ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

COURSE STRUCTURE AND SYLLABUS

BACHELOR OF COMPUTER APPLICATION (BCA) PROGRAMME

BCA 1ST SEMESTER SYLLABUS STRUCTURE

Sl.No.	Subject Code	Subject Name	L	T	P	C
Theory Subjects						
1	BCA171101	Computer Fundamental and ICT Hardware	3	2	0	4
2	BCA171102	Communicative English	3	2	0	4
3	BCA171103	Introduction to C Programming	3	2	0	4
4	BCA171104	Mathematics – I	3	2	0	4
Practical Subjects						
5	BCA171113	Laboratory I (C Programming)	0	0	10	5
TOTAL			12	8	10	**21**
Total Contact Hrs : 30 ; Total Credits : 21						

BCA 1ST SEMESTER SYLLABUS

Paper : BCA171101
Subject Name : Computer Fundamental and ICT Hardware
Marks : (Theory-70, Internal Evaluation – 30)
Pre–requisite : NIL

UNIT	PARA	Content	Weeks
1		Evolution of Computer system, Classification of Computer, Modern Computer, Hardware and Software. Major components of a Digital Computer (A brief introduction of CPU, Main memory, Secondary memory devices and I/O devices) Keyboard, monitor, mouse, printers, Secondary storage devices (floppy disks, hard disks and optical disks), backup system and why it is needed.	2
2		Number System: Representation of numbers (only a brief introduction to be given) and characters in computer. Binary, Hexadecimal, Octal, BCD, ASCII. EDCDIC and Gray codes. Conversion of bases. Representation of signed integers, Sign and magnitude, 1's complement and 2's complement representation. Arithmetic operations using 2's complement representation and conditions for overflow/underflow and its detection.	2
3		Assembler, Compiler, Interpreter, Linker and Loader. Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.	2
4		Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional HDD.	2
5		Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-r, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, New Technologies. Driver installation, Writing and cleaning CD and DVD.	2
6		Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of motherboards. RAM, different kinds of RAM. RAM up gradation. Cache and Virtual Memory concept.	2
7		SMPS. BIOS. Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.	1
Books	1.	Anita Goel, **Computer Fundamentals**, Pearson, 2010.	
	2.	**Comdex: Hardware and Networking Course Kit**:, DreamTech press.	
	3.	V. Rajaraman, Neeharika Adabala, **Fundamentals of Computers**, PHI, EEE 6th Edition	
	4.	Ron Gilster**, PC hardware: A beginners Guide**, Tata McGraw Hill.	
	5.	E. Balaguruswamy, **Computer Fundamentals and C Programming**, Tata McGraw Hill.	

Paper : BCA171102
Subject Name : Communicative English
Marks : (Theory-70, Internal Evaluation – 30)
Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1		**Concept and fundamentals of communication skills** Scope and Meaning of communication; essentials of good communication- listening and reading skills, verbal and non verbal communications, gestures and body language, formal	3
2		**Oral Communication** Mechanisms of effective oral communication- how to speak a language clearly, fluently and naturally; pronunciation – stress and intonation; everyday conversation and chat; group discussion and interviews; public speaking.	2
3		**Written communication** Mechanisms of effective written communication – punctuation, sequencing of ideas, building paragraph/body, a good introduction and conclusion; word buildings; writing letters for different occasions; report/ summary/ gist writing etc..	2
4		**Business communication in English** Extensive oral and written examples of various kind of Business communication **English in the field of science & technology Marks: 15** Extensive oral and written examples of various kinds of English used in the field of science and technology	3
5		**Personal Interview Marks** An external expert appointed by the University, the head of the concerned department and the course in-charge of the institution will constitute an expert panel and students will be required to appear before them for viva voce to give evidence of their acquired communicative skills.	2
6		**Home assignment and group discussion** Home assignments and group discussion will have to be arranged by the teacher in charge of the course and from properly maintained records of such assignments and group discussion, one internal committee formed by the HOD of the CS/IT/CA department of the College concerned will finalize the marks..	1
Books:	1.	**Strengthen your Writing**: V. R. Narayanaswami (Orient Longman)	
	2.	**Everyday Dialogues in English**: Robert J. Dixon (Prentice Hall of India)	
	3.	**Spoken English**: V. Sasikumar & P. V. Dhamija (Tata McGraw-Hill Publishing Ltd.)	
	4.	**C. S. Communication**: Rayudu (Himalaya Publishing House)	
	5.	**Oxford Advanced Learner's Dictionary** Or **Cambridge Advanced Learner's**	

