	CourseName	Hours Per Week				THEORY			PRACTICAL			Total Marks	
			L	T	P	C	CIA	SEE	Total	CIA	SEE	Total		
Professional Core Courses	BCA20101	English for Technical Communications	5			4	70	30	100	-	-	-	100	4
Professional Core Courses	BCA20102	Environmental Studies	5			4	70	30	100	-	-	-	100	4
Professional Core Courses	BCA20103	C Programming	4			4	70	30	100	-	-	-	100	4
Professional Core Courses	BCA20104	Basic Mathematical Computation	4			4	70	30	100	-	-	-	100	4
	BCA20105	Programming Lab with C			2	1				30	70	100	100	1
	BCA20106	English for Technical Communications			2	1				30	70	100	100	1
Total			18		4	18			400			200	600	18



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20601	English Language and Communication	5	0	0	4	A
<p>UNIT:1 Introduction to Business Communicatio: Meaning and Importance, Process of Communication, Channels of Communication, Nature of Technical Communication , Formal and Informal Communication Networks, Grapevine,Barriers to effective Communication, Case Studies.</p>						
<p>UNIT: 2 Corporate Communication: Corporate Etiquette and Office Dynamics,SWOT Analysis. Principles of Oral Presentation- i) Factors affecting presentation ii) Presentation with Multimedia iii) Learning Effective Presentation skills ,GD- Protocol and Practice e. PI- Protocol and Practice.</p>						
<p>UNIT: 3 Writing Skills: Planning Business Messages: Rewriting & edition- The First Draft, Reconstruction of the Final Draft. Business Letters: Sales Letter, Complaint Letter, Reply To Complaint, Placing Order, Enquiry Letter, Reply to enquiry, Request Letter & Job Application Letter & Resume, CV, Memo, Notice, Agenda, Minutes .Modern Forms of Communication: Fax and E-Mail Writing Practices. Reports i) Nature & Significance ii) Types of Report iii) Different Formats of Report iv) Writing Strategies. Proposals i) Nature & Significance ii) Types of Proposal iii) Structure & Writing Strategies .Note Taking and Note Making</p>						
<p>UNIT: 4Non-Verbal Communication: Significance and Importance ,Body Language: Meaning,Reading and Language Comprehension :Strategies for reading Comprehension, Comprehension of Technical Materials, Précis Writing.Effective Listening (4L) a. Process b. Hearing and Listening c. Types of Listening,Effective Listening :Process , Hearing and Listening , Types of Listening,Barriers, Listening Exercise</p>						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
<p>Text Books: 1.Monipally: Business Communication Strategies, Tata McGraw Hill 2. Madhukar: Business Communication; Vikas Publishing House</p>						
<p>Reference Books: 1.Ghanekar: Communication Skill for Effective Management; EPH 2. Sharma: Business Correspondence & Report Writing; TMH</p>						



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Subject Code	Title of the subject	L	T	P	C	QP
BCA20103	C Programming	4	0	0	4	A
UNIT:1		10 Hours				
<p>Introduction to Computers: Basic Organization of a Computer, Number System, Conversion. Programming Basics: Algorithm, Flowchart, Structured Programming Approach, Structure of a C Program, Compiling, Linking and Executing Programs.</p> <p>C Language Fundamentals: Character Set, Key Words, Identifiers, Data Types, Variables and Constants, Operators, Expressions, Type Conversions, Statements, Managing Console Input and Output Operations.</p> <p>Control Structures: Decision Making and Branching - If and Switch, Loop Structures - While, Do While and For, Unconditional Jumps - Continue, Break and Go To.</p>						
UNIT:2		10 Hours				
<p>Arrays: Concept, Declaration and Manipulation of Arrays, One Dimensional, Multidimensional Array and their Applications.</p> <p>Strings: Concept of Strings, String Handling Functions, Array of Strings.</p> <p>Pointers: Pointer Variable and its Importance, Dereferencing, Pointer Arithmetic and Scale Factor, Pointers and Arrays, Pointer and Strings, Array of Pointers, Pointers to Pointers.</p> <p>Functions: Designing Structured Programs, User Defined and Standard Functions, Formal and Actual Arguments, Function Prototype, Parameter Passing, Functions Returning Multiple Values, Functions Returning Pointers, Pointers to Functions, Nesting of Functions, Recursion, Passing Arrays to Functions. Scope and Extent: Scope Rules, Storage Classes - Auto, Extern, Register and Static.</p>						
UNIT:3		10 Hours				
Structures, Unions and Enumerations: Declaration and Initialization of Structures, Structure as Function Parameters, Structure Pointers, Unions, Enumerations.						
UNIT:4		10 Hours				
File Input and Output: Defining, Opening a File and Closing a File, Input/output Operations in Files, Random Access to Files, Error Handling. Command Line Arguments, Dynamic Memory Management, Pre-Processor Directives. Graphics using C programming.						
UNIT:5(As per choice of faculty) Graphics using C.		06 Hours				
Portion covered can be tested through Internal evaluation only not to be included in University examination)						
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs						
Text Books						
<ol style="list-style-type: none"> Pradip Dey, Manas Ghosh, "Programming in C", First Edition, Oxford University Press, 2011. E. Balagurusamy, "Programming in ANSI C", 4th edition, 2007, McGraw-Hill Publication, New Delhi. Brian W. Kernighan, Dennis Ritchie, "The C Programming Language" (2nd Edition), 1988, Prentice Hall. 						



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4. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

Ref. Books

1. K.R. Venugopal, S.R. Prasad, "Mastering C", McGraw-Hill Education India.
2. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGrawHill,2006.
3. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley(India) Pvt. Ltd., Pearson Education in South Asia, 2011.



