J. C. Bose University of Science and Technology, YMCA, Faridabad, Haryana

Department of Computer Applications
(Faculty of Informatics and Computing)

Scheme and Syllabus

BCA

(Semester I – II)

W.e.f. 2023

Scheme
(Semester I & II)

BCA- I Semester

Sr. No	Category	Course code	Course Title	Course Requirements (hrs)			Sessional Marks/End-Term Marks		Total Marks	Credits
				L	P	Total	Sessional	End Term		
1	Discipline Specific -Major	BCA-23-101	Fundamentals of Computers	4	-	4	25	75	100	4
2	Discipline Specific -Major	BCA-23-103	Programming in C	3		3	25	75	100	3
3	Discipline Specific -Minor	BCA-23-105	Digital Electronics -I	3	-	3	25	75	100	3
4	Interdisciplinary	BCA-23-107	Mathematics	3	-	3	25	75	100	3
5	Ability Enhancement courses	ENG-LL-23-01	Writing Skills and the Art of Rhetoric (WSAAR)	2	-	2	25	75	100	2
6	Value Added Course	BCA-23-109	Quantitative Reasoning	2	-	2	25	75	100	2
7	Discipline Specific Lab	BCA-23-111	C Programming Lab	-	2	2	15	35	100	1
8	Discipline Specific Lab	BCA-23-113	Digital Electronics Lab	-	2	2	30	70	100	1
9	Skill Enhancement Courses	BCA-23-115	Workshop I (Hardware)	-	6	6	30	70	100	3
Total						27	240	660	900	22

BCA- II Semester

Sr. No	Category	Course code	Course Title	Course Requirements (hrs)			Sessional Marks/End-Term Marks		Total Marks	Credits
				L	P	Total	Sessional	End Term		
1	Discipline Specific-Major	BCA-23-102	Introduction to Operating System	3	-	3	25	75	100	3
2	Discipline Specific-Major	BCA-23-104	Computer Networks	4		4	25	75	100	4
3	Discipline Specific-Minor	BCA-23-106	Digital Electronics-I	3	-	3	25	75	100	3
4	Interdisciplinary	BCA-23-108	Economics	3	-	3	25	75	100	3
5	Ability Enhancement courses	ENG-LL-23- 02	Communication, Mediation and Resolution (CMR)	2	-	2	25	75	100	2
6	Value Added Course		Environment Science -1	2	-	2	25	75	100	2
7	Discipline Specific Lab	BCA-23-110	OS Lab	-	2	2	30	70	100	1
8	Discipline Specific Lab	BCA-23-112	LOC Lab	-	2	2	30	70	100	1
9	Skill Enhancement Courses	BCA-23-114	Workshop II (Networking)	-	6	6	30	70	100	3
Total						27	240	660	900	22

SEMESTER I

Fundamentals of Computer
BCA-I Semester

No. of Credits: 3

L	T	P	Total		Sessional:	25 Marks
3	0	0	3		Theory:	75 Marks
					Total:	100 Marks
					Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1   To understand the major components of computer system, the types and functions of memory.
2   To learn about the difference between software and hardware in a computer system along with the fundamentals of Operating systems and its types.
3   To understand the concept of programming languages and their corresponding Translators
4   To learn about the basic types of Networks, Internet and computer viruses.

Syllabus:

UNIT – I: Computer Fundamentals
Generations of Computers, Definition, Block Diagram along with its components, characteristics & classification of computers, Limitations of Computers, Human-Being VS Computer, Applications of computers in various fields. **Memory:** Concept of primary & secondary memory, RAM, ROM, types of ROM, Cache Memory, flash memory, Secondary storage devices: Sequential & direct access devices viz. magnetic tape, magnetic disk, optical disks i.e. CD, DVD, virtual memory.

UNIT – II: Computer hardware & software
I/O devices, definition of software, relationship between hardware and software, types of software. **Overview of operating system:** Definition, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system.

UNIT – III: Computer Languages
Analogy with natural language, machine language, assembly language, high-level languages, fourth generation languages, compiler, interpreter, assembler, Linker, Loader, History and Characteristics of a good programming language, Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in

programming, Documentation, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming, Advantages and disadvantages of Structured programming.

UNIT IV: Overview of Networking
An introduction to computer networking, Network types (LAN, WAN, MAN), Network topologies, Modes of data transmission, Forms of data transmission, Transmission channels(media),OSI model, Introduction to internet and its uses, Applications of internet, Hardware and Software requirements for internet, Intranet, Applications of intranet. **Computer Virus:** Definition, types of viruses, Characteristics of viruses, anti-virus software.