Paper : BCA171103
Subject Name : Introduction to C programming
Marks : (Theory-70, Internal Evaluation – 30)
Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1		**Overview of C** Importance of C, sample C program, C program structure, executing C program. Variables, Data Types, Constants: integer constant, real constant, character constant, string constant; Character set, C tokens, keywords and identifiers, variables declaration, Assigning values to variables---Assignment statement, declaring a variable as	2
2		**Operators and Expression** Categories of operator- Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators; arithmetic expressions, precedence and associativity of operators,	2
3		**Managing Input and Output Operators** Reading and writing a character, formatted input, formatted output.	2
4		**Decision Making and Branching Statement** ***if*** statement, ***if.....else*** statement, nested ***if.... else*** statement , ***switch....case*** statement, ***goto*** statement. **Decision Making and Looping** Definition of loop, categories of loops, ***for*** loop ***while*** loop, ***do-while*** loop, ***break*** statement, ***continue*** statement	2
5		**Arrays** Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.. **Functions** The form of C functions, Return values and types,return statement,	2
6		**Structures and Unions & Preprocessors** Defining, giving values to members, initialization and comparison of structure variables, array of structure, array within structure, structure within structure, structures and functions, unions. Macro substitution, file inclusion.	1
7		**Pointers and File Management in C** Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures. Opening, closing and I/O operations on files, random access to files, command line arguments.	2
Books:	1.	Yashavant Kanetkar, **Let Us C**, Eighth Edition, BPB Publications.	
	2.	Kernighan and Ritchie, **The C Programming Language**, Second Edition, Prentice Hall, 1998.	

Paper : BCA171104
Subject Name : MATHEMATICS-I
Marks : (Theory-70, Internal Evaluation – 30)
Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1		**Determinants and Matrices** Definition and different types (such as identity matrix, diagonal matrix etc) of matrices, vectors and matrices. Addition, subtraction and multiplication of matrices. Properties of matrix operations. Existence of additive and multiplicative identity and additive inverse matrices. Transpose of a matrix and its properties. Symmetric and skew symmetric matrices. Elementary transformation of a matrix. Invertible matrices. Determinant of a square matrix, minor, cofactor. Adjoint of a matrix and matrix inversion. Determination of rank of a matrix. Eigen values and Eigen vectors of a matrix (Stressing on symmetric matrices). Cayley-Hamilton theorem - Cramer‟s rule.	4
2		**Complex Numbers** Definition and Algebra of complex numbers. Modulus and conjugate of a complex number. Representation of complex numbers - Argrand diagram and polar representation. Roots of linear and quadratic equations in one variable, real roots, irrational roots, complex roots, Relation between the roots and the coefficients. and Balance Sheet for Proprietary concerns,	3
3		**Limits and Derivatives** Intuitive idea of limits and derivatives. Limits of polynomials, rational functions and Indeterminate forms. Derivatives, Algebra of derivative of a function. Derivative of polynomials and trigonometric functions.	3
4		**Calculus** Roll‟s theorem, Lagrange‟s Mean Value theorem. Meaning of the sign of derivative., maxima and minima (single variable).	3
Books	1.	Narayanan S. and Manickavachagam , **Allied Mathematics Vol.1& Vol.2.**	
	2.	M.K. Venkataraman, NPC, **Engineering Mathematics Vol.1 & Vol.2,**	

Paper : BCA171113
Subject Name : LABORATORY-I
Marks : (Theory-70, Internal Evaluation – 30)

LAB PART	PARA	Laboratory Content	Total Weeks
1 (75%)	1.1	Computer Basics, Operating Systems basics and commands	4
	1.2	Simple Programs, Conditional statements, arrays	2
	1.3	Complex programs using functions and subroutines	3
	1.4	Pointers, structures, Unions and Files	4
Books:		As given in **BCA171103**	

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ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

COURSE STRUCTURE AND SYLLABUS

BACHELOR OF COMPUTER APPLICATION (BCA) PROGRAMME

BCA 2ND SEMESTER SYLLABUS STRUCTURE

Sl.No.	Subject Code	Subject Name	L	T	P	C
Theory Subjects						
1	BCA171201	Data Structure and Algorithm	3	2	0	4
2	BCA171202	Mathematics II	3	2	0	4
3	BCA171203	Digital Logic	3	2	0	4
4	BCA171204	Accounting and Financial Management	3	2	0	4
Practical Subjects						
5	BCA171215	Laboratory II (C++Programming)	0	0	10	5
TOTAL			12	8	10	**21**
Total Contact Hrs: 30; Total Credits:21						

Paper		**BCA171201**	
Subject Name		**Data Structure and Algorithm**	
Marks		Theory- 70 , Internal Evaluation:30	
Pre-requisite		Nil	
UNIT		**Content**	**Weeks**
1		**Introduction to Data Structure** : Linear and Non Linear Data structure	1
2		**Linear Data Structure** Array(one and two dimension),Application of Array, Linked list(singly, double and circular) and its application Stack ,Queue and its application.	4
3		**Non linear Data structure** Binary tree, Binary search Tree, properties of binary tree and its types, Tree traversal methods	3
4		**Graph algorithms** Graph ,DFS and BFS, Graph representation in memory, Spanning tree, Kruskal and Prim's Algorithm	4
5		**Algorithm Concepts and sorting and searching techniques** Analysis of Algorithm: Time and Space complexity of algorithms, average case,best case and worst case analysis Sorting and Searching algorithm such as Selection sort, Insertion-sort, Bubble-sort, Binary search, Linear search.	3
Books	1	Classic Data Strcurure : By D Samanta	
	2	Data Structure Through C++ By Y Kanetkar	
	3	Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education	