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20104	Basic Mathematical Computation	4	0	0	4	A
UNIT:1 Linear Algebra :Determinant and its properties (up to third order), Minor and cofactors, Matrices, addition, multiplication and transpose of a matrix, Symmetric and skew-symmetric matrices and their properties, Adjoint, Inverse matrix, Solution of linear equations in three variables by Cramer's rule and matrix inversion method, Permutation and Combinations, Binomial theorem.						
UNIT: 2 Two Dimensional Geometry: Locus, Straight lines, Circle, Conic section, Transformation of axes, Plane polar curves						
UNIT:3 Differential Calculus (12L Limits of function and continuity, fundamental properties of continuous functions (without proof), Derivatives, Geometric meaning of derivative, successive differentiation, Rolle's theorem, Mean value theorems, Taylor's and Maclaurin's theorem, Taylor's series, Functions of several variables, Limit and Continuity, Partial derivatives, Total differential, Euler's theorem on homogeneous functions of two variables. Tangents and normals						
UNIT:4 Integral Calculus (8L) Indefinite integrals, Definite integrals and their elementary properties, Definite integral as the limit of sum, Idea of improper integrals. Area under a plane curve.						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books: 1.Higher Algebra, S. K. Mapa, Levant Books. 2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd. 3. Co-ordinate Geometry, S. L. Lone						
Reference Books: 1. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd. 2. Advanced Engineering Mathematics, E Kreyszig, Wil						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20105	Programming Lab with C	0	0	2	1	
List of Experiments:						
1. Find Area, Perimeter of Square & Rectangle.						
2. Find max. Among 3 nos.						
3. Check leap year						
4. Factorial of Number						
5. Calculate a b						
6. Prime Number.						
7. Perfect Number.						
8. Armstrong Number.						
9. Floyd's Triangle						
10. Fibonacci Series						
11. Inter conversion of Decimal, Binary & Hexadecimal no.						
12. LCM & GCD of numbers						
13. Insert & Delete an element at given location in array.						
14. Transpose of matrices						
15. Multiplication of matrices						
16. Display upper & lower diagonal of matrices						
17. Array of Structure e.g. student result, Employee pay slip , Phone bill						
18. Function with no parameter & no return values						
19. Function with parameter & return values						
20. Function with parameter & no return values						
21. Function with call by reference						
22. Recursion function e.g. sum of digit, reverse of digit						
23. String manipulation function e.g. string copy, concatenation, compare, stringlength,reverse						
24. Pointer Arithmetic						
25. File handling e.g. Read / Write file, copy file, merging file						
26. Random access of file						
27. File handling with command line arguments						
28. Drawing line, rectangle, circle, ellipse by using graph						
29. Changing foreground/ background color						
30. Changing color & font of text						
31. Swapping of numbers by using bit wise operator.						
32. Macro expansion						
33. File Inclusion						



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34. IO interfacing & Device Driver using C

Lab Code	Name of the Lab	L	T	P	C	QP
BCA20106	English for Technical Communication Lab	0	0	2	1	
List of Experiments:						
<ul style="list-style-type: none">• Inter-personal Communication and Building Vocabulary – Starting a Conversation – Responding Appropriately and Relevantly – Using Appropriate Body Language – Role Play in Different Situations – Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.• Reading Comprehension –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, , Skimming, Scanning, Inferring Meaning.• Writing Skills – Structure and Presentation of Different Types of Writing – Letter Writing/Resume Writing/ e-correspondence/ Technical Report Writing.• Presentation Skills – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ emails/Assignments... etc.,• Group Discussion and Interview Skills – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.						



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2nd Semester

Category	Course Particulars		Credit Particulars				Evaluation							Credits
	CourseCode	CourseName	Hours Per Week				THEORY			PRACTICAL			Total Marks	
			L	T	P	C	CIA	SEE	Total	CIA	SEE	Total		
Professional Core Courses	BCA20201	Computer Architecture	4			4	70	30	100	-	-	-	100	4
Professional Core Courses	BCA20202	Database Management System	5			4	70	30	100	-	-	-	100	4
Professional Core Courses	BCA20203	Data Structures	4			4	70	30	100	-	-	-	100	4
Professional Core Courses	BCA20204	Advanced Mathematical Computation	5			4	70	30	100	-	-	-	100	4
	BCA20205	Data Structures lab using C			2	1				30	70	100	100	1
	BCA20206	Database Management System Lab			2	1				30	70	100	100	1
Total			18		4	18			400			200	600	18



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2nd Semester

Subject Code	Title of the subject	L	T	P	C	QP
BCA20201	Computer Architecture	4	0	0	4	A
<p>UNIT:1 (10 Hours) Introduction: Basic architecture of computer, Functional units, Operational concepts, Bus structures, Von Neumann Concept. Basic Processing: Instruction code, Instruction set, Instruction sequencing, Instruction Cycle & Execution Cycle, Instruction format, Addressing modes, Micro instruction, Data path and control path design, Micro programmed vs. Hardwired controlled unit, RISC vs.CISC. Arithmetic: Design of ALU, Binary arithmetic, Addition and Subtraction of signed number, Multiplication of Positive number, Signed operand multiplication, Division, Floating point number representation and arithmetic. Digital Electronics: Boolean algebra, Digital Logic, Truth Tables, K map, Number system,Flip - Flop</p>						
<p>UNIT:2 (10 Hours) Memory: Memory Hierarchy, RAM, ROM, Cache memory organization, Mapping techniques, Virtual memory, Memory Interleaving, Secondary Storage, Flash drives.</p>						
<p>UNIT:3 (10 Hours) Input/output: Accessing I/O devices, I/O mapped I/O, Programmed I/O, Memory Mapped I/O, Interrupt Driven I/O, Standard I/O interfaces, Synchronous and Asynchronous Data transfer, DMA data transfer. Introduction to Parallel processing: Flynn’s Classification, Pipelining, Super Scalar processors, Array processing, vector processing.</p>						
<p>UNIT:4 (10 Hours) 8085 Microprocessor and Assembly level Programming using 8085 microprocessor Module 5 (6 hours)(as per choice of faculty) Portion covered can be tested through Internal evaluation only not to be included in University examination)</p>						
<p>Text Books 1. Mano.M. “Computer System and Architecture” (3rd Ed) (PHI). 2. Computer Architecture by Hwang and Briggs. (MGH). 3. Fundamentals of Computer Organisation by M V L N Raja Rao; Scitech publ. 4. Carl Hamacher, ZvonkoVranesic, SafwatZaky, “ComputerOrganization”, 5th Edition, McGraw-Hill Education India</p>						
<p>Ref. Books 1. William Stalling,“Computer Organization and Architecture”, Pearson Education 2. J. P. Hayes, “Computer Architecture and Organization”,MGH 3. A.S. Tananbaum, “Structured Computer Organization”, Pearson Education</p>						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20202	Database Management System	0	3	0	3	A
UNIT:1 Introduction (10 Hours) Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database, users and DBA Relational Model Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus						
UNIT:2 (10 Hours) Entity-Relationship model: Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema. Relational Database design: Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1NF, 2NF, 3NF, Decomposition using FD- dependency preservation, BCNF, Multi- valued dependency, 4NF, Join dependency						
UNIT:3(10 Hours) Query Processing & Query Optimization: Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, materialized views Transaction Management: Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two- Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking						
UNIT:4 (10 Hours) Security: Introduction, Discretionary access control, Mandatory Access Control, Data Encryption SQL Concepts:Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator,Functions - aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries,correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Savepoint Distributed Data Base concepts. PL/SQL Concepts: Cursors, Stored Procedures, Stored Function, Database Triggers						
UNIT:5 (as per choice of faculty) (06 Hours) (as per choice of faculty) Portion covered can be tested through Internal evaluation only not to be included in University examination)						



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Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, “Database Systems Concepts”, McGraw-Hill Education , New Delhi
2. RamezElmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education Inc., New Delhi.