Course Outcomes:
At the end of program the student will be able to:
1. Understand about the major components of computer system, the types and functions of memory.
2. Differentiate between software and hardware in a computer system along with the fundamentals of Operating systems and its types.
3. Learn the concept of programming languages and their corresponding software tools.

4. Analyse about the basic types of Networks, Internet and computer viruses.

Text/ Reference Books:

1   Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi.
2   Balagurusamy E, Computing Fundamentals and C Programming, Tata McGraw Hill.
3   Norton, Peter, Introduction to Computer, McGraw-Hill
4   Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
5   Rajaraman, V., Fundamentals of Computers, PHI

BCA-23-103
Programming in C
BCA-I Semester

No. of Credits: 3

L	T	P	Total			
3	0	0	3			

Sessional: 25 Marks

Theory: 75 Marks

Total: 100 Marks

Duration of Exam: 3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1.   To understand the fundamentals of C language.
2.   To learn different statements like sequential, decision making, iterative such as if-else, loops.

     To understand functions and its types in c along with the concept of recursion
3.   and storage classes.

     To learn about the concept of Arrays, Strings and Pointers.

4.

UNIT I: Overview of C
Characteristics of C programming language, C identifiers, keywords, Constants and Variables, Data types, Assignment statement, Symbolic constant, Structure of a C Program, inbuilt functions.
Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, shorthand assignment operators, conditional operators and increment and decrement operators, Arithmetic expressions: concept of l-value and r-value, evaluation of arithmetic expression, type casting (implicit and explicit) and type conversion, operator hierarchy & associativity.

UNIT II: Decision making & branching
Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, Switch statement, goto statement.
Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement, Nested loops.

UNIT III: Functions and Pointers: Definition of functions,Standard Mathematical functions, Input/output: Unformatted & formatted I/O function in C, Input functions viz. getch(), getche(), getchar(), gets(), output functions viz., putch(), putchar(), puts(), random(), system().

User defined functions: Function prototype, Local and global variables, Storage classes: auto, extern, register and static their scope, storage& lifetime, passing parameters and returning value, recursion.

Pointers: Understanding Pointers, Accessing the address of a variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a variable through its pointer, Pointer Arithmetic.

UNIT IV: Arrays and User defined Structures
Arrays: Definition, types, initialization, storage and addressing, searching and sorting in arrays, passing arrays to functions, Declaration and initialization of string, Input/output of string data, inbuilt string manipulation functions, Array of Strings.

Structures: Structures, Union and Enumerations, File Handling.

Course Outcomes:
At the end of program the student will be able to:
1. Acquire knowledge about building blocks of C language like variables, data types, managing I/O etc.
2. Solve basic problems using different statements like sequential, decision making, iterative such as if-else, loops and derived data types like arrays and structures.
3. Apply the concept of functions and pointers to solve problems and also understand about various storage classes
4. Create programs using the concept of arrays, strings, structures and file handling.

Text/ Reference Books:

1.The C programming language, Dennis M. Ritchie,Pearsons Educations.

2. Gottfried, Byron S., Programming with C, Tata McGraw Hill

3.Let us C, YashwantKanetker, BPB Publications.

4. Pointers in C,YashwantKanetker, BPB Publications.

5. Balagurusamy, E., Programming in ANSI C, 4E, Tata McGraw-Hill

6. Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi.

7. Jeri R. Hanly& Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.

Digital Electronics-I
BCA-I Semester

No. of Credits:	3					
L	T	P	Total		Sessional:	25 Marks
3	0	0	3		Theory:	75 Marks
					Total:	100 Marks
					Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1. To introduce the fundamentals of digital electronics.
2. To familiar the students about the design and analyze various combinational circuits.
3. To give exposure to the students about design and analyze various sequential circuits.
4. To introduce various converters.

Syllabus:
UNIT- I: Fundamentals of Digital Systems

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal, hexadecimal number, binary arithmetic, one's and two's complements arithmetic,

UNIT-II: Combinational Digital Circuits

Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders.

UNIT-III: Sequential Circuits and Systems

A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter,

UNIT-IV: Digital to Analog Converters

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit,.

Course Outcomes:
At the end of this course, students will be able to:

1. Design and analyse combinational logic circuits.

2. Acquire basic knowledge of digital logic families & semiconductor memories.

3. Design & analyse synchronous sequential logic circuits.

4. Design various converters

Text/ Reference Books:

1. Millman and Halkias, Integrated Electronics, Pearsons Education

2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

3. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

4. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

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BCA-23-107
Mathematics
BCA-I Semester

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No. of Credits: 3

L	T	P	Total		Sessional:	25 Marks
3	0	0	3		Theory:	75 Marks
					Total:	100 Marks
					Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1. To understand Sets, Relations and functions along with their properties,types and operations on them.