Paper		**BCA171202**	
Subject Name		**Mathematics II**	
Marks		Theory- 70 , Internal Evaluation: 30	
Pre-requisite		Nil	
Unit		**Content**	**Weeks**
1		**Sets, relations and functions** Definition and representation of sets, cardinality of sets, elementary set operations- union, intersection, difference, Cartesian product, concept of universal set and complementation, Venn diagram, De Morgan's Law, simple properties of set operations. Relations, properties of binary relation-reflexive, symmetric, and transitive, equivalence relations, equivalence classes and partitions. Functions, one-to-one and onto function, composition of functions, invertible functions, Principle of mathematical induction.	**4**
2		**Combinatories and recurrence relations** Permutations, Combinations, permutations with repetitions, combinations with repetitions, recurrence relations and their solutions.	**3**
3		**Sequence and Series** Sequence, Arithmetic Progression and Geometric Progression, general term, A.M. (Arithmetic Mean), G.M.(Geometric Mean). Relation between A.M and G.M. Sum of AP and GP series, Sum to n terms of special series. Sequence of real numbers, bounded, convergent and divergent sequence, uniqueness of the limit and bounds of convergent sequence. Infinite series, exponential and logarithmic series.	**4**
4		**Basic of Graph Theory**: Various types of graphs,paths and cycles, directed and undirected graphs, Hand Shaking Theorem, Eulerian and Hamiltonian graphs, Graph connectivity, graph traversals, Isomorphismof graphs, Subgraphs, Complement of graph,, matrix representation of graphs.Trees: Properties of trees, rooted trees. Distance and centres in trees.	**4**

	Books	1. Tremblay, J.P, Manohar, R. Discrete Mathematical Structures with Application to Computer Science.	
		2. Discrete Mathematics, N. Ch. SN Iyenger, K.A. Venkatesh, V.M. Chandrasekaran, P.S. Arunachalam, Vikash Publishing House Pvt. Ltd.	
		3. Graph Theory By Narsingha Deo	

Paper		**BCA171203**	
Subject Name		**Digital Logic**	
Marks		Theory – 70 , Internal Evaluation - 30	
Pre-requisite		BCA171101	
Unit	**PARA**	**Content**	**Weeks**
1		**Represenation of information:** Number system, Idea about number representation, Decimal, binary, octal, hexadecimal number system and their arithmetic. Representation of negative numbers.	1
2		**Boolean Algebra and logic gates:** Axiomatic definition of Boolean algebra, Rules (postulates and basic theorems) of Boolean algebra, dual and complement of Boolean expression, Canonical form and Standard form, Sum of product and product of sum form, Conversion between Boolean expression and truth table, Karnaugh map method (upto four variable k-map), Don't care condition, Different types of gates, Implementation of logic expression with logic gates.	5
2		**Combinational Circuit :** Adder: half adder, full adder, Subtractor: half subtractor and full subtractor, Magnitude comparator, Decoder, Encoder, Application examples of decoder and encoder, Multiplexer, Demultiplexer, Application examples of multiplexer and Demultiplexer.	4
3		**Sequential Circuit:** Simple RS flip-flop or latch, Clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop, Analysis of Clocked Sequential circuits, State Reduction and Assignment, Flip –Flop Excitation tables, Design Procedure for sequential circuits.	4
4		**Registers and counters :** Introduction to registers and counters. Types of registers and counters , Use of registers and counters.	1
	Books	1.M. M. Mano, *Digital Logic and Computer Design*, PHI, 1994 C.	
		2. Bartee, *Computer Architecture and Logic Design*, McGraw Hill, 1991	

