School of Computer Science and Engineering

Program: BCA

Scheme: 2019-2022

Curriculum

SEMESTER-I

S. No.	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	BCAC1101	Discrete Mathematics	3	0	0	3	20	50	100
2	BCAC1102	Fundamentals of Digital Computers	3	0	0	3	20	50	100
3	BCAC1103	Introduction to Information Technology	3	0	0	3	20	50	100
4	BCAC1104	Programming Essentials in C	3	0	0	3	20	50	100
5	SLBC1001	Basic English	0	0	4	2	50	-	50
6	BCAC1114	Programming Essentials in C Lab	0	0	2	1	50	-	50
7	BCAC1113	Information Technology Lab	0	0	2	1	50	-	50
		Total	**12**	**0**	**8**	**16**			

SEMESTER-II

S. No.	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	ENVS1001	Environmental Science	3	0	0	3	20	50	100
2	SLBC1002	Professional Communication	0	0	4	2	50	-	50
3	BCAC1211	Data Structures using C	3	0	0	3	20	50	100
4	BCAC1203	Web Technology	3	0	0	3	20	50	100
5	BCAC1204	Enterprise Resource Planning	3	0	0	3	20	50	100
6	BCAC1205	Numerical Methods	3	0	0	3	20	50	100
7	BCAC1202	Python Programming	3	0	0	3	20	50	100
8	BCA9004	Disruptive Technologies	2	0	0	2	20	50	100
9	BCAC1201	Data Structures using C Lab	0	0	2	1	50	-	50
10	BCAC1213	Web Technology Lab	0	0	2	1	50	-	50
11	BCAC1212	Python Programming Lab	0	0	2	1	50	-	50
		Total	**20**	**0**	**10**	**25**			

SEMESTER-III

S. No	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	BCAS2001	Computer Architecture	3	0	0	3	20	50	100
2	BCAS2002	Database Management System	3	0	0	3	20	50	100
3	BCAS2003	JAVA Programming	3	0	0	3	20	50	100
4	BCAS2004	Introduction to Algorithm Analysis and Design	3	0	0	3	20	50	100
5	LLL223	Logical Skill Building	0	0	4	2	50		50
6	BCAS2036	Introduction to Cryptographic Fundamentals	3	0	0	3	20	50	100
7	BCAS2007	Computer Networking	3	0	0	3	20	50	100
8	BCAS2008	Computer Networking Lab	0	0	2	1	50	-	50
9	BCAS2009	Java Programming Lab	0	0	2	1	50	-	50
10	BCAS2010	Database Management System LAB	0	0	2	1	50	-	50
		Total	**16**	**0**	**10**	**23**			

SEMESTER-IV

S. No.	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	LLL245	Campus-to-Corporate	0	0	4	2	50	-	50
2	BCAS2015	Operating System	3	0	0	3	20	50	100
3	BCAS2016	Software Engineering	3	0	0	3	20	50	100
4	BCAS2025	.Net Technology	3	0	0	3	20	50	100
5	BCAS2021	Linux Administration	3	0	0	3	20	50	100
6	BCAS2013	Graph Theory	3	0	0	3	50	-	50
7		Elective-I	3	0	0	3	20	50	100
8	BCA9003	iOS, Android APP Development Lab	0	0	2	1	50	-	50
9	BCAS2026	.Net technology Lab	0	0	2	1	50	-	50
10	BCAS2022	Linux Administration Lab	0	0	2	1	50	-	50
11		Elective-I Lab	0	0	2	1	50	-	50
		Total	**18**	**0**	**12**	**24**			

SEMESTER-V

S. No.	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	BCAS3002	Mobile Application Development	3	0	0	3	20	50	100
2	BCAS3003	Computer Graphics	3	0	0	3	20	50	100
3	BCAS3004	E-Commerce	3	0	0	3	20	50	100
4	BCAS3006	Software Project Management	3	0	0	3	20	50	100
5		Elective-II	3	0	0	3	20	50	100
6	BCAS3005	Computer Graphics Lab	0	0	2	1	50	-	50
7	BCAS3007	Mobile Application Development Lab	0	0	2	1	50	-	50
8		Elective II lab	0	0	2	1	50	-	50
9	BCAS9998	Project-I	0	0	8	4	50	-	50
		Total	**15**	**0**	**14**	**22**			

SEMESTER-VI

S. No.	Course Code	Name of the Course	L	T	P	C	IA	MTE	ETE
							Assessment Pattern		
1	BCAS9999	Project Work-2	0	0	30	15	50	-	50
		Total	**0**	**0**	**30**	**15**			

LIST OF ELECTIVES

S. No.		Course Code	Name of the Course	L	T	P	C
1		BCAS2028	Advance DBMS	3	0	0	2
2	**Elective-1**	BCAS2029	Advance DBMS Lab	3	0	0	2
3	**(Any one)**	BCA9001	PE-1 - AI & ML	3	0	0	2
4		BCA9002	PE-1- AI & ML using Python Lab	0	0	2	1

S. No.		Course Code	Name of the Course	L	T	P	C
1	**Elective -II** **(Any Two)**	BCAS3008	Multimedia System	3	0	0	2
2		BCAS3009	Multimedia System Lab	0	0	2	1
3		BCAS3010	Network Security	3	0	0	2
4		BCAS3011	Network Security Lab	0	0	2	1
		BCAS3012	Search Engine Optimisation	3	0	0	2
		BCAS3013	Search Engine Optimisation Lab	0	0	2	1

S. No.		Course Code	Name of the Course	L	T	P	C
1	**Elective -II** **(Any Two)**	BCAS3008	Multimedia System	3	0	0	2
2		BCAS3009	Multimedia System Lab	0	0	2	1
3		BCAS3010	Network Security	3	0	0	2
4		BCAS3011	Network Security Lab	0	0	2	1
		BCAS3012	Search Engine Optimisation	3	0	0	2
		BCAS3013	Search Engine Optimisation Lab	0	0	2	1

Detailed Syllabus

Name of The Course	Discrete Mathematics	L	T	P	C
Course Code	BCAC1101	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

This course provides elementary mathematical knowledge and problem solving techniques.This course studies the mathematical elements of computer science including propositional logic, predicate logic, combinatorics, mathematical induction, recurrence relation, graphs, and Boolean algebra. At the end of this course student should be able to understand the concepts and skills of basic operations in discrete mathematics.

Course Outcomes

CO1	Explain at high levels concepts and implement basic operations in discrete mathematics.
CO2	Perform combinatorial analysis to solve counting problems.
CO3	Develop mathematical models from computation theory to programming languages through combinatorics.
CO4	Use mathematical reasoning to comprehend and construct mathematical arguments**,** graphs.
CO5	Develop techniques for counting, permutations and combinations.

Text Book (s)
1. Seymour lipschutz, Marc Lars Lipson, Theory and Problems of Discrete Mathematics Third Edition, Schaum's Outline Series McGRAW-HILL.
2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, PHI
3. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill

Reference Book (s)
1. Swapan Kumar Sarkar, A Textbook of Discrete Mathematics, S.Chand Publication
2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill
3. J.L. Mott, A. Kandelad T.P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, PHI, 2nd Edition, 1999.
4. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill

Course Content:

Unit-1	MATHEMATICAL LOGIC	8 hours
Introduction, Propositions, Connectives, Truth tables, Tautologies and Contradictions, Equivalences implications, Normal forms, Methods of proof rules of inference for quantified propositions, Mathematical induction.		
Unit-2	COMBINATORICS	8 hours
Basics of counting, Combinations of permutations, Enumeration of combination and permutation, Pigeonhole principle, Inclusion, Exclusion principle, Ordered and unordered portions.		
Unit-3	RECURRENCE RELATIONS	8 hours
Generating function of sequences, Calculating coefficients of generating functions, Recurrence relations, solving recurrence relations by substitutious and generating functions, Method of characteristic roots, Solution of homogenous recurrence relations		
Unit-4	GRAPH THEORY	8 hours
Basic concepts of graph theory, Diagraph, Paths, Reachability connectedness, Matrix representation of graphs, Subgraphs, Isomorphisms trees, Properties, Directed tress, Binary trees.		
Unit-5	BOOLEAN ALGEBRA	8 hours
Post, Hasse diagrams, Lattices, Types of Lattices, Boolean Algebra, Basic theorems, Applications.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Fundamentals of Digital Computers	L	T	P	C
Course Code	**BCAC1102**	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

The purpose of this course is to provide digital computer fundamentals. The main goal of the course is to introduce students to the number system conversion from one base to another, to solve equations using Karnaugh map and Tabulation method, design circuits for binary adder, code converter, multiplexer, arithmetic circuits and accumulator.

Course Outcomes

CO1	Develop an understanding of the number system
CO2	Design the logic gates And solve K-maps Problems.
CO3	Understand the logics of Adder, Multiplexer and encoder-decoder.
CO4	Understand the Flip-flops and application of flip-flops
CO5	Understand Registers and Memory classification.

Text Book (s)

M. Morris Mano – Digital Logic and Computer Design, 3rd Ed, PHI – 1994.

Reference Book (s)

A.P. Malvino and D.P. Leach – Digital Principles and Applications – Fourth Edition – Tata McGraw Hill Edition – 1999.

Course Content:

Unit-1	Introduction	8 hours
Introduction – Converting Numbers from One Base to Another – Complements – Binary Codes – Integrated Circuits – Boolean Algebra – Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms		
Unit-2	Logic Gates	8 hours
Logic Gates – Karnaugh Map Up to 3 Variables – Don't Care Condition – Sum of Products and Products of Sum Simplification		
Unit-3	Adder – Subtractor	8 hours
Adder – Subtractor – Code Converter – Multilevel NAND and NOR Circuits – Binary Parallel Adder – Decimal Adder – Binary Multiplier-Binary Divider-Decoders – Encoder – Multiplexers-Demultiplexer.		
Unit-4	Flip Flops	8 hours
Flip Flops – Triggering of Flip Flops – Design of Counters –Ripple Counters.		
Unit-5	Registers	8 hours
Registers – Shift Registers –Memory Devices – Introduction,Classificationof Memories ,Basic Memory Structure ,RAM,ROM,PLA.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Introduction to Information Technology	L	T	P	C
Course Code	BCAC1103	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Provide information about the various computer tools available.
2. Enable the students understand the role of information technology in various fields.

Course Outcomes

CO1	Understand the basics of Information System and GPS
CO2	Understand about Computer System, CPU, Microprocessor and I/O.
CO3	Learn about the I/O Devices and storage Media.
CO4	Understand about the Software, word processing, spreadsheets and database Application.
CO5	Understand the Network Application, Tools of multimedia.

Text Book (s)
1. D.P. Curtin, K. Foley, K. Sen and C. Morin, Information Technology – The Breaking Wave, TMH Edition – 1999.

Reference Book (s)
1. Sawyer, Williams and Hutchinson, Using Information Technology – Brief Version, McGraw Hill International Edition – 2003.
2. Fundamentals of Information Technology, Alexis Leon & Mathews Leon–Vikas Publishing House Pvt. Ltd. – 1999.

Course Content:

Unit-1	Introduction	8 hours
IT an Introduction – Information Systems – Software and Data – IT in Business, Industry, Home, at Play, Education, Training, Entertainment, Arts, Science, Engineering and Maths – Computers in Hiding – Global Positioning System (GPS).		

Unit-2	Technology	8 hours
Types of Computers – Anatomy of a Computer – Foundations of Modern Information Technology – The Central Processing Unit – How Microprocessors and Memory Chips are Made – Memory – Buses for Input and Output – Communication With Peripherals.		

Unit-3	Devices	8 hours
I/O Devices – Inputting Text and Graphics – State of the Art – Input and Output – Pointing Devices – Foundations of Modern Output – Display Screens – Printers – Foundations of Modern Storage – Storage Media – Increasing Data Storage Capacity – Backing up your Data – The Smart Card.		

Unit-4	Interfaces	8 hours
Software – User Interfaces – Application Programs – Operating Systems – Document – Centric Computing – Major Software Issues – Network Computing – Word Processing and Desktop Publishing – Spreadsheet and Database Applications.		