2. To understand Propositions, its basic operations, types and applications.

3. To learn about the concept of recurrence and recurrence relations

4. To make the students understand Regular expressions, Regular Language and their conversions, conversion of automata machines

UNIT- I: Sets Theory
Definition of Set, Representation of Sets, Operations on sets, Laws of Sets, Cartesian Products, Partially Ordered Set, Relation between Boolean algebra and set theory.
Relations and Functions: Relations and its types, Binary Relation, Properties of Binary relation, Matrix representation of relations, Equivalence Relation, Partial Ordering Relation, Hasse diagram, well ordered set, Lattices, Properties of lattices, Bounded lattices, Complemented and Distributive lattices
Functions and its Types, Composition of function, Inverse and Composite Function, Recursively defined function.

UNIT–II: Propositional Logic
Boolean algebra, Propositions, logical operations, Tautologies, Contradictions, Logical implication, Logical equivalence, Normal forms: CNF, DNF, PCNF, PDNF, Theory of

Inference and deduction. Predicate Calculus: Predicates and quantifiers, Mathematical Induction.

UNIT-III: Recursion and Recurrence Relation
Linear recurrence relation with constantcoefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

UNIT–IV: Theory of Automata
Definition of grammar and language, Chomsky Hierarchy of Grammars, NFA, DFA,Conversion of NFA to DFA, Regular expressions, conversion of regular expression to Finite Automata, FA with output: Moore machine, Mealy machine, Conversions, introduction to Turing machine.

Course Outcomes:
At the end of this course, students will be able to:
1. Apply set theory, functions, relations and lattices to solve computational problem.
2. Design propositions and apply operations on them.
3. Design solutions to the problems using recursive functions.
4. Understand different models of computation.

Text/ Reference Books:
1. C.L.Liu: Elements of Discrete Mathematics McGraw Hill.
2. Lipschutz, Seymour: Discrete Mathematics, Schaum's Series.
3. Babu Ram: Discrete Mathematics, Vinayek Publishers, New Delhi.
4. Trembley, J.P. & R. Manohar: Discrete Mathematical Structure with Application to Computer Science, TMH.
5. Kenneth H. Rosen : Discrete Mathematics and its applications, TMH.
6. Theory of Computer Science; K.L.P. Mishra. N. Chandrasekaran

ENG-LL-23-01
Writing Skills and the Art of Rhetoric (WSAAR)
BCA-I Semester

No. of Credits:			3			
L	T	P	Total		Sessional:	25 Marks
3	0	0	3		Theory:	75 Marks
					Total:	100 Marks
					Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:

Unit-I: Narration and Writing
Define, Describe, Narrate and Argue; Articulating Questions and Innovative Thoughts; Narration: chronological order and a chronological order; first-person, second-person and third person point of view in narration; key elements: plot, character, pov, setting and conflict; Storytelling, event news stories and Corporate Storytelling; problem-solution structures.
Exercise: *Ekphrasis*, Pictures: Describing scenes; Creating Stories out of words and pictures.

Unit-II: Reasoning and Rhetoric: Rhetoric, the art of persuasion; *ethos, logos* and *pathos*, Aristotle's triangle; Freytag's pyramid; reasoning; organizing; articulating; Synthesis; *Antanagoge; Hypophora.*
Recognize and evaluate the strength of an argument and its impact.

Exercise: Rhetorical and Oratorical Skills: Techniques for effective public speaking, both prepared and extemporaneous; Brainstorm ideas for your own short speech.

Unit-III: Writing Features and Articles: Writing Features and Articles, , Op-Eds (Opinions and Editorials), Features; Articles; Topical Issues, Memes; Backgrounders; Memes; Idioms, Proverbs; Using Literary Devices and Figurative Language.
Exercises: Building Memes and Feature Writing
Unit: IV: Performance and Drills
Reading Drills; Speaking Drills; Team-Performance Drills; Solo Performance Drills; Apply the elements of rhetoric you have learned so far in the final draft of your op-ed and discussion.

Course Outcomes:

After completion of the course student will be able to :
1. Understand the concept of soft skills including communication skills, listening skills, positive thinking and also will be able to enhance own personality.
2. Able to write business letters.
3. Able to write reports.
4. Able to make effective resume and will also be able to present himself/herself in interview, speeches, presentations, talks etc.