Paper	BCA171204	
Subject Name	**Accounting and Financial Management**	
Marks	Theory- 70 , Internal Evaluation:30	
Pre-requisite	Nil	
Unit No.	**Contents**	weeks
1.	**Introduction to Accounting, GAAP and Accounting Standards** Introduction; Meaning of Accounting, Users of Accounting Information; Objectives of Accounting; Advantages & Limitations of Accounting; Qualitative Characteristics of Financial Statements; Branches of Accounting; Basic Accounting Terminology; Double Entry System of Book Keeping. Meaning of Generally Accepted Accounting Principles (GAAP); Basic Assumptions, Basic Principles & Modifying Principles of Accounting.	4
2.	**Journalizing, Posting, Balancing and preparation of a Trial Balance** Classification of Accounts – Traditional & Modern Approach, Rules for Debit and Credit, Journalising – Simple and compound, Posting of journal into the ledgers.	4
3.	**Cash Book and Depreciation** Cash Book: Meaning and Types of Cash Book- Single Column, Cash Book with Discount Column, Preparation of Cash Book with Cash, Bank and Discount Column. Depreciation: Meaning of Depreciation and Depreciation Accounting; Causes of Depreciation; Factors Affecting the Amount of Depreciation; Methods of Allocating Depreciation- SLM and WDV Method.	4
4.	**Ratio Analysis** Meaning of Ratio and Ratio Analysis, Classification of various Accounting Ratios, Advantages and limitations of Ratio Analysis, Computation of Liquidity, Activity and Profitability Ratios.	3
Books	1. P.C.Tulsian - Financial Accounting (Pearson Education) 2. Accountancy – B. B. DAM, Capital Publishing House. 3. Cost and Management Accounting (Theory and Problems) – M.N. Arora, Himalaya Publishing House.	

Paper		**BCA171215**	
Subject Name		**Laboratory II (C++ Programming)**	
Marks		Practical- 70 , Internal Evaluation:30	
Pre-requisite		BCA171201	
UNIT		**Content**	**Weeks**
1		Concept of Object oriented programming in C++	3
2		Array ,Linked list ,stack ,queue implementation using C++	4
3		Binary search Tree implementation	2
4		DFS and BFS implementation	2
5		Sorting Algorithm: Bubble, Insertion and Selection Sort	2
6		Searching: Linear Search and Binary Search.	2
Books		1.Classic Data Strcurure : By D Samanta	
		2. Object oriented Programming with Ansi & Turbo C++ By A. Kamthane	

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ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

Bachelor of Computer Application (BCA)

3rd Semester

ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

Bachelor of Computer Application (BCA)

3rd Semester

Sl.No.	Subject Code	Subject Name	L	T	P	C
Theory						
1	BCA171301	Computer Architecture and Organization	3	2	0	4
2	BCA171302	Database Management System	3	2	0	4
3	BCA171303	Object Oriented Programming in Java	3	2	0	4
4	BCA171304	Environmental science	3	2	0	4
Practical						
5	BCA171315	Laboratory-III (Java and Basic Sql lab)	0	0	10	5
TOTAL			12	8	10	**21**
Total Contact Hrs: 30; **TotalCredits:21**						

Paper : BCA171301
Subject Name: Computer Architecture and Organization
L-T-P-C: 3-2-0-4

UNIT		Content	Weeks
1		**Introduction** Basic structure of a digital computer; registers, bus, assembly and machine language programming, micro operations (arithmetic, logic and shift).	2
2		**Processor Organization:** Instruction set, types, formats, addressing modes, stack, subroutine, ALU, Instructions cycle, Hardwired and Micro programmed control, Pipelining, Flynn's classification, RISC and CISC paradigms	3
3		**Memory Organization** Memory Hierarchy, ROM and RAM chips, Auxiliary memory, Associative memory, Cache memory, Cache mapping techniques, Caching Algorithms, Introduction to virtual memory	3
4		**Input-Output Organization** Peripheral devices, Interface, Interrupt Type, Priority Interrupt, Synchronous vs. Asynchronous Controllers, I/O transfer techniques: Program controlled, Interrupt controlled and DMA, Input-output processor	3
5		**Micro Processor and Micro Controllers** Overview of Microprocessor and Microcontrollers	1
Books:	1.	Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization",McGraw-Hill	
	2.	William Stallings, Computer Organisation and architecture, Pearson	
	3.	Mano M.M: Computer system Architecture, PHI (EEE)	

Paper code : BCA171302
Paper Name: Database Management system
L-T-P-C: 3-2-0-4

UNIT		Content	Weeks
1		Introduction : What is DBMS , Traditional File Approach vs. DBMS approach advantage of using DBMS ,DBMS User, Role of DBA	2
2		Entity Relationship models: ER diagrams, generalization, specialization, aggregation. Database models - Network model , Hierarchical model , and Relational model, Data Flow Diagram.	3
3		Relational algebra (Select, Project, Cross, Product, theta join, equi join, natural join, outer join), Set Operation, SQL constructs (Select ... From… Where… Group by ….. Having… Order by….), Insert, Delete, Update, View, Definition and use, nested quires, Constraints considers(NOT NULL , UNIQUE, Check Primary key. Foreign key).	3
4		Relational Data Base Design : Integrity constraints (domain constraints , referential , assertions , triggers , functional dependencies) , Normalization (using FDs)	3
5		Transactions : Concept , state , ACID properties	2
Books:	1	Elmarsi and Navathe, fundamentals of Database Systems , Norsa publishing Company,1989	
	2	J.D . Ullman , Principles of Database Systems , Galgotia Publishing Private Limited	
	3	Silberschatz, Korth and Sudersan , Principles of Database Systems Mc GrawHill Publication	
	4	C.J .Date An Introduction to Database systems , Vol - I And Vol II Addison - Wesley Publishing Company.	