Unit-5	Networks	8 hours
Network Applications – Foundation of Modem Networks – Local Area Networks – Wide Area Networks – Links Between Networks – Networks: Dial–up Access – High Bandwidth Personal Connections – Multimedia – Tools of Multimedia – Delivering Multimedia – Multimedia on Web.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Programming Essentials in C	L	T	P	C
Course Code	BCAC1104	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Introduce the students to the concepts of C programming with emphasis on the following topics Functions, Arrays, Pointers, Structures, Files.
2. Solve problems using the above concepts.

Course Outcomes:

CO1	Understand the working and architecture of 'C'
CO2	Understand when and how to take decisions, to compare and iterate, to simplify the problems.
CO3	Students should be able to implement syntax and logics for development according to user account, implement algorithmic solutions in a programming language.
CO4	Solve problems of limited scope by writing programs using the concepts taught.
CO5	To allow the student to write their own programs using standard language infrastructure regardless of the hardware or software platform.

Text Books

1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004.

Reference Books

1. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999

Course Content:

Unit-1	Introduction	8 hours
Identifiers - Keywords- Data Types - Access Modifiers - Data Type Conversions - Operators - Conditional Controls - Loop Controls- Input / Output Operations - Character Test Functions		
Unit-2	Arrays	8 hours
Arrays - One Dimensional Arrays - Two Dimensional Arrays - Multi Dimensional Arrays - Handling of Character Strings - String - Handling Functions - Table of Strings - enum - Typedef.		
Unit-3	Functions	8 hours
User Defined Functions - Need for User Defined Functions - Category of Functions - Nesting of Functions - Recursion - Functions with Arrays - Storage Classes - Macros and Preprocessors.		
Unit-4	Structures	8 hours
Structures - Array of Structures - Arrays within Structures - Structures within Structures - Structures and Functions - Unions - Size of Structures.		
Unit-5	Pointers	8 hours
Pointers - Pointer Variables - Passing Pointers to Functions - Pointers and One Dimensional Array - Dynamic Memory Allocation - Pointers and Multi Dimensional Arrays - Arrays of Pointers - Pointers to Structures – Data files - Opening and Closing a Data file - Creating a Data file - Processing a Data file - Unformated Data file.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Basic English	L	T	P	C
Course Code	SLBC1001	0	0	4	2
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Ant requisite		50		50	100

Course Objectives:
1. To expose students to communication challenges (verbal as well as non-verbal) in the professional environment
2. To define & interpret verbal and non-verbal messages
3. To express and present themselves effectively in business situations

To familiarize students with contemporary writing practices in the business environment

Course Outcomes

CO1	To understand importance & various concepts of effective business communication
CO2	To enable students to understand significance and interpretation of Nonverbal communication
CO3	To understand & execute the concept, principles and various situations in Group Discussion & how to handle them.
CO4	To prepare the students for job interviews.
CO5	To familiarize students with contemporary writing practices in the business environment

Text Book (s)
Meenakshi Raman, Prakash Singh, Business Communication, Oxford University Press

Course Content:

Unit-1	**Professional Communication**	8 hours
Purpose, Process & Classification of Communication		
Barriers of Communication		
7Cs of Communication		
Unit-2	**Non-Verbal Communication**	8 hours
Role of Non-Verbal Communication		
Classification of Non-Verbal Communication		
Guidelines for developing Non-Verbal Communication		
Unit-3	**Written Communication**	8 hours
Structure & Layout of Business letters		
Type of Letters: Sales, Order, Complaint, Enquiry, Memo, Circular, Notice, etc.		
Unit-4	**Spoken**	8 hours
Introduction to Pronunciation		
Group Discussion, Mock Interviews		
Unit-5	Practical	8 hours

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Programming Essentials in C Lab	L	T	P	C
Course Code	BCAC1114	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Design and implementation of programming logic.
2. Learn to use different data types.

Course Outcomes

CO1	Understand the working and architecture of 'C'
CO2	Understand when and how to take decisions, to compare and iterate, to simplify the problems.
CO3	Students should be able to implement syntax and logics for development according to user account, implement algorithmic solutions in a programming language.
CO4	Solve problems of limited scope by writing programs using the concepts taught.
CO5	To allow the student to write their own programs using standard language infrastructure regardless of the hardware or software platform.

Text Books
1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004.

Reference Books
1. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999

List of Experiments:

1. Write a program to convert temperature from degree centigrade to Fahrenheit. °F = °C*9/5+32
2. Write a program to compute the addition, subtraction, product, quotient and remainder of two given numbers.
3. Write a program to swap the values of two variables.
4. Write a program to compute net amount from the given quantity purchased and rate per quantity. Discount of 10 .is allowed if quantity purchased exceeds 100.
5. Write a program to print the sum of digit of a given number.
6. Write program to print the Fibonacci series up to a given number.
7. Write a program to print the prime numbers within a given number.
8. Write a program to check a given number is prime or not.
9. Write a program to check whether a no is an Armstrong number.
10. Write a program to determine and print the sum of the following harmonic series for a given value of n1 +1/2+1/3+1/4+……+1/n
11. Write a program to print the Floyds triangle

    1

    3

    5 6
12. Write a program to read three integer values from the keyboard and display the output stating that they are the sides of right angled triangle.
13. Write a program to accept an year from the user and check whether the entered year is a leap year or not.
14. Write a program to print binary equivalent of an integer number.
15. Write a program to print the following pattern (take number of lines as input from the user).

    ***

    **

    *

16. Write a program to evaluate the following functions to
    $Sin(x) = x - x3/3! + x5/5! - \ldots$ & $Cos(x) = x - x2/2! + x4/4! - x6/6! + \ldots$
17. Write a program to _nd out the length of a given string without using the library function strlen().
18. Write a program to print the reverse of a given string.
19. Write a program to check if a given string is palindrome or not. A string is said to be palindrome if the reverse of the string is equal to the string.
20. Write a program to count the number of vowels in a given string.
21. Write a program for addition of two nxm matrices
22. Write a program for multiplication of two nxm matrics
23. Write a program to compute factorial of a given number using function.
24. Write a function for swapping of two numbers.
25. Write a program for finding factorial of a number using recursion.
26. Write a program to sort an array using Bubble Sort (using function).
27. Write a program to search a key number in an array using Sequential Search Method.(use function)
28. Write a program to accept student details (name,roll, address,phone no)and store them in a _le and perform the following operations on it.
    a. Search b. Add c. Delete d. Modify e. Display.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Information Technology Lab	L	T	P	C
Course Code	BCAC1113	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Develop the abilities for different information technologies.
2. Learn to use latest technologies.

Course Outcomes

CO1	Understand the basics of Information System and GPS
CO2	Understand about Computer System, CPU, Microprocessor and I/O.
CO3	Learn about the I/O Devices and storage Media.
CO4	Understand about the Software, word processing, spreadsheets and database Application.
CO5	Understand the Network Application, Tools of multimedia.

Text Book (s)
2. D.P. Curtin, K. Foley, K. Sen and C. Morin, Information Technology – The Breaking Wave, TMH Edition – 1999.

Reference Book (s)
3. Sawyer, Williams and Hutchinson, Using Information Technology – Brief Version, McGraw Hill International Edition – 2003.
4. Fundamentals of Information Technology, Alexis Leon & Mathews Leon–Vikas Publishing House Pvt. Ltd. – 1999.

Sr.No.	Title of Lab Experiments
1.	Write a procedure to create a resume.
2.	Write a procedure to create a cover page of a project report.
3.	Write a procedure to create a greeting card.
4	Write a procedure to create company letter head.
5	Write a procedure to create simple newsletter.
6.	Write a procedure to create a mail merge letter.
7.	Write a procedure to create a macro and use it in an application.
8.	Write a procedure to create a presentation on basic DOS commands given below: a. Dir b. Md c. Cd d. Copy e. Del f. Copy
9	Write a procedure to create presentation and add audio to it.
10.	Write a procedure to create a worksheet with 4 columns, enter 10 records and find the sum of all columns
11.	Write a procedure to create a report containing the pay details of the employee.
12.	Write a procedure to create a student result sheet.
13.	Write a procedure to create a simple bar chart to represent the sales of a company for 3 different periods
14.	Write a procedure to create a worksheet importing data from database and calculate sum of all the columns
15.	Write a procedure to create a simple table for result processing.
16.	Write a procedure to create a query table for the result processing table.
17.	Write a procedure to create a form to update/modify the result processing table.
18.	Write a procedure to create a report to print the result sheet and marks card for the result.

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Environmental Science	L	T	P	C
Course Code	ENVS1001	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Introduce the fundamentals and abstract concepts of environment studies.
2. Learn how concepts of social issues and the environment studies are useful in realistic problem solving.

Course Outcomes:

CO1	Students will understand the need for eco-balance
CO2	Also, Knowledge on the method of pollution prevention
CO3	Understand the knowledge of Environmental Pollution
CO4	Demonstrate Social Issues and the Environment
CO5	Students able to understand Human Population and the Environment

Text Books

1. Kurian Joseph & R. Nagendran, "Essentials of Environmental Studies", 1st Edition , Pearson Education, 2004.

Reference Books

1. Keerthinarayana & Daniel Yesudian,"Environmental Science and Engineering",1st Edition, Hi-Tech publications, 2004.

2. Erach Bharucha, "A Text Book for Environmental Studies", Text Book of University Grants Commission, 2004.

3.Metcalf & Eddy,"Wastewater Engineering: Treatment and Reuse", New Delhi, TMH

Course Content:

Unit-1	Environment & Natural Resources	8 hours
Definition, scope, importance, need for public, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.		
Unit-2	Ecology & Bio-Diversity	8 hours
Concept of ecosystem, structure & function of an ecosystem, producers, consumers and decomposers, energy flow, ecological succession, food chains, food webs and ecological pyramids. Bio diversity: Definition, genetic, species and ecosystem diversity, bio-geographical classification of India, hotspots, threats related to habitat loss, poaching of wildlife, man-wildlife conflicts, Conservation of bio-diversity.		
Unit-3	Environmental Pollution	8 hours
Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid `waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.		
Unit-4	Social Issues and the Environment	8 hours
Urban problems related to energy & sustainable development, water conservation, rain water harvesting, watershed management, problems related to rehabilitation – case studies, Wasteland reclamation, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness.		
Unit-5	Human Population and the Environment	8 hours
Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology – Visit to local polluted site / Case Studies.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Professional Communication	L	T	P	C
Course Code	SLBC1002	0	0	4	2
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Make students understand that both oral & written communications are equally important.
2. The students should be comfortable with both verbal & written communication.

Course Outcomes

CO1	Students understand the value of business communication, written & presentation skills in professional life.
CO2	Students should be well equipped with business & written communication with effective presentation skills.
CO3	Students understand the Forms of Technical Communication
CO4	Students able to understand presentation strategies
CO5	Understand the fundamentals of human relations

Text Books
1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi .
2. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.

Reference Books
1. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
3. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
4. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
6. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

Course Content:

Unit-1	Basics of Technical Communication	8 hours
Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication; Barriers to Communication		
Unit-2	Constituents of Technical Written Communication	8 hours
Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.		
Unit-3	Forms of Technical Communication	8 hours
Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Job application and Resumes. Official Letters: D.O. Letters; Govt. Letters, Letters to Authorities etc. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing.		
Unit-4	Presentation Strategies	8 hours
Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time- Dimension		
Unit-5	Fundamentals of Human Relations	8 hours
Intra-personal, Interpersonal and Group Relationships, Transactional Analysis Implications for Managers in Organizational Context. Formal Written Communication: Official Letters, Report, Writing: Categories Formats, Memorandums and Circulars, Agenda and Minutes, Resume, Drafting Advertisements. Enquires and Replies, Quotations, Voluntary Offers, Placing of Order, Cancellation of Order, Complains and Adjustments. Formal Verbal Communication: Group Discussion, Interview, Extempore, Business		

Negotiation, Public Speaking, Meeting, Toasting, Counselling, Business Presentation. Negotional Skills.
Social Skills for Managers: Update of Etiquettes a Manager should observe in Various Formal and Informal Situations; The Knowledge of Body Language.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Name of The Course	Data Structures using C	L	T	P	C

Course Code	BCAC1211	3	0	0	3
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Ant requisite		20	50	100	100

Course Objectives:
1. Introduce the fundamentals and abstract concepts of Data Structures.
2. Introduce searching, sorting techniques
3. Learn how concepts of data structures are useful in problem solving.