Text/ Reference Books:

1. Butterfield, Jeff. Soft Skills for Everyone. New Delhi: Cengage Learning. 2010.
2. Chauhan, G.S. and Sangeeta Sharma. Soft Skills. New Delhi: Wiley. 2016.
3. Goleman, Daniel. Working with Emotional Intelligence. London: Banton Books. 1998.
4. Hall, Calvin S. et al. Theories of Personality. New Delhi: Wiley. rpt. 2011.
5. Holtz, Shel. Corporate Conversations. New Delhi: PHI. 2007.
6. Kumar, Sanajy and PushpLata. Communication Skills. New Delhi: OUP. 2011.
7. Lucas, Stephen E. The Art of Public Speaking. McGraw-Hill Book Co. International Edition, 11th edition**.**

BCA-23-109
Quantitative Reasoning
BCA-I Semester

No. of Credits: 3

L	T	P	Total		Sessional:	25 Marks
3	0	0	3		Theory:	75 Marks
					Total:	100 Marks
					Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1 To Understand the basic concepts of quantitative ability
2 To learn the basic concepts of logical reasoning Skills
. To acquire satisfactory competency in use of reasoning
3 To understand the problems for campus placements aptitude papers covering
. Quantitative Ability, Logical Reasoning Ability
4
·   **Syllabus:**

UNIT I Quantitative Aptitude:

Periods Numerical computation: Applications based on Numbers, Chain Rule, Ratio Proportion, Time and work, Time and Distance, Percentages, Profit Loss and Discount, Simple interest and Compound Interest Partnerships, Shares and dividends, Data interpretation Data interpretation related to Averages, Mixtures and allegations, Bar charts, Pie charts, Venn diagrams

Unit II Verbal Ability:

Reading Comprehension Structure of a Reading Passage – Idea Organization Styles – Style and Tone – Skimming and Scanning – Techniques for Fast and Active Reading –Different Types of Questions and Techniques for Answering Them – Reading between the Lines and Reading beyond the Lines – Theme Detection – Identifying Central Idea of the Passage – Using Context to Answer Vocabulary Based Questions

Unit III Critical Reasoning:

Understanding Critical Reasoning – Basic Terminology in CR (Premise, Assumption, Inference and Conclusion) – Sequencing of Sentences (Rearranging Jumbled Paragraphs) – Cloze Passages.

Unit IV Numerical Reasoning:

Problems related to Number series, Analogy of numbers, Classification of numbers, Letter series, Seating arrangements, Directions, blood relations and puzzle test. Combinatory: Counting techniques, Permutations, Combinations and Probability Syllogisms and data sufficiency

Course Outcome:

On successful completion of the course the students will be able to:
1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning Skills
3. Acquire satisfactory competency in use of reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability

Text books &References:

1. A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
2. Analytical and Logical reasoning By Sijwali B S
3. Quantitative aptitude for Competitive examination By R S Agarwal
4. Analytical and Logical reasoning for CAT and other management entrance test by Sijwali B S
5. Quantitative Aptitude by Competitive Examinations by AbhijitGuha 4 th edition
6. https://prepinsta.com/
7. https://www.indiabix.com/
8. https://www.javatpoint.com/

				BCA-23-111		
				C Programming Lab		
				BCA-I Semester		

Discipline Specific Course

No. of Credits:			2			
L	T	P	Tota l		Sessional:	15 Marks
0	0	2	2		Theory:	35 Marks
					Total:	50 Marks
					Duration of Exam:	3 Hours

List of Experiments

1. Write programs to give introduction to basic C I/O instructions, variables and constants :
   a) To print Hello World.
   b) To perform arithmetic operations on varaibles:+,-,/,* etc.
   c) To calculate area and perimeter of a circle.
   d) To find average of five numbers.

2. Write programs to implement if-then-else, nesting if else:
   a) To find the larger between two numbers.
   b) To calculate gross salary giving basic salary, da,hra.
   c) To find the largest between three numbers.
   d) To find whether a number entered by user is leap year or not.

3. Write programs to implement loops:

   a) To print even numbers from1 to 50
   b) To print odd numbers from 1 to 100
   .c) To generate table of number
   d) To find reverse of a number
   e) to print different patterns .
   f) To calculate sum of n numbers using do-while loop. (for statement)
   g) To find the average mail height & average female heights in the class (input is in the form of gender code, height).