Paper : **BCA171303**

Subject Name : **Object Oriented Programming in Java**

L-T-P-C: 3-2-0-4

UNIT		Content	Weeks
1		**Introduction:** Java's History, Importance of Java for the Internet, Java's Magic : Byte-code, Its Features Java Virtual Machine Concepts, Primitive Data Type And Variables, Java Operators, Expressions, Statements and Arrays. **Object Oriented Concepts:** Class and Objects:-Class Fundamentals, Creating objects, Assigning object reference variables; Introducing Methods, static methods, Constructors and types of constructor, Overloading constructors; *this* Keyword; Using Objects as Parameters, Argument passing, Returning objects, Method overloading.	4
2		**Inheritance and Polymorphism:** Inheritance Basics, Access Control, Multilevel inheritance, Method Overriding, Abstract Classes, Polymorphism, *final* keyword **Packages:** Defining Package, CLASSPATH, Package naming, Accessibility of Packages, using package members.	3
3		**Interfaces:** Implementing Interfaces, Interface and Abstract Classes **Exceptions Handling:** Exception , Handling of Exception, Using try-catch, Catching multiple exceptions , Using finally clause , Types of Exceptions, Throwing Exceptions.	3
4		**Multithreading Programming:** The Java Thread Model, Understanding Threads, Creating a Thread, Creating Multiple Threads, Thread Priorities. **Creating Applets in Java:** Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, The HTML APPLET Tag Passing Parameters to Applets.	3

Books:	1.	E. Balaguruswami, **Programming with Java**, Second Edition, Tata McGraw-Hill Publication	
	2.	Herbert Schildt, **The Complete Reference Java 2**, Fifth Edition, Tata McGraw-Hill Publication	

Paper code : BCA171304
Paper Name: Environmental Science
L-T-P-C: 3-2-0-4

UNIT	Content	HOURS
1	**Concepts Of Environmental Sciences :**Definition of environment, scope and importance of environment studies; Need for public awareness; Structure and functions in an ecosystem.	4
2	**Natural Resources :**Renewable and Non-renewable Resources; Forest, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative)	5
3	**Biodiversity And Its Conservation :**Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation.	4
4	**Environmental Pollution :**Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution – Rural /Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.	5
5	**Social Issues And Environment**: From unsustainable to sustainable development.Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures Climate change- Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics.	6

Text/Reference Books:

1. Agarwal, K.C., Environmental Biology, Nidi Publication Ltd**.**, Bikaner, 2001.
2. Bharucha Erach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmadabad, 2002.
3. Dr R J Ranjit Daniels. And Dr Jagadish Krishnaswamy.-- Environmental studies-2010-Willey India .

Paper : **BCA171315**

Subject Name : **Laboratory-III (Java and Basic SQL Lab)**

L-T-P-C: 0-0-10-5

UNIT	PARA	Content
1 (75%)	1.1	Simple Programs using Operator and Expressions
	1.2	Programs on Decision making statements, Looping Statements,
	1.3	Programs based on Classes & Objects
	1.4	Programs based on Inheritance
	1.5	Program based on package and multithreading
	1.6	Program based on Exception Handling
2 (25%)	2.1	**Basic SQL statements** : Create, Insert, Update, Select, Delete, Alter table structure etc. using MySQL/Oracle
Books:	1.	E. Balagurusamy, **Programming with Java**, Third Edition, Tata McGraw-Hill Publication
	2.	SQL, PL/SQL: The Programming Language Of Oracle, Ivan Bayross, BPB Publication

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ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

Bachelor of Computer Application (BCA)

4th Semester

ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

Bachelor of Computer Application (BCA)

4th Semester

Sl.No.	Subject Code	Subject Name	L	T	P	C	Marks	
Theory							**CE**	**ESE**
1	BCA171401	Software Engineering	3	2	0	4	30	70
2	BCA171402	Web Technology	3	2	0	4	30	70
3	BCA171403	Theory of Computer Science	3	2	0	4	30	70
4	BCA171404	Computer Networks	3	2	0	4	30	70
Practical								
1	BCA171415	Laboratory-IV (Web Tech lab)	0	0	10	5	15	35
TOTAL			12	8	10	**21**	**135**	**315**
Total Contact Hrs: 30; **Total Credit: 21**								