Course Outcomes

CO1	Understand the Basic concepts of Data Structures.
CO2	Understanding various searching & sorting techniques.
CO3	Analyze step by step and develop algorithms for Linked List to solve real world problems.
CO4	Applying various data Structures like Stacks, Queues in real world problems.
CO5	Implement and developed new program for graphs and trees using C.

Text Books
1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.
2. Data Structure and algorithm using C :By R.S.Salaria-Khanna Publication.
3. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication

Reference Books
5 Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI
6 Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
7 R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
8 Lipschutz, "Data Structures" Schaum's Outline Series, TMH
9 G A V Pai, "Data Structures and Algorithms", TMH

Course Content:

Unit-1	Introduction to Data Structure	8 hours
Introduction, Basic Terminology : Data and information, ADT, Data Organization and types of Data Structure.		
Unit-2	Arrays	8 hours
Representation of Linear Arrays, Types of Arrays : 1D,2D & M-D Concept, Sorting & Searching Algorithms-Bubble, Selection, Merge, Quick sort, linear and binary search. Type of Memory Allocations		
Unit-3	Linked List	8 hours
Concept of Linked List, Representation of linked List in memory, Memory Allocation, Garbage Collection ,Overflow and Underflow, Traversing a linked list, Searching a linked list, Insertion & Deletion in Linked List, More types of linked list: Header Linked List , Two way List and Circular linked list		
Unit-4	Stacks, Queues , Recursion	8 hours
Concepts of Stack, Operation on Stack, Array Representation of Stack, Arithmetic Expression POLISH Notation, Concepts of Queue, Operation on Queue, Representation of queues, Other types of queue: Priority Queues, Deque and Circular queue. Recursion : factorial number, Fibonacci series and Tower of Honai		
Unit-5	Introduction of Trees and Graph	8 hours
Introduction of Trees – Binary Trees –Binary Search Trees. Types of Graph		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Web Technology	L	T	P	C
Course Code	BCAC1203	3	0	0	3

Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

This course is intended to provide students with the knowledge and skills necessary for building and evaluating web sites. It covers a range of topics including: basic concepts of the Internet and internet browsers, fundamentals of Website design, Websites building tools and languages, basics of HTML (text, fonts, colors, images, lists, tables, frames, forms), Scripting and Scripting Languages (VB Script, Java Script), Website publishing, Website evaluation and assessment, case studies.

Course Outcomes

CO1	The student will gain programming skills both in basic and advanced levels using HTML and CSS.
CO2	Demonstrate the knowledge and able to apply the design principles, techniques and technologies to the development of creative websites using JS and HTML
CO3	Apply different syntactical elements of vbscript
CO4	The student will be able to create ASP based web applications
CO5	Understand database connectivity procedures for web applications

Text Books

Web Design: A Complete Introduction by Nigel Chapman and Jenny Chapman. John Wiley & Sons

Reference Books

HTML 4.0, No Experience required – E. Stephen Macj, J. Platt (bpb)
Completer Reference HTML - Thomas A. Powell (TMH)
Dynamic HTML in action - Michele Petrovisjy (TMH)
Unleashed HTML - (Techmedia SAMS)

Course Content:

Unit-1	Introduction and HTML	8 hours
Basic web designing: Introduction to web browser, architecture of web browser, web page, static & dynamic web pages, home page, web-site, Web-servers & clients, www. Introduction to HTML: History, structure of HTML document, creating & executing HTML. Tags of HTML, Creating Lists & Links, Creating Bookmarks, Image tags, Tables and Frames tags. Forms and CSS: Understanding Form, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. Creating CSS, applying CSS to HTML documents. Use of <META> Tag.		

Unit-2	JavaScript	8 hours
JavaScript: Introduction: Scripting Language, The Use of JavaScript, Using Javascript in an HTML document, <SCRIPT> Tag. Overview of Javascript Programming: Variable, Scope of variables, number & string, Operators Statements: if-else, for, while, break, continue, for-in, new, return. Arrays, JavaScript Functions & Objects, Document Object Model (DOM), Hierarchy of objects. Properties & Methods of Objects, Event Handling & Form Validation.		

Unit-3	VBScript	8 hours
Introduction, VBScript Statements and loops, Arrays, VBScript objects, VBScript layout statements, error handling, adding objects, Forms, Controls & managing transactions, VBScript event programming, Procedures & Functions		

Unit-4	ASP	8 hours
Introduction, Variables, Data types of ASP, Statements, Request & Response Objects: Response Object - buffering page, page caching, Request Object – QueryString collection, form collection, server-variables collection, working with HTML forms, retrieving form data suing text boxes, textareas, buttons, checkboxes, select lists. Form validation, Session & Application Object.		

Unit-5	Database and File system	8 hours
ASP with Databases: Connection and data sources, creating connections with OLEDB and ODBC, connecting to SQL server with OLEDB and ODBC, connection to MS-Access, Executing SQL statements. Working with Record set, File System Object(FSO), Folder object		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Enterprise Resource Planning	L	T	P	C
Course Code	BCAC1204	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
- Know basic business functional areas and explains how they are related.
- Illustrate how un-integrated information systems fail to support business decision and how integrated information systems can help a company prosper by providing business managers with accurate, consistent, and current data.
- Understand how Enterprise Resource Planning software is used to optimize business processes acquire experience in using ERP software that can be applied in further coursework

Course Outcomes

CO1	Understand the basic concepts of ERP.
CO2	Understand the enterprise modelling and related concepts
CO3	Identify different technologies used in ERP.
CO4	Understand and apply the concepts of ERP implementation and Perspective and ERP Modules.
CO5	Understand different tools/technologies used in ERP.

Text Books
1. Enterprise Resource Planning, Alexis Leon, Tata McGraw-Hill.
2. Concepts in Enterprise Resource Planning, Third Edition Bret Wagner & Ellen Monk

Reference Books
1. Concepts in Enterprise Resource Planning, Joseph A. Brady, Ellen F. Monk, Bret J. Wagner.
2. nterprise Resource Planning Systems, Daniel E. O'Leary, Cambridge University Press.

Course Content:

Unit-1	ERP: An Overview	8 hours
Introduction to ERP, Reasons for Growth Of ERP, Problem areas in ERP implementations, The future of ERP, Characteristics and features of ERP, Benefits of ERP.		
Unit-2	Enterprise Modelling and Integration for ERP	8 hours
Enterprise-An overview, What is enterprise , Integrated Management Information, The role of enterprise, Business modelling, Integrated Data Model, Role of Common/Shared Enterprise Database, Establishing Customer-Enterprise Link, Establishing Vendor-Enterprise Link, Client/Server Architecture and Enterprise wide Computing, Characteristics of client/Server Architecture, Different Components of ERP Client/Server Architecture		
Unit-3	ERP And related Technologies	8 hours
BPR(Business Process reengineering) :Definition, The different phases of BPR, Enterprise Redesign Principles, BPR and IT, Data Warehousing, Data Warehouse Components, Structure and Uses of Data Warehouse, Data Mining, What Is Data Mining, Data Mining Process, Advantages and Technologies Used In Data Mining, OLAP, Supply Chain Management: Definition, Benefits, ERP Vs SCM, CRM		
Unit-4	ERP Implementation	8 hours
Evolution, Evolution of ERP, Evolution of Packaged Software Solutions, The Obstacles in ERP implementation, ERP Implementation Lifecycle (Different Phases), Implementation Methodology, ERP Implementation-The Hidden Costs, In-house Implementation-Pros and Cons, Vendors and role of vendors for ERP, Consultants and role of consultants for ERP.		
Unit-5	Technologies In ERP System	8 hours
Introduction, Electronic Data Interchange(EDI), Use of EDI, Evolution of EDI, Benefits of the EDI, EDI Standards, EDI Services, EDI Components, EDI Administration, EDI Integration, ALE Integration, Internet Integration, OCR Integration		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Numerical Methods	L	T	P	C
Course Code	BCAC1205	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

In this course we will learn various numerical methods for finding solutions to the following Mathematical problems: *1.Roots of Equations,   2.Systems of Linear Algebraic Equations,* 3. *Interpolation,* 4. Differentiation, 5. *Integration,* 6. *Ordinary Differential Equations,* 7. ***Statistical Quality Control Methods(Control Charts)***

Course Outcomes

CO1	Employ the concept of errors and apply various numerical methods to find the roots of non linear equations and solution of system of equations (K3)
CO2	Apply interpolated formulas to find approximated polynomials and missing values (K3)
CO3	Solve differentiation and integration for complex functions using numerical methods (K4)
CO4	Solve Ordinary differential equations using different numerical methods (K4)
CO5	Apply basic statistical methods to solve problems of basic data science problems of real world (K4)

Text Books:

1-Raja Raman V, Computer Oriented Numerical Methods, Prentice Hall.

2-Grewal B. S., Numerical Methods in Engineering and Science, Khanna Publishers, Delhi.

3-Gupta S. P., Statistical Methods, Sultan and Sons.

Reference Books:

1- Gerald & Wheatley, Applied Numerical Analyse, AW.
2- Jain, Iyengar and Jain, Numerical Methods for Scientific and Engineering Computations, New Age Int.
3-Veerarajan T. Ramachandran T., Theory and Problems in Numerical Method, TMH.

Course Content:

Unit-1	**Introduction and Solution of nonlinear equation**	**12 hours**
Advantage of Numerical techniques, Computer Arithmetic, Mathematical preliminaries, Precision and Errors, types of errors and General error formula, Error in a series approximation; Non-Linear Equations: Bisection Method, Newton-Raphson method, Iteration method, Method of false position, Methods of finding complex roots, Rate of convergence of Iterative methods, Polynomial Equations		
Unit-2	**Data interpolation and methods**	**8 hours**
Finite Differences, Difference tables, Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula.		
Unit-3	**Solution of Linear Equation**	**6 hours**
Direct Methods: System of Linear Equation, Gauss Elimination, Jordon, Pivoting and non-Pivoting, Iterative Methods: Gauss seidel and Jacobi Method		
Unit-4	**Numerical Integration, Differentiation and differential equations**	**8 hours**
Numerical differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Differential Equation : Picard's Method, Euler's Method, Taylor's Method, Predictor Corrector Methods, Runge-Kutta Methods		
Unit-5	**Regression and curve fitting**	**8 hours**
Frequency chart, Regression Analysis, Linear and Nonlinear Regression, Multiple regression, , Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc Statistical Quality Control methods.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Python Programming	L	T	P	C

Course Code	BCAC1202	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

This course introduces the student to the Python language. Upon completion of this class, the student will be able to write non trivial Python programs dealing with a wide variety of subject matter domains. Topics include language components, the IDLE environment, control flow constructs, strings, I/O, collections, classes, modules, and regular expressions. The course is supplemented with many hands on labs using Windows

Course Outcomes

CO1	Write Basic Programs using Python programming constructs.
CO2	Work with python string handling techniques and user defined functions.
CO3	Use data structures like Lists, tuples and dictionaries.
CO4	Understand File handling and Regular Expressions.
CO5	Apply Object oriented programming techniques and database.

Text Book (s)

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Re illy publication

Reference Book (s)

1. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at http://www.greenteapress.com/thinkpython/
2. Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.