4. Write a program to find roots of a quadratic equation using functions and switch statements.

5. Write programsto implement arrays:

   a) To calculate Sum of all the elements of an array
   b)To implement Linear search
   c) To implement Binary Search
   d) To implement basic Sorting algorithms(Selection/Bubble)
   e) To find the largest and second largest number out of given 50 numbers.

6. Write programs to implement the concept of 2-D arrays(Matrices)

   a) to add two matrices
   b) Write a program to multiply two matrices.
   c)Write a program to transpose a given matrix.

7. Write programs for string operations

   a) various string inbuilt functions
   b) to read a string and write it in reverse order.
   c) Write a program to concatenate two strings of different lengths.

d)Write a program to calculate length of a string without using string inbuilt function.
8. Write program for basic pointer arithmetic.
9. Write a program to swap two numbers using pointers.
10. Write programs to implement functions:
a) to find factorial of a number using function. b) Write a program to calculate a^b using function. c) Write a program to print Fibonacci series using recursion
11. Write programs for implementing Structures.
12. Write Programs for File Handling

BCA-23-113							
Digital Electronics Lab							
BCA-ISemester							
Discipline Specific Course							
No. of Credits:			2				
L	T	P	Total		Sessional:	15 Marks	
0	0	2	2		Theory:	35 Marks	
					Total:	50 Marks	
					Duration of Exam:	3 Hours	
List of Experiments							
1.Fabrication of all the gates using Diode & transistors and verification of truth table.							
2.To design & realize combinational circuit using K-map & logic simplification							
3.To design 4 bit parallel adder/ subtractor/ for unsigned/ signed numbers							
4.To verify the operation of Multiplexer & to implement any given function with a MUX							
5.To verify the operation of DEMUX & decoder.							
6.To verify the truth table of SR, JK, D & T Flip-Flop & conversion of one Flip-Flop to another FF.							
7. To design UP-DOWN decade counter using JK/T Flip-Flop & derive o/p into SSD							
8. To verify the function of 4- bit ALU.							
9. To study the operation of 8-bit A/D converter.							
10.To design 4 bit DAC							

BCA-23-115						
Workshop 1						
BCA-I Semester						
Discipline Specific Course						
No. of Credits:			2			
L	T	P	Total		Sessional:	15 Marks
0	0	2	2		Theory:	35 Marks
					Total:	50 Marks
					Duration of Exam:	3 Hours

List of Experiments
1. Set date and time of the windows and change screensaver and appearance.
2. Manage files and folders.
3. To study various components of PC such as keyboard, mouse, CPU, RAM, motherboard and SMPS.
4. Toassemble a PC.
5. Tostudy, remove and replace floppy disk drive, hard disk and CD ROM drive .
6. Printer Installation and Servicing and troubleshooting.
7. Study various operations on Hard Disk such as formatting, logical partitioning, error checking, defragmentation etc..
8. Installation of various Operating Systems
9. Handling registry file, automatic update, security settings.

SEMESTER II

BCA-23-102
Introduction to Operating systems
BCA-II Semester

No. of Credits: 3

L	T	P	Total
3	0	0	3

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1. To understand evolution and types of OS and to understand the structure, components and functions of OS.
2. To learn about Processes, threads and various Scheduling policies.
3. To understand the principle of Deadlocks and various memory management schemes
4. To understand virtual memory management, Disk management, I/O management and File system

Syllabus:

UNIT – I : Fundamentals of Operating System
Introduction to Operating System, its need and operating System services, Early systems, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems.
Process Management: Process concept and context, Process Control Block, Operation on processes, Threads, and Inter-process Communication.

UNIT-II: CPU Scheduling Basic concepts, scheduling criteria, scheduling algorithms: FCFS, SJF, Premptive and non-premptive, Round Robin,& Queue Algorithms.
Deadlocks: Deadlock characterization, Prevention and Avoidance, Deadlock Detection and Recovery Methods for handling deadlocks, Banker'sAlgorithm.

UNIT-III: Memory Management

Logical versus Physical address space, Swapping, Contiguous allocation, Paging, Segmentation.
Virtual Memory: Demand paging, Performance of demand paging, Page replacement, Page replacement algorithms, Thrashing.

UNIT-IV: Disk Scheduling and File Management
Disk structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.
Type of File systems, File Structure, File allocation methods: Contiguous allocation, Linked allocation, Indexed allocation, Free space management: Bit vector, Linked list, Grouping, Counting.