Paper Code : BCA171401
Paper Name : Software Engineering
L-T-P-C: 3-2-0-4

UNIT		Content	Weeks
1		**INTRODUCTION:** Overview of Software Processes, Software life cycle Models - Waterfall, Iterative, Prototype and Spiral Models.	3
2		**PROJECT MANAGEMENT:** Project planning, Software cost estimation – techniques (empirical and heuristics), COCOMO models.	2
3		**SOFTWARE REQUIREMENTS** Feasibility Studies, Functional and non-functional requirements, software prototyping, SRS document.	2
4		**DESIGN CONCEPTS** Design fundamentals, design representation, function and Object Oriented Design, cohesion and coupling, Overview of DFD and UML diagrams (usecase, activity, sequence and class).	3
5		**CODING AND TESTING:** Coding style, Structured programming, verification and validation, error and debugging, black box and white box testing, unit testing, system testing, Integration testing.	3
6		**SOFTWARE MAINTENANCE:** Maintainability factors, Importance of maintenance, maintenance types	2
Books	1.	Rajib Mall; Software Engineering	
	2.	Sommerville, Software Engineering, Pearson education	
	3.	Pressman. R.S..Software Engineering: A practitioner's Approach. Mc GrawHill	

Paper Code: **BCA171402**

Paper Name: **Web Technology**

L-T-P-C: 3-2-0-4

UNIT		Content	Weeks
1		**Internet Basics:-**Introduction to Internet and WWW.Computer Network, types of Computer Network: LAN, WAN, MAN; Network Topologies.	2
2		Web Browsers and how it works, Search Engines, Categories of Search Engines, Hypertext Transfer Protocol (HTTP), URL, Protocols (SMTP, POP3, IMAP), Browsers – versions and functions, URLs, webpage and Type of webpage, Domain Names.	3
3		**Static Web Development:** HTML - Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images, types of lists, tables, frames, Forms Processing.	3
4		**Introduction to Java Script:** Data Types, Control Statements, Operators, Built in and User-Defined Function.	2
5		**Cascading Style Sheet:** Types of Style Sheets – Internal, Inline and External style sheets, creating styles.	1
6		**Server side programming**: Introduction to PhP, variables,coperator,Array Looping, Function etc. Web Server Concepts, Database Connectivity using Mysql	3
Books:	1.	Web Technologies 2nd Edition, Achyut S Godbole & Atul Kahate	
	2.	Internet and World Wide Web Deitel HM, Deitel ,Goldberg , Third Edition	

Paper Code : BCA171403

Paper Name : **Theory of Computer Science**

L-T-P-C: 3-2-0-4

UNIT	PARA	Content	Weeks
1		Basics:	
		Concepts of Automata Theory: Automata, Alphabets, Strings, Languages, Grammars.	1
2		Automata and Finite state machine:	
	2.1	Automata and its applications, FSM, comparison between automata and FSM, string acceptance, Minimization of Automata.	2
	2.1	Finite Automata: Deterministic and non deterministic finite Automata, Equivalence of DFA & NFA, Finite Automata with Epsilon-Transitions.	2
3		Grammars and Languages:	
	3.1	Classification of grammars and languages, designing a grammar, acceptance of string.	1
	3.2	Regular Expression(RE) and Languages: Building RE, operators of RE, Conversion of RE to Automata and Automata to RE. automata corresponding to regular grammar, Application of RE and its algebraic laws, Closure properties of RE, homomorphism and it's inverse for RL	3
	3.3	Context-free Grammars: Definition and Derivation of languages. Derivation tree, Ambiguity in Grammars and languages, Simplification of CFG	2
Books:	1.	Hopcroft, Motwani & Ullman: Introduction to Automata Theory, Languages and Computation. 3rd Edn. LPE.	
	2.	Theory of Computer Science(Automata Languages and Computation): KLP Mishra, N.Chandrasekaran, PHI	
	3	Martin : Introduction To Languages & Theory Of Computation, TMH	
	4	Formal Languages and Automata Theory, C.K Nagpal, OXFORD	

Paper Code : Computer Networks

Paper Name : BCA171404

L-T-P-C: 3-2-0-4

Unit	PARA	Content	Weeks
1.		**Introduction to Computer Networks:** What is Computer Networks? Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.	2
2.		**Physical Layer:** Concept of Analog & Digital Signal, Transmission Modes, Bandwidth, Transmission Impairments, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division. Introduction to Transmission Media : Twisted pair, Coaxial cable, Fibre optics Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.	4
3.		**Data Link Layer:** Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP.	4
4.		Network Layer: Design issues, Classful and Classless Addressing , Categories of Routing algorithms Congestion control, Congestion prevention policies, Leaky bucket and token bucket algorithms.	2
5.		**Transport Layer:** Elements of transport protocols, connection establishment and release, flow control Internet Transport Protocol (TCP and UDP)	2
6.		**Application Layer:** World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP),	1
7.		**Networking and Internetworking Devices**: Hub, Bridge, Switch Router, Gateway.	1
Books: 1. Forouzan, Data communication and networking, 4th Edn, TMGH 2. Tanenbaum A.S., Computer Network, PHI (EEE)			