Course Content:

Unit-1	Introduction	8 hours
History , Features , Working with Python, Installing Python, basic syntax, interactive shell, editing, saving, and running a script. The concept of data types; variables, assignments; immutable variables; numerical types; Arithmetic and Logical operators and Boolean expressions. Debugging, comments in the program; understanding error messages; Catching exceptions using try and except. Built-in functions – type(), id(), eval(), random, chr(), ord(); Conditional Statements : If, If-else, Nested if-else; Looping: For, While, Nested loops; Control Statements: Break, Continue, Pass;		

Unit-2	Function and Strings	8 hours
Functions in Python: Defining a function, Calling a function, Types of functions, Function Arguments – default arguments, keyword arguments, variable/arbitrary arguments. Global and local variables. Recursive functions.String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. String functions: len(), upper(), lower(), casefold(),find(),replace(),split(),join(). Formatting using % (string modulo) and format operators		

Unit-3	Lists, Tuples and Dictionaries	8 hours
Basic List operators, List methods, iterating over a list, replacing, inserting, removing an element; searching and sorting lists,calculating the sum and average of items in a list ; Tuples - sequence of values , immutability, Comparing tuples, Tuple assignment, tuple methods:		

Unit-4	Dictionaries and Files	8 hours
Dictionary- Store data as key-value pairs in dictionaries, dictionary methods, search for values, change existing values, add new, key-value pairs, and delete key-value pairs, nesting objects, sorting, dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file		

Unit-5	Object Oriented Programming	8 hours
Class, Objects, Class variables, Instance variables, Types of methods, Inheritance		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks			
20	50	100	100			
Name of The Course	Disruptive Technologies		**L**	**T**	**P**	**C**
Course Code	BCA9004		2	0	0	2

Prerequisite	Basic programming Languages				
Co requisite					
Ant requisite					

Course Objectives:

i) Able to outline the strength of various systems and their role in an Industry 4.0 world
ii) Learners will gain deep insights into the fundamental concepts of disruptive technologies, their promises as well as their current limitations
iii) To provide an overview with the fundamental techniques and principles in the exciting growing field of big data analytics.
iv) To understand the state of the art of Arduino architecture and Sensors
v) To study about different tools like Python, Tableau and Arduino

Course Outcomes:

CO1	Understand the drivers and enablers of Industry 4.0 and how organizations and individuals should handle challenges to reap the benefits.
CO2	Build the deep insight into the main methods used in machine learning (ML) and artificial intelligence (AI) Utilize the potential impact of Artificial Intelligence and machine learning
CO3	Acquire fundamental enabling techniques and scalable algorithms to Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
CO4	Analyse basic IOT protocols and its characteristics to determine the performance
CO5	Implement the basic IoT applications on embedded platform

Reference Book (s)

1. Chris Albon "Machine Learning with Python Cookbook "O'Reilly Media; March 2018
2. Marleen Meier David Baldwin "Mastering Tableau 2019.1: An expert guide to implementing advanced business intelligence and analytics with Tableau 2019.1, 2nd Edition Feb 2019
3. Charalampos Doukas "Building Internet of Things With the Arduino: Volume 1" Mar 2012

Alasdair Gilchrist "Industry 4.0: The Industrial Internet of Things" June 2016

Course Content:

Unit-1	Introduction to Industry 4.0	8 hours
Introduction - Business and IT Trends - Enterprise Software Trends- Key Emerging, Invention & Innovation, Industry 4.0, Industry Evolution, Key Technologies - AR/VR- Digital currencies and Blockchain Technology- Intelligent Computing AI and Autonomous Robots– Data Science and Deaplearning- Computer Vision – Industrial IoT.		

Unit-2	Introduction AI & ML using Python	8 hours
Introduction, Scope of AI & ML, Applications, Challenges, Types of learning: Supervised, Unsupervised, Reinforcement. Preparation of Data-Training and Testing. Introduction to Python, Data types, Variables, Conditions, Loops, List, Dictionary, Functions, Class and Objects, NumPy array and operations, Pandas Dataframe and operations, Matplotlib Visualization, Scikit-Learn usage, installation of Anaconda distribution, End-to-end AI & ML Project.		

Unit-3	Introduction Data Analytics using Tableau	8 hours
Introduction - Big data, challenges, applications, Big data analytics algorithms , Big data system, Big Data Life Cycle, data representation, cleansing, validation, Data analysis and visualization. Tableau Introduction- Installation, connecting to data, Aggregate functions, sorting, Calculation, grouping, Set, Action, Dashboard creation.		

Unit-4	Introduction to Embedded system & arduino	8 hours
Overview of Embedded Systems, Components of Embedded Systems, about arduino IDE , Arduino architecture and pin details, Digital & Analog I/O's, Types of Arduino boards, Installing and Setting up the Arduino development environment and simulation software, Software simulation on LED and switches, Software simulation on motor with driver, Software simulation on analog and digital sensors .		

Unit-5	Introduction to IoT & Programming Concepts	8 hours
Introduction to IoT , IoT Protocols, IoT open source platform and sensors, Basic programming Structure, Variables, constants and data types, Operators, Control Structure, Library Functions, Creating account in open source IoT platform, Configuring and programming Wi-Fi module with MCUs, Interfacing switches and LEDs with MCUs , Interfacing motor and driver with MCUs , Interfacing analog and digital sensors with controller. Line follower robot.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

	Name of The Course	Data Structures using C Lab	L	T	P	C
	Course Code	BCAC1201	0	0	2	1

Prerequisite	
Co requisite	
Ant requisite	

Course Objectives:

1. Introduce the fundamentals and abstract concepts of Data Structures.
2. Introduce searching, sorting techniques
3. Learn how concepts of data structures are useful in problem solving.

CO1	Understand the Basic concepts of Data Structures.
CO2	Understanding various searching & sorting techniques.
CO3	Analyze step by step and develop algorithms for Linked List to solve real world problems.
CO4	Applying various data Structures like Stacks, Queues in real world problems.
CO5	Implement and developed new program for graphs and trees using C.

Text Books

4. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.
5. Data Structure and algorithm using C :By R.S.Salaria-Khanna Publication.
6. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication

Reference Books

10 Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI
11 Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
12 R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
13 Lipschutz, "Data Structures" Schaum's Outline Series, TMH
14 G A V Pai, "Data Structures and Algorithms", TMH

List of Experiment:

1. Write a program to compute minimum/maximum of a given array.
2. Write a program to sort given set of numbers in ascending/descending order using Bubble Sort and analyze its complexity.
3. Write a menu-based program to perform array operations: deletion of an element from the specified position, inserting an element at the specified position, printing the array elements.
4. Write a program to search an element in the array using linear search.
5. Write a program to search an element in a 2-dimensional array.
6. Write a program to perform following operations in matrix:
    a. Addition
    b. Subtraction
    c. Multiplication
    d. Transpose
7. Write a menu-based program to perform following operations on single linked list:
    a. To insert a node at the beginning of the list.
    b. To insert a node at the end of the list.
    c. To insert a node after a given node in the list.
    d. To delete the first node from the list.
    e. To delete the last node from the list.
    f. To delete a node after a given node from the list.
    g. To delete a node at a given position from the list.
8. Write a menu-based program to perform following operations on double linked list:
    a. To insert a node at the beginning of the list.
    b. To insert a node at the end of the list.
    c. To insert a node after a given node in the list.
    d. To delete the first node from the list.
    e. To delete the last node from the list.
    f. To delete a node after a given node from the list.
    g. To delete a node at a given position from the list.
9. Write a menu-based program to perform following operations on circular linked list:
    a. To insert a node at the beginning of the list.
    b. To insert a node at the end of the list.
    c. To insert a node after a given node in the list.

d. To delete the first node from the list.
e. To delete the last node from the list.
f. To delete a node after a given node from the list.
g. To delete a node at a given position from the list.

10. Write a menu-based program to implement stack operations: PUSH, POP using array implementation of stack.
11. Write a menu-based program using functions to implement stack operations: PUSH, POP using linked implementation of stack.
12. Write a program to convert infix expression into postfix expression and then to evaluate resultant postfix expression.
13. Write a program to solve Towers of Hanoi Problem.
14. Write a menu-based program to implement linear queue operations: INSERTION, DELETION using array implementation of queue.
15. Write a menu-based program to implement linear queue operations: INSERTION, DELETION using linked list implementation of queue.
16. Write a menu-based program to implement circular queue operations: INSERTION, DELETION.
17. Write a program to traverse a binary tree using PRE-ORDER, IN-ORDER, POST-ORDER traversal techniques.
18. Write a menu-based program to perform operations for a binary search tree (BST).
    a. Search an element
    b. Find minimum
    c. Find maximum
    d. Insertion
    e. Deletion
19. Write a program to traverse a graph using breadth-first search (BFS), depth-first search (DFS).
20. Write a program to sort given set of numbers in ascending/descending order using insertion sort and also search a number using binary search.
21. Write a program to sort given set of numbers in ascending/descending order using Quick sort and selection sort. Also record the time taken by these two programs and compare them.
22. Write a program to sort given set of numbers in ascending/descending order using Merge sort.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Name of The Course	Web Technology Lab (PBL)	L	T	P	C
Course Code	BCAC1213	0	0	2	1
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Ant requisite		20	30	50	100

Course Objectives:

This course is intended to provide students with the knowledge and skills necessary for building and evaluating web sites. It covers a range of topics including: basic concepts of the Internet and internet browsers, fundamentals of Website design, Websites building tools and languages, basics of HTML (text, fonts, colors, images, lists, tables, frames, forms), Scripting and Scripting Languages (VB Script, Java Script), Website publishing, Website evaluation and assessment, case studies.

Course Outcomes

CO1	The student will gain programming skills both in basic and advanced levels using HTML and CSS.
CO2	Demonstrate the knowledge and able to apply the design principles, techniques and technologies to the development of creative websites using JS and HTML
CO3	Apply different syntactical elements of vbscript
CO4	The student will be able to create ASP based web applications
CO5	Understand database connectivity procedures for web applications

Text Books

Web Design: A Complete Introduction by Nigel Chapman and Jenny Chapman. John Wiley & Sons

Reference Books

HTML 4.0, No Experience required – E. Stephen Macj, J. Platt (bpb)

Completer Reference HTML - Thomas A. Powell (TMH)

Dynamic HTML in action - Michele Petrovisjy (TMH)

Unleashed HTML - (Techmedia SAMS)

List of Experiment:

1. To create a basic web page consisting of various HTML tags.
2. To create HTML links.
3. To create HTML Table.
4. To create HTML list.
5. To create CSS file in HTML.
6. To create Student Registration Forms in HTML.
7. To create HTML Frame.
8. Introduction to java script like Add,DIV,Mul,Sub etc.
9. Using java script variables, data type and object.
10. Using java script function.
11. Using java script using validation in HTML forms.
12. Introduction to VB Script like Add,Div,Mul,Sub etc.
13. Using data type & variable.
14. Using VB Script loops and conditions.
15. Using VB script variable & procedures.
16. Introduction to ASP
17. WAP in ASP displaying the current date and time
18. WAP in ASP print the hours minutes and second
Value Added List of Experiments
1. In the XML create a program of employee detail like employee id, name, salary, designation…..

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Name of The Course	Python Programming Lab	L	T	P	C
Course Code	BCAC1212	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

This course introduces the student to the Python language. Upon completion of this class, the student will be able to write non trivial Python programs dealing with a wide variety of subject matter domains. Topics include language components, the IDLE environment, control flow constructs, strings, I/O, collections, classes, modules, and regular expressions. The course is supplemented with many hands on labs using Windows

Course Outcomes

CO1	Write Basic Programs using Python programming constructs.
CO2	Work with python string handling techniques and user defined functions.
CO3	Use data structures like Lists, tuples and dictionaries.
CO4	Understand File handling and Regular Expressions.
CO5	Apply Object oriented programming techniques and database.

Text Book (s)
1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Re illy publication

Reference Book (s)
1. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at http://www.greenteapress.com/thinkpython/
2. Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.