Course Outcomes:

After completion of the course student will be able to :

1. Learn various types of OS and will also understand the various functions of OS.
2. Understand CPU scheduling along with its various algorithms. Also, the students will be familiar with different deadlock handling algorithms.
3. Apply various memory management schemes like demand paging and segmentation and also able to understand virtual memory and page replacement algorithms.
4. Understand disk scheduling and different file handling schemes in OS.

TextBooks/Reference Books:

1. Abraham Silberschatz,PeterB.Galvin,"OperatingSystemConcepts",AddisonWesleypublishing. Co.,7th. Ed., 2004.
2.   Nutt Gary, "Operating Systems", Addison WesleyPublication,2000.
3. Andrew S.Tannenbaum, "Modern Operating Systems", Pearson Education Asia, Second Edition, 2001.
4.   William Stallings, "Operating Systems, "Internals and Design Principles", 4th Edition, PH, 2001.

BCA-23-104
Computer Network
BCA-II Semester

No. of Credits: 3

L	T	P	Total		Sessional:	25 Marks
3	0	0	3		Theory:	75 Marks
					Total:	100 Marks
					Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1 To understand basic computer network technology, Data Communications System and its components, different types of network topologies and protocols.
2. To know basic protocols of data link layer, how they can be used to assist in network design and implementation
3. To analyse the features , protocols and operations of network layer
4. To understand transport and application layer protocols, along with basics of cryptography.

UNIT-I: Data Communication Components
Representation of data, analog and digital signals, asynchronous and synchronous transmission.Various Connection Topology, Protocols and Standards, OSI model, TCP/ IP reference model, Transmission Media, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT-II: Data Link Layer and Medium Access Sub Layer
Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Medium access controls, Pure ALOHA, Slotted ALOHA, Introduction to CSMA/CD, CDMA/CA.

UNIT-III: Network Layer

Switching, IP packet format, Logical addressing – IPV4, IPV6, Physical to IP address mapping protocols – ARP, RARP, BOOTP and DHCP–Delivery, Introduction to forwarding and unicast Routing protocols.

UNIT-IV: Transport Layer and Application Layer
Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service,Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth.

Course Outcomes:
Upon successful completion of the course, the students will be able to:
1. Acquire knowledge about basic computer network technology, Data Communications System and its components, different types of network topologies and protocols.
2. Understand the basic protocols of data link layer, how they can be used to assist in network design and implementation
3. Apply protocols of data link layer in network design and implementation.
4. Analyse the features and operations of various transport and application layer protocols, along with basics of cryptography.

TextBooks/References:
1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
5. Network and Internet, Douglas Comer, Prentice Hall of India.
6. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America
7. Computer Networks, UYLess Black, Pearsons Education.

BCA-23-106
Digital Electronics-II
BCA-II Semester

No. of Credits:			3		
L	T	P	Total	Sessional:	25 Marks
3	0	0	3	Theory:	75 Marks
				Total:	100 Marks
				Duration of Exam:	3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1. To introduce the fundamentals of digital electronics.
2. To familiar the students about the design and analyze various combinational circuits.
3. To give exposure to the students about design and analyze various sequential circuits.
4. To introduce various converters.

Syllabus:
Unit-I: Digital codes and Logic Families
Codes, error detecting and correcting codes, FET, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

Unit II: Combinational Digital Circuits
Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

Unit III: Sequential Circuits and Systems:
Ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

Unit IV: Analog to Digital Converters:
Quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

Course Outcomes:
At the end of this course, students will be able to:
1. Design and analyse combinational logic circuits.
2. Acquire basic knowledge of digital logic families & semiconductor memories.
3. Design & analyse synchronous sequential logic circuits.
4. Design various converters

Text/ Reference Books:

1. Millman and Halkias, Integrated Electronics, Pearsons Education
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
3. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
4. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

No. of Credits: 3

L	T	P	Total
3	0	0	3

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1. To learn the concepts of micro and macro economics.
2. To understand how households (demand) and businesses (supply) interact in various market structures to determine price and quantity of a good produced.
3. To understand the links between production costs and the economic models of supply.
4. To understand how different degrees of competition in a market affect pricing and output.

Syllabus:
UNIT-I: Introduction to the subject
Micro and Macro Economics, Relationship between Science, Engineering, Technology and Economic Development. Production Possibility Curve, Nature of Economic Laws.

UNIT-II: Time Value of Money
Concepts and application. Capital budgeting; Traditional and modern methods, Payback period method, IRR, ARR, NPV, PI (with the help of case studies).

Demand: Meaning of Demand. Law of Demand, Elasticity of Demand; meaning, factors effecting it and its practical application and importance. Demand forecasting (a brief explanation).