Reference Books:

1. Hector Garcia-Molina, Jeffret D. Ullman, JennifferWidom, “Database Systems: A Complete Book”, Pearson Education Inc., New Delhi.
2. C. J. Date “An introduction to Database System”, Pearson Education Inc., New Delhi.
3. Bipin Desai, “An introduction to Database System”, Galgotia Publications.
4. Peter Rob & Carlos Coronel, “Database Systems: Design, Implementation, and Management”, CENGAGE Learning India Pvt. Ltd., New Delhi.
5. Mark L. Gillenson, “Fundamentals of Database Management Systems”, Wiley India Pvt. Ltd., New delhi.
6. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw-Hill Education (India), New Delhi.



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Subject Code	Title of the subject	L	T	P	C	QP
BCA20203	Data Structure with C	4	0	0	4	A
<p>UNIT:1 Conceptsof Abstract data type (4L) Concept of abstract data types, Structure, union, enum, pointer to structure, Self-referential structure, Pointer to pointer. Difference between static and dynamic memory allocation, Using functions such as malloc(), calloc(), realloc(), free(). File Management: Application of functions such as fopen(), fclose(), getc(), putc(), fprintf(), fscanf(), getw(), putw(), command line argument.(10 Hours)</p>						
<p>UNIT: 2Data Structure using Array, stack, queue, circular queue, priority queue, dequeue and their operations and applications. Searching: linear search, Binary search, their comparison, Sorting: insertion sort, Selection sort. Quick sort, Bubble sort Heap sort, Comparison of sorting methods , Analysis of algorithm, complexity using big 'O' notation(10 Hours)</p>						
<p>UNIT: 3 Linked List, Linear link lists, doubly linked lists, stack using linked list, queue using linked list, circular linked list and their operations and applications. Trees, Binary trees, binary search trees, representations and operations, thread representations, sequential representations, B tree , B+ tree. (10 Hours)</p>						
<p>UNIT:4Graphs : Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal: Depth first search and Breadth first search. Spanning Trees, minimum spanning Tree, Shortest path algorithm. Hashing: Definition, Hashing functions, Load factor and collision, open addressing (linear probing) and chaining method to avoid collision. (10 Hours)</p>						
<p>Text Books</p> <ol style="list-style-type: none"> 1.Data Structures in C, Ajay Agarwal, Cyber Tech 2. Data Structures Using C, Radhakrishnan & Shrinivasan, ISTE/EXCEL BOOKS 3. C and Data Structure,Radhaganesan,Scitech 						
<p>Ref. Books</p> <ol style="list-style-type: none"> 1.Data Structure Using C & C++, Tannenbaum, PHI 2. Mastering Algorithms with C,Loudon,SPD/O'REILLY 						



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Subject Code	Title of the subject	L	T	P	C	QP
BCA20204	Advanced Mathematical Computation	5	0	0	4	A
UNIT: 1 (10 Hours) Algebra: Abstract Algebra: Sets, Algebra of sets and their applications, Relations, Mapping, Compositions, Groups, Abelian groups, Sub-groups, Cyclic groups, Notion of ring and fields. Complex numbers, Modulus and amplitudes, De Moivre's theorem Polynomials, Division algorithm, Fundamental theorem of classical algebra (statement only), Descart's rule of sign, Relation between roots and coefficients, symmetric function of the roots, transformation of polynomial equations, Binomial equations						
UNIT: 2 (10 Hours) Differential Equations (14L) Order, degree, formation of a differential equation, Solutions of ODE, First order and first degree: Variable separation method, Homogeneous equations, Exact equations, Condition of exactness (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree, Clairaut's equation, second order linear ODE with constant coefficients, Solutions using D operator method. Cauchy-Euler equations and their solutions						
UNIT: 3(10 Hours) Sequence and Series (6L) Bounded and unbounded sequences, convergence or divergence of a sequence, behaviour of monotone sequences, algebra of convergent sequences, Cauchy's sequence, Cauchy's general principle of convergence, infinite series – its convergence and sum, series with positive terms and standard tests of convergence (without proof), alternating series, Leibnitz test, absolute convergence.						
UNIT:4 (10 Hours)						
Text Books 1.Higher Algebra, S. K. Mapa, Levant Books 2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd						
Ref. Books 1. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20205	Data Structure Using C Lab	0	0	2	1	
<p>Experiment-1(functions) Q1) Write a program to create methods for performing addition, subtraction, multiplication and division on 2 integers.</p> <p>Experiment 2: (concepts of array) Q1)Write a C program to create methods for operations insertion, deletion, searching and display on 1D array of elements.</p> <p>Experiment 3:(matrix) Q1) Write a C program to create function for performing matrix multiplication.</p> <p>Experiment-4: (pointer and DMA) Q1) Write a program to store N numbers using dynamic memory allocation and then find the largest element using UDF.</p> <p>Experiment 5:(structure and DMA) Q1) Write a C program to create a structure called student to store your rollno, name, age. Create an array to input 5 students data and then create an UDF to display details where age\geq20.</p> <p>Experiment 6: (stack) Q1) Write a program using C to create a stack and perform: (i) push operation (ii) pop operation (iii) display operation</p> <p>Experiment 7: (linear queue) Q1) Write a C program to create a linear queue and perform the following operations: (i) insertion ii) deletion and iii) Traversal</p> <p>Experiment 8: (circular queue) Q1) Write a C program to create a circular queue and perform the following operations: (i) insertion ii) deletion and iii) Traversal</p> <p>Experiment 9: (sorting) Q1) write a program to implement bubble sort and selection sort on a list of array elements</p> <p>Experiment 10: (sorting) Q1) Write a program to implement linear and binary search on array elements using UDF</p> <p>Experiment 11: (sorting) Q1) write a program to implement insertion sort on a given list of array elements.</p> <p>Experiment 12: (sorting) Q1) Write a C program to implement quick sort to a given list of integers to sort in ascending order.</p> <p>Experiment 13: (single linked list) Q1)Write a C program that uses functions to perform the following operations on single linked list:</p>						



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3rd Semester

Category	Course Particulars		Credit Particulars				Evaluation							Credits
	CourseCode	CourseName	Hours Per Week				THEORY			PRACTICAL			Total Marks	
			L	T	P	C	CIA	SEE	Total	CIA	SEE	Total		
Professional Core Courses	BCA20301	Operating Systems	4			4	70	30	100				100	4
Professional Core Courses	BCA20302	Object Oriented Programming with Java	5			4	70	30	100				100	4
Professional Core Courses	BCA20303	Computer Graphics	4			4	70	30	100				100	4
Professional Core Courses	BCA20304	Management and Accounting	5			4	70	30	100				100	4
	BCA20305	Operating Systems Lab			2	1				30	70	100	100	1
	BCA20306	Programming lab with C++			2	1				30	70	100	100	1
Total			18		4	18			400			200	600	18