S. No.	Title of Lab Experiments
1	Write a python program to print all prime numbers among the interval given by user.
2	Write a python program to double the values in a list using map()
3	Write a python program to show the importance of operator precedence and associativity of different operators
4	Write a python program to do the following operations • Reversing a given integer number. • Find the sum of digits of given integer number.
5	Write a python program to implement Dice game for 2 players using random()
6	Write a python program to utilize all in-built mathematical functions.
7	Write a python program to check the given string is palindrome or not, without using In-built functions.
8	Write a python program to find a character and number of occurrence of a given character in a string.
9	Write a python program to manage student's details using dictionary.
10	Write a python program to design groceries billing system using dictionary.
11	Write a python program to get a date from user and give the day as output
12	Write a python program to find the number of days between two dates given by user. (Age Calculator)
13	Write a python program to find Factorial of a given number without using Recursion Concept.
14	Write a python program to find sum of N given numbers using Recursion by using Function.
15	Write a python program using the module, maintain students data and retrieve it accordingly.
16	Write a python program to implement a user defined math function using module.
17	Write a python program to copy the content of one file to another file.

18	Write a python program to search the give character or string is present in a file.
19	Write a python program which defines a function f. f takes two arguments a and b and do (a+b) / (a-b) computation. Implement exception handling with try, catch and else.
20	Write a python program to take input from the user again and again until correct value is given by user. Three user defined exceptions can be created i.e: A. NegativeValueError (if value entered is negative), B. ValueTooLarge (if value entered is more than stored value), and C. ValueTooSmall (if the value stored is less than stored value).
Experiments beyond curriculum:	
1	Write an interactive program to create a set of data to maintain the database of examination results.
2	Write a program to maintain student's database in file.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Computer Architecture	L	T	P	C
Course Code	BCAS2001	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

To introduce students to the different functional units of a computer system and to describe the various concepts of the same.

Course Outcomes:

CO1	understand the concepts of arithmetic operations on integer & decimal data, the input-output process and memory management.
CO2	Be familiar with the Von Neumann architecture
CO3	Be familiar with the cost-performance issues and design trade-offs in designing and constructing a computer processor including memory
CO4	Be familiar with the basic knowledge the design of digital logic circuits and apply to computer organization
CO5	understand the concepts of arithmetic operations on integer & decimal data, the input-output process and memory management.

Text Book (s)

1. M. M. Mano – Computer System Architecture – 3rd Edition – PHI – 1994.

Reference Book (s)

1. SubrataGhoshal-Computer Architecture and Organization-First Impression-Pearson-2011
2. J. P. Hayes – Computer Architecture and Organization – McGraw–Hill – 1988 3rd Edition.

Unit-1	Register Transfer and Micro-operations	8 hours
Register Transfer Language-Register Transfer-Bus and Memory Transfers-Arithmetic Microoperations-Logic Microoperations-Shift Microoperations-Arithmetic Logic Shift Unit-Basic Computer organization and design-Instruction Codes-Computer Registers-Computer Instructions- Timing and Control- Instruction Cycle- Memory Reference Instructions-Input Output and Interrupt-Complete Computer Description-Design of Basic Computer-Design of Accumulator Logic	
Unit-2	Central Processing Unit	8 hours
Introduction-General Register Organization-Stack organization, Instruction Format, Addressing Modes-Data Transfer and Manipulation-Program Control.	
Unit-3	Computer Arithmetic	8 hours
Computer Arithmetic – Addition and Subtraction – Multiplication and Division Algorithms – Floating-Point and decimal Arithmetic operations	
Unit-4	Input–Output Organization	8 hours
Input–Output Organization – Peripheral devices – I/O Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory – Access I/O Processor	
Unit-5	Memory Organization	8 hours
Memory Hierarchy – Associative Memory- Cache Memory -Virtual Memory	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Database Management System	L	T	P	C
Course Code	BCAS2002	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Explain data management and the use of various techniques in the manipulation of data subject to various constraints.
2. Describe the entity relationship diagram and to explain the basic concepts of database recovery, concurrency control, security and integrity.

Course Outcomes

CO1	Identify data relationships and to design relational database tables adopting the normalization rules.
CO2	Students able to understand E-R Modeling.
CO3	Be familiar with the concept of Normalization.
CO4	Understand the concept of Data Models.
CO5	Be familiar with the concept of Back Up & Recovery.

Text Book (s)

1. Henry F. Korth and Abraham Silberschatz: Database system concepts, McGraw Hill International Publication, 1988 (Chapters 1 to 6 and 9 to 13), 2nd Edition,1991.

Reference Book (s)

1. Jeffrey D Ullman: Principles of data Base systems, Galgotia Publishers, 2nd Edition 1994.
2. C.J. Date, An Introduction to database Systems, Third Ed., Narosa 3rd Edition 1995.

Course Content:

Unit-1	Introduction: Basic Terminology	8 hours
Introduction: Purpose of Database systems - overall system structure – Data Model		
Unit-2	E-R Modeling	8 hours
Entity relationship model: entities and entity sets relationships - mappings constraints - primary keys - E.R diagram		
Unit-3	Normalization	8 hours
Relational database design: pitfalls – Normal Forms - 1 NF, 2NF 3NF and BCNF		
Unit-4	Data Models	8 hours
Basic concepts of Hierarchical data model – Tree structure diagram, Network Data Model-Data Structure diagram		
Unit-5	Back Up & Recovery	8 hours
Basic concepts of database recovery -concurrency control - Database security and integrity		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	JAVA Programming	L	T	P	C
Course Code	BCAS2003	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

Introduce students Core Java Concepts and to teach students the basic concepts of Java programming. This course covers preliminaries, I/O streaming and file handling and teach students how to program applets in Java, networking and allow the students to implement effectively

Course Outcomes:

CO1	Implement and use efficiently the java programs, can develop applets, able to access database with JDBC, work with networking protocols using java with attractive GUI .
CO2	Understand the concept of Control Statements in JAVA
CO3	Be familiar with string's in JAVA
CO4	Understand Exception Handling in JAVA
CO5	Understand IO Package in JAVA

Text Book (s)
   1. R. Naughton and H. Schildt – Java2 (The Complete Reference) – Fifth Edition – TMH – 2004.
Reference Book (s)

1. K. Arnold and J. Gosling – The Java Programming Language – 3rd Edition., Pearson Edu,2005
2. David Flanagan – Java in a Nutshell: A Desktop Quick Reference for Java Programmers–O'Reilly & Associates, Inc. 1999
3. Bruce Eckel –Thinking in Java – Prentice Hall, 2nd Ed 2002

Course Content:

Unit-1	Introduction	8 hours
Introduction - Object oriented fundamentals, History-Java and the Internet-Java Applets and Applications, Features of Java, Java Virtual Machine (JMV), Byte-Code ,JAVA buzzwords, JAVA Environments, Command Line Arguments, Java program structure, Reserved keywords, Identifiers, Literals, Operators, Separators, Variables, Declaring a variable, Scope and lifetime of variables, Data types, Type conversion, casting		
Unit-2	Language Basics	8 hours
Control Statements, Arrays- One-Dimensional Arrays, Two-dimension Array, Vectors, Operators-Arithmetic, Boolean logical, Relational and Bitwise operators-Operator Precedence. Class :Fundamentals ,The General Form of a Class ,A Simple Declaring Objects, Assigning Object Reference Variables, Methods: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing ,Returning Objects, Recursion Introducing Access Control, Overriding Methods, Final Variables and Methods, Final class, Finalizer Methods, Abstract Methods and Class, Visibility Control, Constructors		
Unit-3	String Handling	8 hours
String : Strings, String Constructors, String length, String Literals, String Concatenation, data types-String conversion. Inheritance : basic ,Types of Inheritance, Member Access, Creating a Multilevel Hierarchy, When Constructors Are Called Method Overriding, Why Overridden Methods?, Abstract Classes, Using final with Inheritance, Using final to Prevent Overriding . Using final to Prevent Inheritance, Packages and Interfaces		
Unit-4	Exception Handling	8 hours
Exception Handling: Exceptions Exception hierarchy, Try, Catch, Finally, Throw		
Unit-5	Input / Output	8 hours
Java.io Package-I/O Basics-Reading console Input-Writing console output Print Writer class-Reading and Writing files-Java I/O classes, Byte Stream Classes, Character Stream		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Introduction to Algorithm Analysis and Design	L	T	P	C
Course Code	BCAS2004	3	0	0	3
Prerequisite	Fundamentals of programming & Data structures				
Co requisite					
Ant requisite					

Course Objectives:

To introduce students, the concepts of algorithm analysis for find out the space and time complexity of different algorithms. Different design techniques such as greedy method, divide and conquer, backtracking, dynamic programming, branch and bound are to be studied for finding the solution to the different problems. It also provides an insight into the basic concepts of NP and NP-hard problems and their relevance in research.

Course Outcomes

CO1	On completion of this subject the student shall be able to find out the efficiency of algorithms for different problems.
CO2	Students able to understand data structure concepts
CO3	Understand advance design and analysis techniques
CO4	Understand the concept of Graph Algorithms

Text Book (s)

T. Cormen, C.E. Leiserson, R.L. Rivest& C. Stein – Introduction to Algorithms – PHI – 2nd Edition, 2005.

Reference Book (s)

1. Knuth E. Donald, Art of Computer Programming Sorting and Searching Vol3, Second Edition, Pearson Education.
2. Brassard Bratley, "Fundamental of Algorithms", PHI
3. A V Ahoetal, "The Design and analysis of Algorithms", Pearson Education
4. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia

Course Content:

Unit-1	**Introduction to Algorithms & Analysis**	**8 hours**
Introduction to Algorithms & Analysis- Design of Algorithms, Growth of function, Complexity of Algorithms, Asymptotic Notations, Recurrences. **Sorting:** Insertion Sort, Quick Sort, Merge Sort		
Unit-2	**Advance Data Structure**	**8 hours**
Advanced Data Structure: Binary Search Trees, Red Black Trees		
Unit-3	**Advance Design and Analysis Techniques**	**8 hours**
Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm		
Unit-4	**Graph Algorithms**	**8 hours**
Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path		
Unit-5	**Special Topics in AAD**	**8 hours**
String Matching, Introduction of NP-Hard and NP-Completeness , Matrix Operations		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Introduction to Cryptographic Fundamentals	L	T	P	C
Course Code	BCAS2036	3	0	0	3
Prerequisite	Programming Essentials in C				
Co requisite					
Ant requisite					

Course Objectives:

1. To learn the fundamental concepts of cryptography.
2. To defend the security attacks on information systems with secure algorithms.

Course Outcomes:

CO1	Learn to analyse the security of the in-built cryptosystems.
CO2	Develop authentication schemes for identity and membership authorization.
CO3	Develop cryptographic algorithms for information security.
CO4	Demonstration of Hashing and Message Digests
CO5	Able to Applications of Cryptographic Algorithms

Text Book (s)

1. D. R. Stinson, Cryptography: Theory and Practice, 3rd ed. Boca Raton, FL: Chapman & Hall/CRC, 2005. (ISBN No.: 978-1-58-488508-5)
2. W. Stallings, Cryptography and Network Security: Principles and Practice, 5th Ed. Boston: Prentice Hall, 2010. (ISBN No.: 978-0-13-609704-4)
3. J. H. Silverman, A Friendly Introduction to Number Theory, 4th Ed. Boston: Pearson, 2012.
4. C. Kaufman, R. Perlman, and M. Speciner, Network Security: Private Communication in a Public .

Reference Book (s)

5. Atul Kahate, Cryptography and Network Security, 2nd ed., Tata Mcgraw Hill education Private Limited, 2011.
6. Computer Security, Dieter Gollman,3rd ed, Wiley Publications,2011.
7. Introduction to Computer Security, Matt Bishop,1st ed,Addison-Wesley Proffesional,2004.
8. Hand Book of Applied Cryptography, by Alfred Menezes, Paul van Oorschot, Scott Vanstone , CRC.