UNIT-III: Production
Meaning of Production and factors of production, Law of variable proportions and returns to scale.Internal and external economies and diseconomies of scale. Concepts of cost of production, different types of costs; accounting cost, sunk cost, marginal cost, Opportunity cost. Break even analysis, Make or Buy decision (case study), Relevance of Depreciation towards industry.

UNIT-IV: Market and Banking
Meaningof market, types of market, perfect competition, Monopoly, Monopolistic, Oligopoly. (main features). Supply and law of supply, Role of demand and supply in price determination.Indian Economy, nature and characteristics.Basic concepts; fiscal and monetary policy, LPG, Inflation, Sensex, GATT, WTO and IMF.Difference between Central bank and Commercial banks.

Course Outcomes:
After completion of this course, student will be able to:
1. Understand how households (demand) and businesses (supply) interact in various market structures to determine price and quantity of a good produced.
2. Represent demand, in graphical form, including the downward slope of the demand curve and what shifts the demand curve.
3. Understand the links between production costs and the economic models of supply.
4. Understand how different degrees of competition in a market affect pricing and output.

TextBooks/References:
1. Jain T.R., Economics for Engineers, VK Publication
2. Chopra P. N., Principle of Economics, Kalyani Publishers
3. Dewett K. K., Modern economic theory, S. Chand
4. H. L. Ahuja., Modern economic theory, S. Chand
5. DuttRudar&Sundhram K. P. M., Indian Economy
6. Mishra S. K., Modern Micro Economics, Pragati Publications
7. Pandey I.M., Financial Management; Vikas Publishing House
8. Gupta Shashi K., Management Accounting, Kalyani Publication

Communication, Mediation and Resolution (CMR)
BCA-II Semester

No. of Credits: 3
L   T   P   Tota   Sessional: 25 Marks
                    l
3   0   0   3   Theory: 75 Marks
                                                          Total: 100 Marks
                                    Duration of Exam: 3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
  1. .

Unit-I: Communication and Barriers to Communication: 7C's of Communication, Win-Win Communication, Strategies for Effective Communication, Zero-Sum; Reasons for Conflict; Communication Barriers.
Unit-II: Critical Thinking and Cognitive Skills: reason; analysis, synthesis, divide and rule; root-cause analysis; logic and logical fallacies.
Reasoning; Logic; Inductive and Deductive Reasoning; Logical fallacies: *Ad hominem,* straw man fallacy; bandwagon fallacy; hasty generalization; false dilemma; false dichotomy; *Tu Quoque* ; circular reasoning and hasty generalization; Recognizing fallacies.
Unit-III: Mediation and Conflict-Resolution: Cognitive Skills and Critical thinking; Listening for key words, phrases and hints, Creative Communicating, Managing and celebrating Diversity, Adaptability and Negotiation; Dispute-resolution; arbitration; mediator's role; caucuses, third party, objectivity, impartiality, neutrality, offers, counter offers, questions, demands, and proposals, impasse, settlement. Brainstorming, Problem solving strategies, Stress management, Significance of Collaboration, Confronting challenges.
Unit-IV: Mediation in Practice: Exercises in role-playing and mediation and one case study assignment as directed by the teacher
Course Outcomes:
After the completion of the course, the students will be able to:
  1
  .

TextBooks/References:
1**.** David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004

2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)

6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.

7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN

???-23-???
Environment Science 1
BCA-II Semester

No. of Credits: 3

L	T	P	Total
3	0	0	3

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Note: The examiner will be required to set seven questions in all having two parts. Part I will have Question Number 1 consisting of a total of 10 parts (short-answer type questions) covering the entire syllabus and will carry 15 marks. In Part II, there will be six questions. The examiner will set one and a half questions from each Unit of the syllabus and each question will carry 15 marks. Question Number 1 will be compulsory. In addition to the compulsory question, A student will have to attempt four more questions from Part II.

Course Objectives:
1. To provide the students a detailed knowledge on the threats and challenges to the environment due to developmental activities.
2. To identify the natural resources and suitable methods for their conservation and sustainable development.
3. To create awareness of the students about the importance of ecosystem and biodiversity for maintaining ecological balance.
4. To learn about various attributes of pollution management and waste management practices.
5. To understand the social issues both rural and urban environment and environmental legislation

UNIT-I: The Multidisciplinary Nature of Environmental Studies
Definition, scope and importance. Need for public awareness.