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3rd Semester

Subject Code	Name of the Subject	L	T	P	C	QP
BCA20301	Operating systems	4	0	0	4	A
UNIT:1 (10 Hours) Operating System Introduction- Functions, Characteristics, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines. Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.						
UNIT:2(10 Hours) Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.						
UNIT:3(10 Hours) File System Interface and Implementation - Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance. Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.						
UNIT:4 (10 Hours) Deadlocks - System Model, Dead locks Characterization, Methods for Handling Deadlocks. Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock. I/O Management – I/O software and its types, Disk Scheduling. Shell Programming: Concept of shell, Types of shell, Editors for shell programming (e.g. vi), basics of Shell programming. Case Study- UNIX, LINUX, and Windows NT.						
UNIT:5 (as per choice of faculty) (06 Hours) Portion covered can be tested through Internal evaluation only not to be included in University examination)						
Teaching Methods: Chalk & Board/ PPT/Video Lectures						
Text Books 1. Silberschatz & Galvin: Operating System Concept, Wiley, Latest Edition. 2. Milan Milenkovic: Operating Systems, Tata McGraw – Hill, Latest Edition. 3. William Stallings: Operating Systems, PHI, Latest Edition.						
Reference Books: 1. Yashawant Kanetkar: Unix Shell Programming, BPB. 2. A.S. Tanenbaum: Modern Operating Systems, latest edition Pearson/PHI. 3. Dhamdhare: Operating Systems, Tata McGraw Hill. 4. Any other book(s) covering the contents of the paper in more depth.						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20302	Object Oriented Programming with JAVA	5	0	0	4	A
<p>UNIT:1(10 Hours). Java Evolution and Overview of Java Language: How Java differs from C and C++,Java and Internet, Java and World Wide Web, Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types,Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values</p>						
<p>UNIT:2(10 Hours) Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators, Type Conversion in Expressions, Operator Precedence and Associativity, Mathematical Functions. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if... else Statement, Nesting of if ... else Statements, The else if Ladder, The switch Statement, The ?: Operator. Decision Making and Looping: Introduction, The while Statement, The do Statement, The for Statement, Jumps in Loops, Labelled Loops.</p>						
<p>UNIT:3(10 Hours) Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods, final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control. Arrays, String and Vectors: Arrays, One-Dimensional Arrays, Creating an Array, TwoDimensional Arrays, Strings, Vectors, Wrapper Classes. Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables. Packages: Putting Classes Together: Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization</p>						
<p>UNIT:4 (10 Hours) Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.Applet Programming: Introduction, How Applets Differ from Application, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More About Applet Tag, Passing Parameters to Applets. Managing Input/Output Files in Java: Introduction, Concepts of</p>						



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Streams Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, using the File Class, Input/Output Exceptions, Creation of Files.

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books

1. E. Balagurusamy, Programming with Java, A Primer Second Edition, Tata McGraw Hill, New Delhi.

Reference Books:

1. H.M.Deitel & P.J.Deitel- JA V A- How to Program, 5th Edn, Pearson Education, New Delhi 2004.

2. P.Naughton and H. Schildt-JAVA: The Complete Reference, TMH, New Delhi 2005.

3. D.Jana- Java and Object Oriented Programming Paradigm, PHI, New Delhi-2005.



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20303	Computer Graphics	4	0	0	4	A
UNIT:1 (10 Hours) What is Computer Graphics? Applications of computer graphics. Display devices: Random scan and Raster scan systems, color CRT, Plasma panel displays, LCD Panels. Graphics Input Devices: Keyboard, Mouse, Trackball, Joystick, Data Glove, Digitizer, Scanner, Touch panels, Light pen, Plotter, Film Recorders, Voice System, Display processors, Graphics tablet.						
UNIT:2(10 Hours) Points and Lines, Digital Differential Analyzer (DDA) and Bresenham’s line drawing algorithm, Circle Generating Algorithms, Midpoint circle and DDA circle algorithm, line attributes, color and Grayscale levels. Polygon Filling: Scan Line Polygon Filling algorithm, Flood-Fill algorithm, Antialiasing. Windows and Clipping: Concept of a window, viewport, window to viewport transformation. Line clipping: Cohen-Sutherland line clipping, Liang-Barsky line clipping. Polygon clipping: Sutherland-Hodgman and Weiler-Atherton polygon clipping Algorithms.						
UNIT:3(10 Hours) 2D Transformation: Basic transformations, Homogeneous Co-ordinates, Composite transformations, translation, rotation and scaling, reflection, shearing, Rotation about an arbitrary point, Zooming and panning, Rubber band methods, Dragging Polygon surfaces, polygon tables, plane equations, polygon meshes, curved lines and surfaces, Blobby objects, Cubic Spline curves, Bezier curves, B-spline curves.						
UNIT:4 (10 Hours) Three dimensional co-ordinate systems, Three dimensional transformations: translation, rotation and scaling, Three dimensional display methods: Parallel projection (mathematical expression), perspective projection(mathematical expression), depth cueing, visible line and surface identification, surface rendering,exploded and cutaway views, three dimensional and stereoscopic views. Visible Surface Detection: Classification, Back Face Detection method, Depth Buffer method, Scan line method.						
UNIT:5 (as per choice of faculty) (06 Hours) Portion covered can be tested through Internal evaluation only not to be included in University examination)						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books 1. D Hearn and Baker M P, Computer Graphics.1996. Prentice Hall of India pvt.ltd. 2. Rogers & Adams, “Mathematical Elements for Computer Graphics”, McGraw Hill, 1989..						
Reference Books: 1. W M Newman &Sproul R F, Principles of Interactive Computer Graphics 2. Harrington Steven, Computer Graphics- A Programmers approach 3. J D Foley and A Van Dam, Fundamentals of interactive Computer Graphics						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20304	Management Accounting	5	0	0	4	A
UNIT:1 (10 Hours) Basic concepts of accounting. Concepts of Conventions of Accounting ,Journal Entries and Ledger Posting, Trial Balance, Financial Statement						
UNIT:2(10 Hours) Basic concepts of cost, classification of cost, cost sheet, material –EQQ, LIFO and FIFO						
UNIT:3(10 Hours) Labor- wage payment system , price rate, time rate, hasley and rowan scheme, overheads, meaning and distribution, primary distribution						
UNIT:4 (10 Hours) Basic management, planning, scheduling, organizing, staffing, directing, controlling, source of finance, long term, short term, cost-volume profit analysis, capital budgeting, budget and budgetary control, cash and flexible budget, investment of funds, conceptual frame work of mutual fund and systematic investment plan(SIP)						
UNIT:5 (as per choice of faculty) (06 Hours) Portion covered can be tested through Internal evaluation only not to be included in University examination)						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books 1. D Hearn and Baker M P, Computer Graphics.1996. Prentice Hall of India pvt.ltd. 2. Rogers & Adams, “Mathematical Elements for Computer Graphics”, McGraw Hill, 1989..						
Reference Books: 1. W M Newman &Sproul R F, Principles of Interactive Computer Graphics 2. Harrington Steven, Computer Graphics- A Programmers approach 3. J D Foley and A Van Dam, Fundamentals of interactive Computer Graphics						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20305	Operating System Lab	0	0	2	1	A
LIST OF EXPERIMENTS: <ol style="list-style-type: none">1. Basics of UNIX commands.2. Shell programming3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority4. Implement all file allocation strategies5. Implement Semaphores6. Implement II File Organization Techniques a7. Implement Bankers algorithm for Dead Lock Avoidance8. Implement an Algorithm for Dead Lock Detection9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU10. Implement Shared memory and IPC11. Implement Paging Technique f memory management.12. 12. Implement Threading & Synchronization Applications						
Reference Books: <ol style="list-style-type: none">1. The Complete Reference C++, Herbert Schilitz, TMH						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20306	Object Oriented Programming with Java Lab	0	0	2	1	A
LIST OF EXPERIMENTS: <ol style="list-style-type: none">1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions?2. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and no recursive functions to print the nth value of the Fibonacci sequence?3. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?4. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?5. Write a Java program for sorting a given list of names in ascending order?6. Write a Java program to multiply two given matrices?7. Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?8. Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes?9. Write a Java program that reads a file and displays the file on the screen, with a line number before each line?10. Write a Java program that displays the number of characters, lines and words in a text?11.						
Reference Books: <ol style="list-style-type: none">1. The Complete Reference C++, Herbert Schilitz, TMH						