Unit-1	Introduction to Security	8 hours
Information Security - Confidentiality, Integrity & Availability – Authentication, Authorization & Non-Repudiation – Introduction to Plain Text, Cipher Text, Encryption and Decryption Techniques, Secure Key, Hashing, Digital signature		
Unit-2	Symmetric and Asymmetric Encryption	8 hours
Block cipher, Stream Cipher - Data Encryption Standard (DES) - Cipher Block Chaining (CBC) - Multiple Encryption DES - International Data Encryption Algorithm (IDEA) - Advanced Encryption Standard (AES). Asymmetric key generation techniques – Applications of Asymmetric encryption methods – RSA- Elliptic Curve Cryptography		
Unit-3	Digital Signatures	8 hours
Digital signature standards - Secure One-time Signatures - Application of Digital Signatures - Diffie-Hellman Key Exchange - Elliptic Curve Digital Signature algorithm.		
Unit-4	Hashing and Message Digests	8 hours
Cryptographic Hash Functions- Applications- Simple hash functions and features for ensuring security - Hash functions based on Cipher Block Chaining- Secure Hash Algorithm (SHA) - Message Digest - MD5		
Unit-5	Applications of Cryptographic Algorithms	8 hours
Applying cryptography algorithms - Smart cards-Mobile phone security - Electronic passports and ID cards - SDA/DDA/CDA Bank Cards - Financial Cryptography – Secure Payment Systems - Crypto currencies – Bitcoin.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Computer Networking	L	T	P	C
Course Code	BCAS2007	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

3. Teach fundamental concepts of networks.
4. Give hands on training of network installation and configuration

Course Outcomes:

CO1	Understand basic of networking from the user's, developer's and administrator's perspective.
CO2	Students able to Physical Layer and Data Link Layer
CO3	Understand the concept of Network Layer
CO4	Demonstration of Transport and Application Layer
CO5	Students able to known network administration

Text Book (s)

1.A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4 thEd. 2003.

2.BehrouzA.Forouzan, "Data Communication and Networking", Tata MCGraw Hill,

3.William stallings, "Data and computer communications", Pearson education Asia, ,

Reference Book (s)

1. MCSE: Networking Essentials Study Guide -- Tata McGrawHill Publication

2. MCSE: Windows 2000 N/W Infrastructure design - Tata McGraw Hill Publication

Unit-1	**Basic Concepts, Network Reference Models**	**8 hours**
Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks (LAN,WAN,PAN). Network Topologies (Bus, Star, Ring, Star Bus, Star Ring and Physical Mesh) , OSI and TCP/IP Models: Layers and their functions, comparison of models	
Unit-2	**Physical Layer and Data Link Layer**	**8 hours**
	Transmission Media: Guided and Unguided. CSMA, Ethernet, FDDI, Token Ring ,Wireless LAN. DLL: Basic functions of DLL, Circuit switching, packet switching and message switching. Flow control, error control. MAC	
Unit-3	**Network Layer**	**8 hours**
	Hub, Repeaters, bridges, gateways, routers, design issues of network layer, Routing algorithms,. Network Layer Protocols: IPv4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol, ARP – RARP –DHCP – ICMP	
Unit-4	**Transport and Application Layer**	**8 hours**
	Transport layer: Process- to- Process delivery, Data traffic, Congestion control: Open loop, closed loop. Flow control and error Control. UDP – TCP. Application Layer: Client- Server model, DNS. DNS in internet E-mail, SMTP, FTP, HTTP, World Wide Web	
Unit-5	**Network Administration**	**8 hours**
	Analyzing the technical support structure(Network manager support, End-user Support), Analyzing the current Network Management, Managing Network Connections, Installing and configuring Network adapters, Installing and Configuring TCP/IP Protocol, Managing network bindings, Sharing files and Printers, Building Internet and Intranet Infrastructure, IP address scheme, assigning IP addresses	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Computer Networking Lab	L	T	P	C
Course Code	BCAS2008	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Teach fundamental concepts of networks.
2. Give hands on training of network installation and configuration

Course Outcomes

CO1	Understand basic of networking from the user's, developer's and administrator's perspective
CO2	Students able to Physical Layer and Data Link Layer
CO3	Understand the concept of Network Layer
CO4	Demonstration of Transport and Application Layer
CO5	Students able to known network administration

Text Book (s)

1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4 thEd. 2003.
2. BehrouzA.Forouzan, "Data Communication and Networking", Tata MCGraw Hill,
3. William stallings, "Data and computer communications", Pearson education Asia, ,

Reference Book (s)

1. MCSE: Networking Essentials Study Guide -- Tata McGrawHill Publication
2. MCSE: Windows 2000 N/W Infrastructure design - Tata McGraw Hill Publication

EX.NO.	TITLE OF LAB EXPERIMENTS
1	BASIC NETWORKING COMMANDS
2	SLIDING WINDOW
3	CYCLIC REDUNDANT CHECK
4	ROUTING-SHORTEST PATH FROM SINGLE NODE
5	BROADCASTING
6	MULTICASTING
7	ADDRESS RESOLUTION PROTOCOL
8	IMPLEMENTATION OF TCP
9	IMPLEMENTATION OF UDP
10	FILE TRANSFER PROTOCOL(FTP)
11	DOMAIN NAME SERVICE(DNS)
12	LEARNING ABOUT CONFIGURATION OF SHARING THE FILES/DESKTOP/PRINTER

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Name of The Course	Java Programming Lab	L	T	P	C
Course Code	BCAS2009	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
Introduce students Core Java Concepts and to teach students the basic concepts of Java programming. This course covers preliminaries, I/O streaming and file handling and teach students how to program applets in Java, networking and allow the students to implement effectively

Course Outcomes

CO1	Implement and use efficiently the java programs, can develop applets, able to access database with JDBC, work with networking protocols using java with attractive GUI .
CO2	Understand the concept of Control Statements in JAVA
CO3	Be familiar with string's in JAVA
CO4	Understand Exception Handlingin JAVA
CO5	Understand IO Packagein JAVA

Text Book (s)
   1. R. Naughton and H. Schildt – Java2 (The Complete Reference) – Fifth Edition – TMH – 2004.
Reference Book (s)

1. K. Arnold and J. Gosling – The Java Programming Language – 3rd Edition., Pearson Edu,2005
2. David Flanagan – Java in a Nutshell: A Desktop Quick Reference for Java Programmers–O'Reilly & Associates, Inc. 1999
3. Bruce Eckel –Thinking in Java – Prentice Hall, 2nd Ed 2002

List of Experiment:
1. Write a program that will print a "hello java" message on the screen.
2. Write a program to read a string from the command line and display the string on the screen.
3. Write a program to read an integer from the command line and calculate square root of that value.
4. Write a program to read an integer value through Scanner class and check whether it is even or odd.
5. Write a program to create constructor of a class and initialize values in it and later print them.
6. Write a java code to implement the concept of method overloading.
7. Write a java code to implement the concept of constructor overloading.
8. Write a java code to implement the concept of simple inheritance, multilevel inheritance, and hierarchical inheritance.
9. Write a program to show how method overriding is implemented in java.
10. Write a program to implement the concept of abstract classes.
11. Write a program to implement multiple inheritances using interface.
12. Write a java code to demonstrate the concept of inner classes.
13. Write a java code to show both the uses of "super" keyword.
14. Write a program to create your own package and import that package in a program.
15. Write a java program to show the use of various string functions like concat, indeOf.
16. Write programs for Exception handling using try, catch, throw and finally.
17 Write a program to read a single character from keyboard using Buffered Readerclass and print it

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Database Management System Lab	L	T	P	C
Course Code	BCAS2010	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Teach efficient storage mechanisms of data for an easy access.
2. Design and implementation of various basic and advanced SQL query.
3. Introduce various techniques for representation of the data in the real world.
4. Learn to design DDL &DML.

Course Outcomes:

CO1	Understand variety of types of database management system.
CO2	Understand wide variety of database and use them appropriately to solve problems using query
CO3	Understand and implement of fundamental query & their applications, namely DDL and DML and simple normalization etc.

Text Book (s)
1. Henry F. Korth and Abraham Silberschatz: Database system concepts, McGraw Hill International Publication, 1988 (Chapters 1 to 6 and 9 to 13), 2nd Edition,1991.

Reference Book (s)

1. Jeffrey D Ullman: Principles of data Base systems, Galgotia Publishers, 2nd Edition 1994.
2. C.J. Date, An Introduction to database Systems, Third Ed., Narosa 3rd Edition 1995.

LIST OF EXPERIMENTS
1) Implement Data Definition language Statements.
2) Implement Data Manipulation Statements.
3)Implement SELECT command with different clauses.
4)Implement various type of Integrity Constraints on database.
5)Implement SINGLE ROW functions (Character, Numeric, Date functions) and GROUP functions (avg, count, max, min, sum).
6)Implement various type of SET OPERATORS (Union, Intersect, Minus)
7)Implement the concept of grouping of Data and Subqueries.
8)Implement the concept of Data Control Language (DCL), Transaction Control Language(TCL).
9)Implement Simple and Complex View.
Value Added Experiments
10Create a Database for Banking Sector and implement various queries on it.
11 Create a Database for Customer Sale/purchase and implement various queries on it.

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Campus-to-Corporate	L	T	P	C
Course Code	LLL245	0	0	4	2
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. To assess the current employability level of students.
2. To prepare students to perform effectively in Personal Interview.
3. To prepare the students for solving mathematical problems appearing in Placement Papers.

Course Outcomes:

CO1	Enhance and practice employability skills required in the placement process using a simulated environment
CO2	Communicate effectively in a Personal Interview
CO3	Model interpersonal communication in a monitored environment
CO4	Enhance the ability of problem solving and decision making in short span of time

Reference Book (s)
1. Delivering Employability Skills in the Lifelong Learning Sector by Ann Gravells, ISBN-10: 1844452956
2. Sample Papers of Various companies; Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region

Unit-1	Group Discussion	2 hours
	• Group Discussion- Concepts • Group Discussion – Practice	

Unit-2	Real Life Simulation- Employability Skills- Job Fair	12 hours
	• Introduction to Job Fair • Resume Writing • Personal Interview Concepts • Mock Interviews • Job Fair – Final Event	

Unit-3	Quantitative Aptitude	6 hours
	• Syllogism • Logical Reasoning • Paper Pattern Discussion	

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Operating System	L	T	P	C
Course Code	BCAS2015	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Provide the fundamental principles of modern operating systems that explores design aspects of modern operating systems.
2. Solve problems using the above concepts.

Course Outcomes

CO1	Understand how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions
CO2	Understand how the operating system abstractions can be implemented
CO3	Understand the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software
CO4	Understand basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection
CO5	Understand the storage management concepts

Text Book(s)
1. Operating System Concepts (7th Ed) by Silberschatz and Galvin, Wiley, 2000.

Reference Books
1. Operating Systems (5th Ed) – Internals and Design Principles By WilliamStallings, Prentice Hall,
2. Modern Operating Systems by Andrew S Tanenbaum, Prentice Hall India, 1992.
3. Operating Systems (3rd edition) by Gary Nutt, Nabendu Chaki, SarmishthaNeogy, Pearson
4. Operating Systems Design & Implementation Andrew S. Tanenbam, AlbertS. Woodhull Pearson
5. Operating Systems Achyut S. Godbole Tata Mc Graw Hill
6. Operating Systems D.M.Dhardhere Tata Mc Graw Hill

Course Content:

Unit-1	Introduction	8 hours
Operating System and Function, Evolution of Operating System, System Software, OS services and Components: Multitasking , Multiprogramming, Multiprocessing, Time Sharing, Buffering, Spooling, Distributed OS		
Unit-2	Process Management	8 hours
Concept of process and threads: Process states, Process management, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling		
Unit-3	Sceduling	8 hours
Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling. Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection		
Unit-4	Memory Management	8 hours
Memory partitioning: Swapping, Paging, Segmentation Virtual memory: Overlays, Demand paging, Performance of Demand paging, Virtual memory concepts, Page replacement algorithms, Allocation algorithms, Example OS : Linux		
Unit-5	I/O Management	8 hours
I/O Devices and The Organization of I/O Function, I/O Buffering, Disk I/O, Operating System Design Issues. File System: File Concept, File Organization and Access Mechanism, File Directories, File Protection, File Sharing, Implementation Issues		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Software Engineering	L	T	P	C
Course Code	BCAS2016	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

　　　　Identify, formulate, analyze, and solve problems, as well as identify the computing requirements appropriate to their solutions

Course Outcomes:

CO1	Understand basic concepts and applications of Software Engineering.
CO2	Work with software requirement engineering process.
CO3	Understand the concepts of software design.
CO4	Develops the basic concepts of Coding and Testing concepts.
CO5	Understand the principles of software maintenance.