Paper Code: BCA171415

Paper Name: Laboratory-IV (Web Tech Lab)

L-T-P-C: 0-0-10-5

UNIT	PARA	Content	Weeks
1	1.1	Designing simple HTML page, Headings, Paragraphs, Line Breaks etc	4
	1.2	Creating Links to Other Pages	3
	1.3	Using Frames, Tables, List in a web page	3
	1.4	Forms processing, Style sheets	3
2		Simple JavaScript to perform Arithmetic operations , Controlling JavaScript Execution	3
Books:	1.	E. Balagurusamy, **Programming with Java**, Third Edition, Tata McGraw-Hill Publication	
	2.	SQL, PL/SQL: The Programming Language Of Oracle, Ivan Bayross, BPB Publication	

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ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

Bachelor of Computer Applications (BCA)

5th Semester

ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

Bachelor of Computer Applications (BCA)

5th Semester: Course Structure

Sl.No.	Subject Code	Subject Name	L	T	P	C	Marks	
Theory							**CE**	**ESE**
1	BCA171501	Operating System	3	2	0	4	30	70
2	BCA171502	Network Security and Cryptography	3	2	0	4	30	70
3	BCA171503	System Software	3	2	0	4	30	70
4	BCA171504E*	Elective – I	4	0	0	4	30	70
Practical								
1	BCA171521	Minor Project	0	0	10	5	30	70
TOTAL			13	6	10	**21**	**150**	**350**
Total Contact Hrs: 29; **Total Credit: 21**								

Elective-I Subjects (Any One)		
Sl. No.	**Subject Code**	**Subjects**
1	BCA171504E1	Microprocessor and Assembly Language
2	BCA171504E2	Design and Analysis of Algorithm
3	BCA171504E3	Graph Theory
4	BCA171504E*	Any Other Subject offered from time to time with the approval of the University

Paper Code : BCA171501
Paper Name : Operating System
L-T-P-C : 3-2-0-4

UNIT		Content	Weeks
1		**Introduction** Operating System (OS) and its evolution, definition of different types of OS, OS services, Linux vs Unix Kernel	1
2		**Process concepts and IPC** Program vs process, process descriptor, context switching, process state Process creation and termination	2
3		**Scheduling and techniques** Concept of scheduling, CPU scheduler, Scheduling types, scheduling queues and criteria Scheduling algorithms: FCFS, SJF, Round Robin.	2
4		**Process synchronization** Race condition, Critical section, Mutual exclusion. Semaphores: Binary, counting, weak, strong. Readers-Writers problem and Dining philosopher's problem.	2
5		**Memory Management** Address binding, logical vs physical address space, swapping, Memory allocation types and issues, fragmentation. Segmentation, Paging and demand paging Page replacement algorithms: FIFO and LRU	2
Books:	1	Tanenbaum Andrew S, Modern Operating Systems, Eastern Economy	
	2	Silberschatz A, Galvin P: Operating system concepts, 4th ed. Addition Willy Publication	
	3	Linux Kernal Development, Robert Love, 3rd ed. , Pearson	
	4	Operating System- Design and Implementation, PHI (EEE)	
	5	Milenkovic M.: Operating System- Concepts and Design, MGH Tanenbaum	

Paper Code : BCA171502
Paper Name : Network Security and Cryptography
L-T-P-C : 3-2-0-4

Unit		Content	Weeks
1		Overview of basic concepts of network security, goals and principles of network security. Types of attacks. Security services and security mechanisms.	2
2		Cryptography: symmetric key and asymmetric key encipherment. Cryptanalysis and various cryptanalysis attack	3
3		Symmetric-key ciphers: Monoalpahbetic cipher: additive, shift, multiplicative, affine Polyalphbetic cipher: Autokey, Playfair, Vigenere, Hill	4
4		Symmetric-Key algorithms : Data Encryption Standard (DES) and Advanced Encryption Standard (AES)	3
5		Asymmetric-Key algorithms: RSA	2
6		Concept of Digital Signature, MD5, SHA-1	2
Books:	1	William Stallings, "Cryptography & Network Security", Pearson Education, 4th edition, 2010.	
	2	Network Security Essentials: Applications and Standards, by William Stallings, Prentice Hall	