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4th semester

Category	Course Particulars		Credit Particulars				Evaluation							Credits
			Hours Per Week				THEORY			PRACTICAL			Total Marks	
	CourseCode	CourseName	L	T	P	C	CIA	SEE	Total	CIA	SEE	Total		
Professional Core Courses	BCA20401	Software Engineering	4			4	70	30	100				100	4
Professional Core Courses	BCA20402	Python Programming	4			4	70	30	100				100	4
Professional Core Courses	BCA20403	Computer Networks	5			4	70	30	100				100	4
Professional Core Courses	BCA20404	Web Technologies	5			4	70	30	100				100	4
	BCA20405	Software Engineering Lab			2	1				30	70	100	100	1
	BCA20406	Python Programming Lab			2	1				30	70	100	100	1
	BCA20407	Web Technologies Lab			2	1				30	70	100	100	1
Total			18		6	19			400			300	700	19



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4th semester

Subject Code	Title of the subject	L	T	P	C	QP
BCA20401	Software Engineering	5	0	0	4	A
UNIT:1 Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS Development Life Cycles- SDLC and its phases Models- Waterfall, Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS System analysis- DFD, Data Modeling with ERD.(10 Hours)						
UNIT: 2 Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree. Concept of User Interface, Essence of UML. CASE tool. (10 Hours)						
UNIT: 3 Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing, acceptance testing Design methodologies: top down and bottom up approach, stub, driver, black box and white box testing. (10 Hours)						
UNIT:4 ERP, MRP, CRM, Software maintenance SCM, concept of standards (ISO and CMM) (10 Hours)						
Text Books 1. System analysis and design, Igor Hawryskiewicz, Pearson 2. Analysis and design of Information System, V Rajaraman, PHI						
Ref. Books 1. Software Engineering, Ian Sommerville, Addison-Wesley.						