Text Book (s)

1. Roger S Pressman," Software Engineering – A Practitioner's Approach", McGraw Hill, USA, 2007.

2. Sommerville I, "Software Engineering", Pearson Education India, New Delhi, 2006.

Reference Books

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. Pankaj Jalote, Software Engineering, Wiley

Course Content:

Unit-1	Introduction	8 hours
Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Selection of Software Process models	

Unit-2	Requirement Engineering Process	8 hours
Requirement Engineering Process: Elicitation, Analysis, Documentation, Analyzing a problem, creating software specification document, review for correctness, consistency, and completeness, Management of User Needs, Feasibility Study, Characteristics and components SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model	

Unit-3	Software Design	8 hours
Software Design: Refining the software Specification; Software design, fundamental design concept for data, Abstraction, Modularity, Software architecture, Cohesion and Coupling, Architectural design and procedural design, Data flow oriented design, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design, creating design document: Review of conformance for software requirements and quality.	

Unit-4	Implementation & Testing	8 hours
Coding: Relationship between design and implementation, Implementation issues and programming support environment; Coding the procedural design, Good coding style and review of correctness and readability, Structured Programming, need for structured programming, Coding standards, Coding style, Maintainability of programs, Code documentation – Code efficiency	

Testing : Software testing, Testing Objectives, Levels of testing– Unit Testing, Integration Testing, System testing, Acceptance Testing, Verification Vs Validation, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing , Incremental Vs Nonincremental testing, Structural Testing (White Box Testing), Functional Testing (Black Box Testing).	
Unit-5 **Maintenance**	**8 hours**
Maintenance: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Function Point (FP) Based Measures, Cyclomatic Complexity Measures, Software Risk Analysis and Management.	

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	.Net Technology (PBL)	L	T	P	C
Course Code	BCAS2025	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the Framework.
2. By building sample applications, the student will get experience and be ready for large-scale projects

Course Outcomes

CO1	To understand the basis of .NET Framework.
CO2	Develop applications with c# using .NET Framework.
CO3	Develop applications with Visual Basic using .NET Framework..
CO4	Develop active server pages using .NET Framework.
CO5	Read and write data from/to files in ADO.Net .

Text Book (s)
1. Visual studio 2010 - A beginners guide - Joseph Mayo.

Reference Books
1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" Tata Mcgraw Hill (2002 Edition).
2. Pro ASP.NET 4 in C# 2010, MacDonald and Freeman
3. Visual Studio 2010 and .NET 4 Six-in-One (Wrox Programmer to Programmer)

Course Content:

Unit-1	Introduction	8 hours
	Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations, Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions, Defining classes and class members. Assembly, Components of Assembly, Private and Shared Assembly, Garbage Collector, JIT compiler. Namespaces Collections, Comparisons and Conversions, Delegates and Events	

Unit-2	C#	8 hours
	Getting Started with .Net Framework, Exploring Visual Studio .NET, Inside a C# Program, Data Types, Statements, Arrays, Using Strings, Objects, Classes and Structs, Properties, Inheritance, Indexers, Delegates, Events, Namespaces, Generics, Collections and Data Structures, Exception Handling, Threading, Using Streams and Files, Reflection, Assemblies, versioning, Windows Forms, Controls, Data binding to Controls, Advanced Database Programming using ADO.net, Using GDI +,Networking,.net Remoting, Manipulating XML	

Unit-3	VB.Net	8 hours
	Creating Applications with Visual Basic.NET, Variables, Constants, and Calculations, Making Decisions and Working with Strings, Lists, Loops, Validation, Sub Procedures and Functions, Multiple Forms, Standard Modules, and Menus, Arrays, Timers, Form Controls, File Handling, Exception Handling, Working with Databases, Advanced Database Programming using ADO.net, Classes, Generics, Collections, Inheritance, Custom Controls, Packaging & deployment, Using Crystal Reports	

Unit-4	ASP.Net	8 hours
	Building a Web Application, Examples Using Standard Controls, Using HTML Controls, Validating Form Input Controls using Validation Controls, Understanding Applications and State, Applying Styles, Themes, and Skins, Creating a Layout Using Master Pages, Binding to Databases using Controls, Data Management	

with ADO.net, Creating a Site Navigation Hierarchy, Navigation Controls , Membership and Role Management, Login Controls, Securing Applications, Caching For Performance, Working with XML, Using Crystal Reports in Web Forms

Unit-5	DBMS	8 hours

Databases: Introduction, Using SQL to work with database, retrieving and manipulating data with SQL, working with ADO.NET, ADO.NET architecture, ASP.NET data control, data source control, deploying the web site. Crystal reports. LINQ: Operators, implementations, LINQ to objects, XML, ADO.NET, Query Syntax

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Linux Administration	L	T	P	C
Course Code	**BCAS2021**	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- Design and implement common system automation tasks using shell scripts

Course Outcomes:

CO1	Understand the history of Linux and its environment. Comparing Linux and UNIX operating syste. Demonstrating the installation of Linux based operating system (Fedora and Ubuntu) on computer system.
CO2	Explain and appraise the philosophy behind Open Source Software and GNU Public License. Differentiating between Windows based OS and Linux based OS.
CO3	Understanding and Practicing basic Linux commands - ls, cp, cat, mv, rm, chmod, ping, who, who –b, who-m. Analysing security and System Integrity. Managing Processes and users on Linux system. Managing networking using NFS and NIS.
CO4	Understanding boot process and analysing LILO and GRUB boot methods. Analysing dual boot using Linux and Windows based operating system. Explain different aspects of Linux file system and comparing different file system on a Linux distribution.
CO5	Understanding and practicing vi editor and shell. Understanding and practicing shell programming constructs. Creating and executing shell scripts.

Text Book (s):
1. Richard Petersen, The Complete Reference – Linux, McGraw-Hill.
2. LINUX kernel development by Robert Love.
3. YashwantKanetkar, UNIX & Shell programming – BPB
4. Wale Soyinka, "Linux Administration: A Beginner's Guide", McGraw Hill Companies

Reference Book (s):
1. M.G.Venkateshmurthy, Introduction to UNIX & Shell Programming, Pearson Education
2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", O' Reilly

Course Content:

Unit-1	**History and Installation of Linux**	**8 hours**
History, Hardware and Environmental Considerations, Server Design, Methods of Installation, Installing Fedora, Installing Ubuntu Server. Dual-Booting Issues, Comparison between UNIX and LINUX		
Unit-2	**Introduction to Linux: Basic Terminology**	**8 hours**
Linux – The Operating System, Open Source Software, Features of Linux, GNU, GNU Public License, Advantages of Open Source Software, Difference between Windows and Linux		
Unit-3	**Linux Commands**	**8 hours**
General-Purpose commands,File orientedcommands,directory orientedcommands, Communication-orientedcommands, processorientedcommands. Commands like: ls, cp, cat, mv, rm, chmod, ping, Who, who –b, who-m etc. Security and system Integrity, Starting and Stopping the System, System Activity and Process Management, Users, Miscellaneous.		
Unit-4	**Boot Methods and Linux file system**	**8 hours**
Boot Methods: The Boot Process, LILO, GRUB, Dual-Booting Linux and Windows XP/Vista, BootTime Kernel Options.Introduction to Linux file system: Architecture, aspects/features of file system, different types of file systems.		
Unit-5	**Shell Programming**	**8 hours**

Vi Editor, features of different shells,I/Oinshell, controlstructures,loops, subprograms.
Shell scripts: Creating&executingshell scriptsinLinux, shell variables, purpose of shell scripts

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Graph Theory (MOOC)	L	T	P	C
Course Code	BCAS2013	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

The main objective of this course is to introduce graphs as a powerful modeling tool that can be used to solve practical problems in various fields. To achieve this goal, the course introduces the main concepts of graph theory, graph representations and the basic classes of graphs. Several famous graph problems and associated algorithms are also covered. At the end of this course, the student should be able to apply the abstract concepts of graph theory in modelling and solving non-trivial problems in different fields of study.

Course Outcomes

CO1	Understand the basic concepts and applications of Graph theory.
CO2	Work with trees and finding minimum spanning tree of a graph.
CO3	Understand the concepts of graph traversal and matching.
CO4	Develops the basic concepts of matrix represeantation of a graph.
CO5	Understand the principles of planarity and coloring of graphs.

Course Content:

Unit-1	Introduction to Graph Theory	8 hours
Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, Euler graphs, various operation on graphs, Hamiltonian paths and circuits, the travelling sales man problem		
Unit-2	Trees	8 hours
Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms.		
Unit-3	Traversability and Matching	8 hours
Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability, network flows Planer graphs, combinatorial and geometric dual		
Unit-4	Matrix representation of graph	8 hours
Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix. Coloring, covering and partitioning of a graph		
Unit-5	Planarity and Coloring	8 hours
Chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem Discussion of Graph theoretic algorithm wherever required. Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
50	-	50	100

Name of The Course	Elective-I –AI & ML	L	T	P	C
Course Code	**BCA9001**	3	0	0	3
Prerequisite	Discrete Maths and Probability Theory				
Co requisite					
Ant requisite					

Course Objectives:

Presentation of artificial intelligence as a coherent body of ideas and methods to acquaint the student with the basic programs in the field and their underlying theory. Students will explore this through problem-solving paradigms, logic and theorem proving, language and image understanding, search and control methods and learning.

Course Outcomes

CO1	Understand different types of AI agents and implement them using different search algorithms.
CO2	Apply the knowledge and reasoning ability in logical agents and planning in real world.
CO3	Understand representation and manipulation of complex information, knowledge and uncertainty.
CO4	Analyse different Classification Techniques.
CO5	Understand the Machine Learning and its application.

Text Book (s)
1. Elaine Rich and Kevin Knight, "**Artificial Intelligence", McGraw-Hill**

Reference Book (s)
1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", PearsonEducation
3. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

Course Content:

Unit-1	**Introduction to AI**	**8 hours**
Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents, Computer vision, Natural Language Possessing.		
Unit-2	**Searching**	**8 hours**
Searching for solutions, Uniformed search strategies, Informed search strategies, Hill Climbing, Best First Search, A* Algorithm, Constraint Satisfaction, Search for games, Min-Max and Alpha Beta Pruning.		
Unit-3	**Knowledge Representation**	**8 hours**
Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Clauses and Resolution.		
Unit-4	**Learning**	**8 hours**
Semantic Nets, Markov Model ,Hidden Markov Models (HMM), Bayesian Networks		
Unit-5	**Machine Learning**	**8 hours**
Introduction to Machine Learning, Supervised and unsupervised learning, Decision trees, Naive Bayes models, EM algorithm, Reinforcement learning.		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Elective-I - Advance DBMS	L	T	P	C
Course Code	BCAS2028	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

To study basic concepts and major techniques in DBMS implementations. These include concepts and techniques for data storage, query processing, and transaction management. Introduce research development ability in databases through technical survey and presentation

Course Outcomes

CO1	Understand advance database management system techniques.
CO2	Understand in detail query processing and techniques involved in query optimization.
CO3	Understand the principles of concurrency control.
CO4	Understand the principles of recovery management.
CO5	Know recent developments and active research topics in database

Text Book (s)

1. Database system concepts'*, 5 th Edition –by Abraham Silberschatz, Henry Korth, S,Sudarshan, (McGraw Hill International
 2. Data Mining: Concepts and systems'*, by Jiawei nan, Micheline Kamber, (Morgan Kaufmann publishers)

Reference Books

1. Database systems : "Design implementation and management", by Rob Coronel, 4ᵗʰ Edition, (Thomson Learning Press)

2. Database Management Systems by Raghu Ramkrishnan, Johannes Gehrke Second Edition, (McGraw Hill International)

3. Database Management System by Alexis Leaon, Mathews Leon, (leon press)

4. Fundamentals of Database Systems by Remez Elmasri , Shamkant Navathe

Course Content:

Unit-1	OODBMBS & ORDBMS	8 hours
OODBMBS & ORDBMS: Overview of Object-Oriented concepts & characteristics,Objects, Database design for ORDBMS , Comparing RDBMS, OODBMS & ORDBMS **Advance Database Management System –Concepts & Architecture**: Spatial data management , Web based systems-Overview of client server architecture, Databases and web architecture, N-tier ,Architecture, Business logic – SOAP, Multimedia databases , Mobile database		

Unit-2	Parallel databases and Distributed Databases	8 hours
Parallel databases: Introduction , Parallel database architecture , I/O parallelism , Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism , Design of parallel systems		

Unit-3	Distributed Databases	8 hours
Introduction , DDBMS architectures , Homogeneous and Heterogeneous , Databases , Distributed data storage , Distributed transactions , Commit protocols , Availability , Concurrency control & recovery in distributed databases , Directory systems		

Unit-4	Knowledge base Systems and Data Warehousing	8 hours
Knowledge base Systems: Integration of expert in database , application & object database overview **Data Warehousing:** Introduction to Data warehousing , Architecture , Dimensional data modeling- star, snowflake schemas, fact constellation , OLAP and data cubes , Operations on cubes , Data pre-processing - need for pre-processing , data cleaning, data integration and transformation, data reduction		

Unit-5	Data Mining	8 hours
Introduction to data mining , Introduction to machine learning , Descriptive and predictive data mining , outlier analysis, clustering – k means algorithm , Classification - decision tree, association, rules - apriori algorithm , Introduction to text rnh.mg, Bayesian classifiers		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks	
20	50	100	100	
Name of The Course	**iOS, Android APP Development Lab**	L	T	P	C

Course Code	BCA9003	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. To understand the design aspects of operating system.
2. To study the process management concepts & Techniques.
3. To study the storage management concepts.