UNIT-II: Natural Resources
 Renewable and Non-Renewable Resources: Natural resources and associated problems:
- Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

- Energy resources: Growing energy needs, renewable and non- renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT-III: Ecosystems
- Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers.
- Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of thefollowing ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT-IV: Biodiversity and its Conservation
- Introduction – Definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India. Value of biodiversity: consumptive· use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels.
- India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: insitu and ex-situ conservation of biodiversity

UNIT-V: Environmental Pollution Definition
- Causes, effects and control measures of: a) Air pollution b) Water pollution c)Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urban andindustrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-VI: Social Issues and the Environment
- From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products.
- Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act
- Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation Public awareness.

Course Outcomes:

After the completion of the course, the students will be able to:
1. Understand environmental legislation and policies of national and international regime.
2. No regulations applicable to industries and other organizations which significant environmental aspects.
3. Get knowledge of the legal system operating in India and will be in a position to prepare compliance report for getting environmental clearance.
4. Prepare the environmental management system for an organization.

TextBooks/References:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela 2008 PHI Learning Pvt Ltd.
3. Environmental Science by Daniel B. Botkin& Edwards A. Keller, Wiley INDIA edition.
4. Fundamentals of Ecology by Odum, E.P., Barrick, M. and Barret, G.W. Thomson Brooks/Cole Publisher, California, 2005.

BCA-23-110		
OS Lab		
BCA-II Semester		

Discipline Specific Course						
No. of Credits:		2				
L	T	P	Total		Sessional:	15 Marks
0	0	2	2		Theory:	35 Marks
					Total:	50 Marks
					Duration of Exam:	3 Hours

List of Experiments

1. Write C programs to demonstrate various process related concepts.

2. Write C programs to demonstrate various thread related concepts.

3. Write C programs to simulate CPU scheduling algorithms: FCFS, SJF, and Round Robin.

4. Write C programs to simulate Intra & Inter – Process Communication (IPC) techniques: Pipes, Messages Queues, and Shared Memory.

5. Write C programs to simulate solutions to Classical Process Synchronization Problems: Dining Philosophers, Producer – Consumer, Readers – Writers.

6. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.

7. Write C programs to simulate Page Replacement Algorithms: FIFO, LRU.

8. Write C programs to simulate implementation of Disk Scheduling Algorithms: FCFS, SSTF.

9. Write a C programs to implement UNIX system calls and file management

10. Simulate Banker's algorithm for deadlock avoidance.

BCA-23-112						
Digital Electronics-II Lab						
BCA-II Semester						
Discipline Specific Course						
No. of Credits:			2			
L	T	P	Total		Sessional:	15 Marks
0	0	2	2		Theory:	35 Marks
					Total:	50 Marks
					Duration of Exam:	3 Hours
List of Experiments						
1.Study of TTL gates						
2.To design & realize combinational circuit using K-map & logic simplification						
3.To design 4 bit parallel adder/ subtractor/ for unsigned/ signed numbers						
4.To verify the operation of Multiplexer & to implement any given function with a MUX						
5.To verify the operation of gray to binary code convertor.						
6.To verify the truth table of SR, JK, D & T Flip-Flop & conversion of one Flip-Flop to another FF.						
7. To design and verify operation of synchronous UP-DOWN decade counter using JK/T Flip-Flop & derive o/p into SSD						
8. To design and verify operation of synchronous UP-DOWN decade counter using JK/T Flip-Flop & derive o/p into SSD						
9. To verify the function of 4- bit shift register.						
10. To study the operation of 8-bit D/A converter.						

BCA-23-114						
Workshop 2(Networking Lab)						
BCA-II Semester						
Discipline Specific Course						
No. of Credits:		2				
L	T	P	Total		Sessional:	15 Marks
0	0	2	2		Theory:	35 Marks
					Total:	50 Marks
					Duration of Exam:	3 Hours

List of Experiments

1.Study of different types of Network cables and connectors and making the cross-wired cable and straight through cable using clamping tool.

2 Study of Network Devices such as Switch, Router, Gateway, Servers etc.

3 To study and design network/subnet using subnet masking and IP addressing.

4 To study of basic network command and network configuration commands.

5 Performing an Initial Switch Configuration

6 Performing an Initial Router Configuration

7 Configuring and Troubleshooting a Switched Network

8 Connecting and configuring Switch

9 Configuring Ethernet and Serial Interfaces

10 To design Local Area Network for a laboratory

11 Configuring WEP on a Wireless Router

12 Using the Cisco IOS Show Commands

13 Examining WAN Connections Output using commands such as ping, Traceroute, ipconfig

14 Implementing various LAN configurations using LAN kit (Benchmark).

15 Study and configure Firewall such as Cyberom