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Subject Code	Title of the subject	L	T	P	C	QP
BCA20402	Python Programming	4	0	0	4	A
UNIT:1		10 Hours				
<p>Introduction: Installation, First Python Program: Interactive Mode Programming, Script Mode Programming; Identifiers, Reserved Words, Lines and Indentation, Multi-Line Statements, Quotation & Comments; Assigning Values to Variables, Multiple Assignment.</p>						
UNIT:2		10 Hours				
<p>Standard Data Types: Numbers, Strings, Lists, Tuples, Dictionary; Data Type Conversion; Basic Operators: Arithmetic, Comparison, Assignment, Bitwise; Operators: Logical, Membership, Identity; Operators Precedence; Python Numbers & Mathematical functions. Data Type Conversion: Basic Operators: Arithmetic, Comparison, Assignment, Bitwise; Basic Operators, Python Numbers & Mathematical functions; Python Strings.</p>						
UNIT:3		10 Hours				
<p>Python statements and Loops: if, if-else, While, for loops, break, continue, pass, Python Function; Files I/O. Functions: Definition, call, positional and keyword parameter. Default parameters, variable number of arguments. Modules - import mechanisms. Functional programming - map, filter, reduce, max, min. lambda function - list comprehension.</p>						
UNIT:4		10 Hours				
<p>Object Oriented Programming: classes and objects - Inheritance – Polymorphism overloading; Error handling & Exceptions - try, except and raise - exception propagation File Processing: reading and writing files</p>						
UNIT:5 (As per choice of faculty) 06 Hours						
(as per choice of faculty) Portion covered can be tested through Internal evaluation only not to be included in University examination)						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books:						
<ol style="list-style-type: none"> 1. <i>Stephen J. Chapman-‘Electric Machinery and Fundamentals’- McGraw Hill International Edition, (Fourth Edition), 2015.</i> 2. <i>M.G.Say-‘Alternating Current Machines’, English Language Book Society(ELBS)/ Longman, 5th Edition, Reprinted 1990.</i> 						
Reference Books:						
<ol style="list-style-type: none"> 1. “Learning Python”, Mark Lutz, O’Reilly Media, Inc., Fifth Edition, 2013. 2. “Introduction to Computer Science Using Python”, Charles Dierbach, Wiley Publication, Second Edition, 2012. 						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20403	Computer Networks	5	0	0	4	A
UNIT:1 Introduction		(10 Hours)				
Network architecture – layers – Physical links – Channel access on links –Hybrid multiple accesstechniques - Issues in the data link layer - Framing –Error correction and detection – Link-level FlowControl						
UNIT:2(10 Hours) Medium access – CSMA – Ethernet – Token ring – FDDI - Wireless LAN – Bridges andSwitches,Circuit switching vs. packet switching / Packet switched networks – IP – ARP – RARP – DHCP – ICMP –Queueing discipline – Routing algorithms – RIP – OSPF – Subnetting– CIDR – Interdomain routing – BGP – Ipv6 – Multicasting – Congestion avoidance in network layer						
UNIT:3(10 Hours) UDP – TCP – Adaptive Flow Control – Adaptive Retransmission -Congestion control – Congestionavoidance – QoS						
UNIT:4		(10 Hours)				
Email (SMTP, MIME, IMAP, POP3) – HTTP – DNS- SNMP – Telnet – FTP –Security – PGP - SSH.						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books 1.Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach” ,Third Edition,Morgan Kauffmann Publishers Inc., 2003.						
Reference Books: 1. JamesF.Kuross,KeithW.Ross,“Computer Networking,Atop DownApproachFeaturingtheInternet”,Third Edition,Addison Wesley, 2004. 2. NaderF.Mir,“Computer andCommunicationNetworks”,PearsonEducation,2007 3. Comer, “ComputerNetworks andInternetswithInternetApplications”,Fourth Edition, PearsonEducation,2003. 4. Andrew S.Tanenbaum,“Computer Networks”,FourthEdition,2003. 5. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education,2000						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20404	Web Technologies	5	0	0	4	A
UNIT:1 HTML, CSS Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5. CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution.						
UNIT:2 Java script The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions DHTML: Positioning Moving and Changing Elements. (10 Hours)						
UNIT:3(10 Hours) XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches, AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.						
UNIT:4 (10 Hours) PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books 1. Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson. 2. Web Technologies, Uttam K Roy, Oxford 3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrell, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage						
Reference Books: 1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006) 2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012) 3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech. 4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning 5. http://www.upriss.org.uk/perl/PerlCourse.html						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20405	Software Engineering Labs	0	0	2	1	
<p>1: Develop requirements specification for a given problem (The requirements specification Should include both functional and non-functional requirements. For a set of about 20 sample problems, see the questions section of Chap 6 of Software Engineering book of Rajib Mall)</p> <p>2: Develop DFD Model (Level 0, Level 1 DFD and data dictionary) of the sample problem (Use of a CASE tool required)</p> <p>3: Develop structured design for the DFD model developed</p> <p>4: Develop UML Use case model for a problem (Use of a CASE tool any of Rational rose, Argo UML, or Visual Paradigm etc. is required)</p> <p>5: Develop Sequence Diagrams.</p> <p>6: Develop Class diagrams.</p> <p>7: Develop code for the developed class model using Java.</p> <p>8: Use testing tool such as Junit.</p> <p>9: Use a configuration management tool.</p> <p>10: Use any one project management tool such as Microsoft Project or Gantt Project, etc.</p>						
<p>Reference books:</p> <p>1. Fundamentals of Software engineering,Rajib Mall.</p> <p>3. Software design – From programming to architecture, Eric Braude</p> <p>5. Object-oriented software engineering – A use case driven approach,Ivar Jacobson(Computer language productivity award winner)</p>						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20406	Python Programming Lab	0	0	2	1	
<p>List of Experiments:</p> <p>Exercise 1 - Basics</p> <p>a) Running instructions in Interactive interpreter and a Python Script b) Write a program to purposefully raise Indentation Error and Correct it</p> <p>Exercise 2 - Operations</p> <p>a) Write a program to compute distance between two points taking input from theuser (Pythagorean Theorem) b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.</p> <p>Exercise - 3 Control Flow</p> <p>a) Write a Program for checking whether the given number is a even number or not. b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10 c) Write a program using a for loop that loops over a sequence. What is sequence? d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.</p> <p>Exercise 4 - Control Flow - Continued</p> <p>a) Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ... b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.</p> <p>Exercise - 5 - DS</p> <p>a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.</p> <p>Exercise - 6 DS - Continued</p> <p>a) Write a program combine_lists that combines these lists into a dictionary. b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?</p> <p>Exercise - 7 Files</p> <p>a) Write a program to print each line of a file in reverse order. b) Write a program to compute the number of characters, words and lines in a file.</p> <p>Exercise - 8 Functions</p> <p>a) Write a function ball_collide that takes two balls as parameters and computes</p>						



if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius. If (distance between two balls centers) \leq (sum of their radii) then they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function `nearly_equal` to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function `dups` to find all duplicates in the list.

c) Write a function `unique` to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function `cumulative_product` to compute cumulative product of a list of numbers.

b) Write a function `reverse` to reverse a list. Without using the reverse function.

c) Write function to compute GCD, LCM of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a) Install packages `requests`, `flask` and explore them using `pip`

b) Write a script that imports `requests` and fetch content from the page. Eg. (Wiki)

c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

TEXT BOOK

1. THE COMPLETE REFERENCE JAVA J2SE 5TH EDITION BY – HERBERT SCHILDT (TMH)

REFERENCE BOOKS

1. THE COMPLETE REFERENCE JAVA 2 (Fourth Edition) BY - PATRICK NAUGHTON & HERBERTSCHILDT (TMH)

2. PROGRAMMING JAVA - DECKER&HIRSH FIELD VIKAS PUBLISKING (2001) (THOMSONLEARNING) (SECOND EDITON)

3. INTRODUCTION TO JAVA PROGRAMMING - Y.DANIEL LIANG PHI(2002)

4. OBJECT ORIENTED PROGRAMMING THROUGH JAVA 2 BY - THAMUS WU (Mc.Graw Hill)

5. JAVA 2 - DIETEL & DIETEL (PEARSON EDUCATION)

6. INTRODUCTION TO JAVA – BALA GURU SWAMY



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5th semester

Category	Course Particulars		Credit Particulars				Evaluation						Credits	
	CourseCode	CourseName	Hours Per Week				THEORY			PRACTICAL				Total Marks
			L	T	P	C	CIA	SEE	Total	CIA	SEE	Total		
Professional Core Courses	BCA20501	Artificial Intelligence	5			4	70	30	100				100	4
Professional Core Courses	BCA20502	Unix and Shell Programming	4			4	70	30	100				100	4
Professional Core Courses	BCA20503	Cloud Computing	4			4	70	30	100				100	4
	BCA20504	Minor Project			6	3	70	30	100				100	3
	BCA20505	Linux Lab			4	2				30	70	100	100	2
	BCA20506	Industrial Training			2	1				30	70	100	100	1
Total			14		12	18			400			300	700	18