Paper Code : BCA171503
Paper Name : System Software
L-T-P-C : 3-2-0-4

UNIT		Content	Weeks
1		**Introduction:** Introduction and classification of system software, Fundamentals of language processing and specification	2
2		**Assemblers:** Introduction to assembler, assembly process, assembler directives, forward reference, data structures of assembler, one pass assembler, two pass assembler, introduction to macros processors, Macro Definition and Call, Macro Expansion,	3
3		**Loading and linking:** Introduction to Linker and loaders, functions of linker and loader, Static and dynamic linking	2
4		Overview of compiler, difference between compiler and interpreter, Phases of a compiler **Parsing:** Top-down and Bottom-up parsers, shift reduce parser, recursive descent parser, Operator-precedence parsing, LL(1), Introduction to LR parsers, Lex and Yacc	3
5		An Introduction to system software tools, types of editors, user interface, Editor Structure, Software Tools for Program Development, Interactive Debugging System, Debugging Functions and Capabilities	3
Books	1	Aho,A.V., Sethi, and Ullman J.d: complier design.	
	2	Dhamdhere, System programming and operating systems, Tata McGrawHill.	
	3	Leland.L.Beck, System software, An introduction to System Programming, Pearson Education	

Paper Code : BCA171504E1
Paper Name : Microprocessor and Assembly Language
L-T-P-C : 4-0-0-4

UNIT		Content	Weeks
1		Introduction to Micro Computers, Microprocessors and Assembly Languages - Microprocessor architecture and its operations - 8085 MPU - 8085 Instruction set and classifications..	4
2		Writing assembly levels programs - Programming techniques such as looping, counting and indexing addressing nodes - Data transfer instructions - Arithmetic and logic operations - Dynamic debugging.	4
3		Counters and Time delays - Hexadecimal counter - Modulol 0 counter - Pulse Timings for flashing lights - Debugging counter and time delay program - stack - subroutine - conditional call and return instructions	4
4		Interrupt - Implementing interrupts - Multiple interrupt - 8085 - trap - Problems on implementing 8085 interrupt - DMA - Memory interfaces - Ram & Rom - I/O interface - Direct I/O - Memory mapped I/O.	3
Books	1	1. R. S. Gaonkar, 'Microprocessor Architecture, Programming and Applications with 8085/8080A', Wiley East em limited, 1990.	
	2	A. Mathur, 'Introduction to Microprocessor', Third Edition, Tata McGraw-Hill Publishing Co. Ltd., 1993.	
	3	Fundamentals of Microprocessors and Microcontrollers By B Ram,Dhanpat Rai Publication	

Paper Code : BCA171504E2
Paper Name : Design and Analysis of Algorithm
L-T-P-C : 4-0-0-4

UNIT		Content	Weeks
1		**Introduction:** Role of Algorithms in computing, Time and Space complexity, Best case ,Average cage and worst case analysis of algorithms.	1
2		**Growth of functions:** Asymptotic notation, Big Oh,Big Omega,Theta,Small Oh,Small Omega	2
3		**Recurrences** Basic concept of Recurrence, Recursion tree method, Master method	2
4		**Divide and Conquer Algorithms** Merge sort, Quick sort	2
5		**Greedy Algorithms** 0-1 Knapsack problem, Huffman codes, Activity selection problem	2
6		**Introduction to NP completeness** P,NP and NPC problems	1
Books	1	Rajib Mall; Software Engineering	
	2	Sommerville, Software Engineering, Pearson education	
	3	Pressman. R.S..Software Engineering: A practitioner's Approach. Mc GrawHill	

Paper Code : BCA171504E3
Paper Name : Graph Theory
L-T-P-C : 4-0-0-4

Unit		Content	Weeks
1		Basic of Graph Theory: Types Graphs, Incident, Adjacency, Degree, Degree Sequence, Walk, Path, Circuit, Regular Graph, Complete Graph, Bipartite graph, Hand Shaking Theorem, Components and Connectedness, Euler graph, Fieury's algorithms, Konigsberg's Bridge Problem, Hamiltonian graph. Operations on graphs, Graph isomorphism.	2
2		Tree And Its Properties, Eccentricity, Radius, Centres, Diameters, Binary Tree ,Rooted Tree, Height of a binary tree , Spanning Tree, Tournaments and Binary Relations, Arborescence, Polish Notations	2
3		Connectivity of Graphs, Cut set , Network flow, Max Flow Min Cut Theorem	2
4		Spanning Tree Algorithm, Kruskal & Primes Algorithm, Dijkastra Algorithms.	2
5		Matrix Representation of graph : Incident Matrix, Adjacency Matrix	1
6		Colouring Of Graphs, Chromatic Numbers, Independent Set, Chromatic Polynomial, Five colour Theorem, Four Colour Theorem.	3
7		Planar Graphs, Euler Theorem on Planer Graphs, Detection of planarity, Dual of Planar Graphs, Crossing Thickness, Dual of Isomorphic Graphs.	3
Books	1	Narsing Deo: Graph Theory with Applications to Engineering and Computer Science, PHI(EEE)	
	2	Agnarsson: Graph Theory: Modeling, Applications and Algorithms, Pearson Education India	

Paper Code : BCA171521
Paper Name : Minor Project
L-T-P-C : 0-0-10-5

UNIT		Content	Weeks
1		System Development Project.(Windows, Web Based, Mobile Application Development)	15

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