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5th semester

Subject Code	Name of the Subject	L	T	P	C	QP
BCA20501	Artificial Intelligence	5	0	0	4	A
UNIT:1(10 Hours) Introduction : Intelligent Agents: Agents and Environments, The concept of rationality, Nature of Environments, Structure of Environments. Problem Solving: Solving Problems by Searching: Problem solving agents, Uninformed Search strategies, Avoiding repeated states, Informed Searches and Exploration, Informed search strategies, Heuristic functions, Local search algorithms and optimization problems.						
UNIT:2(10 Hours) Adversarial Searches: Games, Optimal decision in games, Alpha beta pruning, and Imperfect real-time decisions. Knowledge and Reasoning: Logical Agents: Knowledge based agents, Propositional logic, Resolution, Effective propositional inference, Agents based on propositional logic.						
UNIT:3(10 Hours) First-Order Logic :Syntax and semantics of First order logic, Using FOPL. Learning: Learning from Observations: Form of learning, Inductive learning, Learning decision tree, Ensemble learning, Computational learning theory.						
UNIT:4(10 Hours) Expert Systems :Introduction (characteristic features of expert systems, Background History, Applications, importance of expert systems); Rule based system architectures (the knowledge base, the inference process, explaining how or why, building a knowledge base, the I/O interface)						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Reference Books: 1. S. Russel, & P Norvig, Artificial Intelligence: A Modern Approach, Pearson education, 2003. 2. Luger, Artificial Intelligence, Pearson education, 2003. 3. Nills J. Nillson, Morgan Kauffman, Artificial Intelligence: A new Synthesis, 2003.						



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Subject Code	Name of the Subject	L	T	P	C	QP
BCA20502	Unix And Shell Programming	4	0	0	4	A
<p>UNIT:1 Introduction to UNIXUNIX operating system, UNIX architecture: Kernel and Shell, Files and Processes, System calls, Features of UNIX, POSIX and single user specification, Internal and external commands</p> <p>Utilities of UNIXCalendar (cal), Display system date (date), Message display (echo), Calculator (bc), Password changing (password), Knowing who are logged in (who), System information using uname, File name of terminal connected to the standard input (tty)UNIX file systemFile system, Types of file, File naming convention, Parent – Child relationship, HOMEvariable, inode number, Absolute pathname, Relative pathname, Significance of dot (.) and dotdot (.), Displaying pathname of the current directory (pwd), Changing the current directory (cd), Make directory (mkdir), Remove directories (rmdir), Listing contents of directory (ls), Very brief idea about important file systems of UNIX: /bin, /usr/bin, /sbin, /usr/sbin, /etc, /dev, /lib,/usr/lib, /usr/include,/usr/share/man, /temp, /var, /home</p>						
<p>UNIT: 2 Ordinary file handling</p> <p>Displaying and creating files (cat), Copying a file (cp), Deleting a file (rm), Renaming/ moving a file (mv), Paging output (more), Printing a file (lp), Knowing file type (file), Line, word and character counting (wc), Comparing files (cmp), Finding common between two files (comm), Displaying file differences (diff), Creating archive file (tar), Compress file (gzip), Uncompress file (gunzip), Archive file (zip), Extract compress file (unzip), Brief idea about effect of cp, rm and mv command on directory</p> <p>File attributes</p> <p>File and directory attributes listing and very brief idea about the attributes, File ownership, File permissions, Changing file permissions – relative permission & absolute permission, Changing file ownership, Changing group ownership, File system and inodes, Hard link, Soft link, Significance of file attribute for directory, Default permissions of file and directory and using umask, Listing of modification and access time, Time stamp changing (touch), File locating (find)</p>						
<p>Shell</p> <p>Interpretive cycle of shell, Types of shell, Pattern matching, Escaping, Quoting, Redirection, Standard input, Standard output, Standard error, /dev/null and /dev/tty, Pipe, tee, Command substitution, Shell variables</p> <p>Process.</p> <p>Basic idea about UNIX process, Display process attributes (ps), Display System processes, Process creation cycle, Shell creation steps (init -> getty -> login -> shell), Process state, Zombie state, Background jobs (& operator, nohup command), Reduce priority (nice), Using signals to kill process, Sending job to background (bg) and foreground (fg), Listing jobs (jobs), Suspend job, Kill a job, Execute at specified time (at and batch)</p>						



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UNIT:4 Customization

Use of environment variables, Some common environment variables (HOME, PATH, LOGNAME, USER, TERM, PWD, PS1, PS2), Aliases, Brief idea of command history

Filters

Prepare file for printing (pr), Custom display of file using head and tail, Vertical division of file (cut), Paste files (paste), Sort file (sort), Finding repetition and non- repetition (uniq), Manipulating characters using tr, Searching pattern using grep, Brief idea of using Basic Regular Expression (BRE), Extended Regular Expression (ERE), and egrep, grep -E

Introduction to shell script

Simple shell scripts, Interactive shell script, Using command line arguments, Logical operator (&&, ||), Condition checking (if, case), Expression evaluation (test, []), Computation (expr), Using expr for strings, Loop (while, for), Use of positional parameters

System Administration

Essential duties of UNIX system administrator, Starting and shutdown, Brief idea about user account management (username, password, home directory, group id, disk quota, terminal etc.) (10 Hours)

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books

1. Learning UNIX Operating System, Peek, SPD/O'REILLY
2. Understanding UNIX, Srirengan, PHI
- 3.. Essentials Systems Administration, Frisch, SPD/O'REILL

Reference Books:



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Subject Code	Name of the Subject	L	T	P	C	QP
MCA20503	Cloud computing	5	0	0	4	A
UNIT:1 (10 Hours) CLOUD COMPUTING COMPANIES AND MIGRATING TO CLOUD 9 Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies						
UNIT:2 (10 Hours) CLOUD COST MANAGEMENT AND SELECTION OF CLOUD PROVIDER 9 Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration						
UNIT:3 (10 Hours) Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations						
UNIT:4 (10 Hours) Don't be reactive,do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books 1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011						
Reference Books: 1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010 2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20504	Minor Project	0	0	0	3	
To carry out a small computer application based project individually or in groups						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20505	Linux Lab	0	0	2	1	
1. Module I: LINUX Utilities Calendar, Displaysystemdate, Messagedisplay, Calculator, Passwordchanging, Knowingwhoare loggedin, Knowing Systeminformation						
2. Module II: Directory creation, removal, listing, navigation Displaying pathname of the current directory (pwd), Changing the current directory (cd), Make directory (mkdir), Removedirectories(rmdir), Listingcontentsofdirectory(lsanditsoptions), Absolutepathname, Relative pathname, Using dot (.) and dotdot (..)						
3. Module III: Ordinary file handling Displayingandcreatingfiles, Copyingafire, Deletingafire, Renaming/movingafire, Paging output, Knowingfiletype, Line, wordandcharactercounting(wc), Comparingfiles, Finding commonbetweentwofiles, Displayingfiledifferences						
4. Module IV: File attributes File and directory attributes listing, File ownership, File permissions, Changing file permissions – relative permission&absolutepermission, Changingfileownership, Changinggroupownership, Filesystemandinodes, Hardlink , Softlink, Defaultpermissionsoffileanddirectoryandusingumask, Listingofmodificationandaccesstime, Time stampchanging, Filelocating						
5. Module V: Shell Types of shell, Pattern matching, Escaping, Quoting, Redirection, Pipe, tee, Command substitution, Shell variables						
6. Module VI: Process Displayprocessattributes, DisplaySystemprocesses, Backgroundjobs, Reducepriority, Sending jobtobackgroundandforeground, Listingjobs						
7. Module VII: Filters Preparefileforprinting, Customdisplayoffileusingheadandtail, Verticaldivisionoffile, Pastefiles, Sortfile, Findingrepetitionandnon-repetition, Manipulatingcharactersusing, Searchingpattern						
8. Module VIII: VI/VIM Editor and Shellscript 1. IntroductiontoVI/VIMeditor, Differentcommandsoftheeditor, Fileeditingintheeditor 2. Introduction to shellscript Simple shell scripts, Interactive shell script, Using command line arguments, Logical operator (&&,), Conditionchecking(if-then, if-then-else-fi, if-then—elif-else-fi, case), Expression evaluation(test, []), Computation(expr), Usingexprforstrings, Loop(while, for, until, continue), Useofpositionalparameters 3. SimpleimplementationofbasicLINUXcommands, utilities, filtersetc. using shellscripts						



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Lab Code	Name of the Lab	L	T	P	C	QP
BCA20506	Industrial Training	0	0	0	1	
To visit a compatible industry to gather practical exposure						



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Category	Course Particulars		Credit Particulars				Evaluation							Credits
	CourseCode	CourseName	Hours Per Week				THEORY			PRACTICAL			Total Marks	
			L	T	P	C	CIA	SEE	Total	CIA	SEE	Total		
Professional Core Courses	BCA20601	Web Programming With PHP and MYSQL	5			4	70	30	100				100	4
Professional Core Courses	BCA20602	Values and Ethics of Profession	4			4	70	30	100				100	4
	BCA20604	Major Project with Viva voce				15						100	100	15
Total			9			15							300	23



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6th semester

Subject Code	Name of the Subject	L	T	P	C	QP
MCA20601	WEB PROGRAMMING WITH PHP AND MYSQL	5	0	0	4	A
UNIT:1		(10 Hours)				
<p>Introduction- open source-PHP – history- features-variables- statements,operators-conditional statements-if-switch-nesting conditions-merging forms with conditional statements-loops-while-do-for – loop iteration with break and continue.</p> <p>Arrays: Creating an array- modifying array-processing array-grouping form with arrays- using array functions- creating user defined functions- using files- sessions- cookies- executing external programs- Creating sample applications using PHP.</p>						
UNIT:2		(10 Hours)				
<p>Components of Database system-Definition and benefits of database-Data Independence-Three level of database architecture-Database Management systemClient server architecture-Distributed processing-Domains-Relations-Integrity constraints-Candidate keys-Primary keys-Foreign keys-Functional dependency(Basic definition)-Normal Forms (1NF, 2NF, 3NF, BCNF)-ER model – OOAD model</p>						
UNIT:3		(10 Hours)				
<p>Effectiveness of MySQL -MySQL Tools-Prerequisites for MySQL connectionDatabases and tables- MySQL data types-Creating and manipulating tablesInsertion, updation and deletion of rows in tables -Retrieving data- Sorting and filtering retrieved data -Advanced data filtering-Data manipulation functionsAggregate functions -Grouping data- Sub queries- Joining Tables-Set operatorsFull text searching.</p>						
UNIT:4		(10 Hours)				
<p>Working MySQL with PHP-database connectivity- usage of MYSQL commands in PHP, processing result sets of queries- handling errors-debugging and diagnostic functions- validating user input through Database layer and Application layer- formatting query output with Character, Numeric, Date and time –sample database applications</p>						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text Books						
<ol style="list-style-type: none"> VIKRAM VASWANI, “PHP and MySQL”, Tata McGraw-Hill, 2005 BEN FORTA , ”MySQL Crash course “ SAMS, 2006. C.J. DATE, “An Introduction to Database Systems”, Addison Wesley, Sixth Edition. Ramesh Elmasri and Shamkant B Navathe,” Fundamentals of DataBase Systems”,Pearson Education,Third Edition 						
Reference Books:						
<ol style="list-style-type: none"> Tim Converse, Joyce Park and Clark Morgan, ”PHP 5 and MySQL”, Wiley India reprint, 2008. Robert Sheldon, Geoff Moes, ”Beginning MySQL”, Wrox, 2005. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas, 2008. 						



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Subject Code	Name of the Subject	L	T	P	C	QP
MCA20602	Values and Ethics of Profession	4	0	0	4	A
UNIT:1		(10 Hours)				
Introduction to Ethical Theories (4L) Consequentialist and Non-consequentialist theories, Hedonism, Utilitarianism, Virtue Ethics, Ethical Relativism, Ethical Naturalism Ethics and Morality (6L) Ethics and Morals, Ethics in Indian Tradition, Building character in workplace, Moral and Ethical Judgement: Canons of ethics, Ethics of duty, Ethics of responsibility						
UNIT:2		(10 Hours)				
Ethics and Environment (8L) Rapid technological growth and depletion of resources, Sources of energy, Energy crisis, Reports of Club of Rome, Environmental degradation, Environmental Regulations, Environmental Ethics, Eco-friendly technologies, Sustainable Development, Important and recent national and international conventions on environment, Appropriate Technology Movement of Schumacher: Later developments						
UNIT:3		(10 Hours)				
Technology and Developing Nations- Technology transfer (8L) Problems of technology transfer, Stages of technology transfer, Problems of technology transfer, Technology Impact Assessment, Problems of man machine interaction, Impact of Assembly line, Automation, Corporate Social Responsibility						
UNIT:4		(10 Hours)				
Ethics of Profession (8L) Attributes of a profession, Science, Technology and Engineering as Knowledge and as Social and Professional Activities, Engineering profession: Ethical issues in engineering practice, Conflicts between business demands and professional ideals, Social and ethical responsibilities of Technologists, Codes of professional ethics, Whistle blowing and beyond. Case studies						
Teaching Methods: Chalk& Board/ PPT/Video Lectures						
Text books : Ethics in Mgmt & Indian Ethos, Ghosh, VIKAS Business Ethics, G. Pherwani, EPH. Ethics, Indian Ethos & Mgmt, Balachandran, Raja & Nair, SHROFF Publishers Human Values, A. N. Tripathi, New Age International						