Course Outcomes

CO1	To use of an operating system to develop software
CO2	To write software systems based on multiple cooperating processes or threads
CO3	To implement file organization techniques
CO4	To implement file allocation strategies
CO5	To implement process scheduling & synchronization algorithms

Text Book(s)
>   2. Operating System Concepts (7th Ed) by Silberschatz and Galvin, Wiley, 2000.

Reference Books
>   7. Operating Systems (5th Ed) – Internals and Design Principles By WilliamStallings, Prentice Hall,
>   8. Modern Operating Systems by Andrew S Tanenbaum, Prentice Hall India, 1992.

List of Experiment:

1. Create a basic Android application to display a string "Welcome to Android" using strings.xml and Explore the directory structure and components of android application.
2. Write a program to create a birthday card displaying greetings using Relative layout and TextViews.
3. Write an Android app that takes user's name as input in an EditText box and on pressing button "OK" will Toast message Welcome <user name>.
4. Create an Android program for a simple Calculator app using UI controls and show arithmetic operations +, -, /, * and mod operations on two operands. Perform input validation and appropriate processing.
5. Write an Android App to display a menu of fast-food items and accepts users order, accordingly generate a Bill. Use Checkbox, Textview, Toast, and button.
6. Write a program using radio button that will select any one of option from movie type(comedy, horror, action, thriller) and toast the message on submit button is clicked.
7. Write an Android app for selecting <item> using spinner.
8. Write an Android app For Registration Form using Explicit Intent.
9. Write a program that accepts user's orders for beverages (tea/coffee) and snacks (chips/cookies) and sends order confirmation email to the user with amount payable.
10. Write a program to start another activity using explicit intent to enter user's information and process response from the activity started in main activity. Use StartActivityForResult.

Value Added Experiments
>   11. Write an android program for sending SMS using Implicit Intents
>   12. Write an android app using content provide to access the database.
>   **13.** Write an app to create a customized listview of contacts like whatsapp list.

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks			
50	-	50	100			
Name of The Course	**.Net technology Lab (PBL)**		**L**	**T**	**P**	**C**

Course Code	BCAS2026	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the Framework.
2. By building sample applications, the student will get experience and be ready for large-scale projects

Course Outcomes

CO1	To understand the basis of .NET Framework.
CO2	Develop applications with c# using .NET Framework.
CO3	Develop applications with Visual Basic using .NET Framework..
CO4	Develop active server pages using .NET Framework.
CO5	Read and write data from/to files in ADO.Net .

Text Book (s)

1. Visual studio 2010 - A beginners guide - Joseph Mayo.

Reference Books

1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" Tata Mcgraw Hill (2002 Edition).
2. Pro ASP.NET 4 in C# 2010, MacDonald and Freeman
3. Visual Studio 2010 and .NET 4 Six-in-One (Wrox Programmer to Programmer)

List of Experiments

1. Write a program in C# to add, subtract, multiply, and divide two numbers.
2. Write a program in C# to compute the area of a circle.
3. Write a program in C# to compute the sum of first 100 numbers.
4. Write a program in C# that uses Building class and displays the following output:
5. house has:
   a. floors
   b. occupants
   a. 2500 total area
   b. 625 area per person
6. Write a program in C# to handle divide- by-Zero exception.
7. Write a program in Visual Basic to compute the factorial of a number.
8. Write a program in Visual Basic to find the roots of quadratic equation.
9. Write a program in Visual Basic to convert temperature from Fahrenheit to Celsius and vice versa.
10. Write a program in Visual Basic to compute the area of triangle and rectangle.
11. Value Addition Experiments
12. Write a program to display holiday in calendar using ASP.Net.
13. Write a program to display the phone number of an author using database.

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Linux Administration Lab	L	T	P	C
Course Code	BCAS2022	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Introduce the basic concepts of Linux Operating System.
2. Introduce the networking concept in Linux.
3. Introduce the Linux programming Techniques.
4. To understand File systems and File structures of Linux operating system.
5. To understand and administer Linux and develop shell scripts.

Course Outcomes

CO1	Understand the history of Linux and its environment. Comparing Linux and UNIX operating system. Demonstrating the installation of Linux based operating system (Fedora and Ubuntu) on computer system
CO2	Explain and appraise the philosophy behind Open Source Software and GNU Public License. Differentiating between Windows based OS and Linux based OS
CO3	Understanding and Practicing basic Linux commands - ls, cp, cat, mv, rm, chmod, ping, who, who –b, who-m. Analysing security and System Integrity. Managing Processes and users on Linux system. Managing networking using NFS and NIS
CO4	Understanding boot process and analysing LILO and GRUB boot methods. Analysing dual boot using Linux and Windows based operating system. Explain different aspects of Linux file system and comparing different file system on a Linux distribution
CO5	5. Understanding and practicing vi editor and shell. Understanding and practicing shell programming constructs. Creating and executing shell scripts.

S.No	Title of the lab experiment
1	Study of any Open source software
2	Process for installing ubuntu open source software
3	Study of general purpose utilities commands.
4	Study of user & session management commands.
5	Study of file system navigation commands, text processing tools, communication commands.
6	Study of VI editor.
7	Study of Shell Script
8	Execute C & C++ programs in Linux.
9	Installation of Linux operating system. a. Partitioning drives b. Configuring boot loader (GRUB/LILO) c. Network configuration d. Setting time zones e. Creating password and user accounts f. Shutting down
10	Do the following changes in Grub file a. Write the path where the grub file is located. b. Change the timeout and title of the system.
11	Bash shell a.buit-in commands b.arithmetic expressions c.functions

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Elective-I Lab - Advance DBMS Lab	L	T	P	C
Course Code	**BCAS2029**	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Teach efficient storage mechanisms of data for an easy access.
2. Design and implementation of various basic and advanced DBMS techniques.
3. Introduce various techniques for representation of the data in the real world.
4. Learn to design user defined data structure

Course Outcomes

CO1	Evaluate and Apply Advanced Database Development Techniques.
CO2	Design & Implement Advanced Database Systems.
CO3	Understand and analyze transaction processing, concurrency control and crash recovery.
CO4	Understand and analyze query processing and optimization.
CO5	Understand and analyze advanced indexing and data organization for DBMS

List of Experiments

- Advanced SQL
- ER Modeling
- Database Design and Normalization
- Accessing Databases from Programs using JDBC
- Building Web Applications using PHP & MySQL
- Indexing and Query Processing
- Query Evaluation Plans
- Concurrency and Transactions

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Mobile Application Development	L	T	P	C
Course Code	BCAS3002	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Introduce the fundamentals and abstract concepts of mobile application.
2. Provide students with the tools and knowledge necessary to create applications that can run on mobile devices

Course Outcomes

CO1	Understand the technical challenges posed by current mobile devices and wireless communications; be able to evaluate and select appropriate solutions.
CO2	Select and evaluate suitable software tools and APIs for the development of a particular mobile application and understand their strengths, scope and limitations.
CO3	Use an appropriate application development to design, write and test small interactive programs for mobile devices.
CO4	Identify the important issues of developing mobile computing systems and applications.
CO5	Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools.

Text Books
1. Pogue, iPhone: The Missing Manual (4th ed.) , Pogue Press, 2010. ISBN: 978-1449393656

Reference Books
1. Guy Hart-Davis, How to Do Everything iPod, iPhone & iTunes (5th ed.), McGraw-Hill Osborne Media, 2009. ISBN: 978-0071630245
2. W. Frank Ableson; Robi Sen; Chris King; C. Enrique Ortiz, Android in Action (3rd ed.), Manning Publications, 2012. ISBN: 978-1-61729-050-3 ISBN: 978-0-13-705842-6

Course Content:

Unit-1	Mobile Application Development Overview	8 hours
Mobile (Cellular) Telephony: mobile devices/radio communications, 1G/2G/3G/4G, carriers device and carrier dependence and independence, **Categories of Mobile Apps:** phone-related, Internet/Web-based, games, GPS-based, standalone utilities, integration utilities, Platform Overview, Mobile Devices Profiles, Mobile Software, Options for development, Common UI Elements			
Unit-2	Architecture, interfaces	8 hours
Software architecture, application models, user interfaces, **Data storage:** ordinary UNIX File System files, SQ Lite Databases, object persistence. **Networking:** Internet, Bluetooth, Near-Field Communication (NFC). **On-board instruments:** accelerometers, compass, GPS, etc. **Specific devices:** Apple iOS (iPhone/ iPad/ iPod Touch), Android devices			
Unit-3	Platforms and Develop environments	8 hours
Operating platforms: Apple iOS, Google Android, windows iPhone7 Development environments: Xcode /Cocoa Frameworks/Objective-C/ iOS simulator, Eclipse (w. Android Development Tools)/Android Application Framework/Java/Android device emulator			
Unit-4	Introduction to Android Programming	8 hours
Installing Android Development Tools , Core Java Concepts, Introduction of android Framework, Android Development Tools, Creating Android Application and Activities, All controls, View Groups(Gallery,Gridview..etc)			
Unit-5	Android Application Development	8 hours
Working with Menus, Intent, 2DGraphics, 2D animation, Audio, Video, Preferences(with all controls), Using File System (from Internal and External), Accessing Sdcard, Database and Content Provider Maps, Geo-coding and Location Based Services, Parsing: Dom Parsing, Json Parsing, Sax Parsing, Pull Parsing			

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Computer Graphics	L	T	P	C
Course Code	BCAS3003	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. To introduce students to the basics of computer graphics.
2. Learn how concepts of computer graphics are useful.

Course Outcomes

CO1	Apply mathematics, physics and computer programming to computer graphics applications and write programmes for various output primitives.
CO2	Summarize and critically review the routines in computer graphics packages like Paint Brush.
CO3	Compare various object representation systems in Graphics systems.
CO4	Be immediately ready to contribute in a significant way to the computer graphics industry.
CO5	Demonstrate the knowledge, technical skills and personal discipline to be successful in a specialized, computer-based graphics field.

Text Books
1. D. Hearn, P. Baker, "Computer *Graphics - C Version",* 2nd Edition, Pearson Education, 1997

Reference Books
1. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995.
2. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. Mc GrawHill.
3. Shalini Govil-Pai, Principles of Computer Graphics, Springer, 2004.

Course Content:

Unit-1	Overview of Graphics Systems	8 hours
Video display devices, Raster-Scan System, Random-Scan, Systems. Random-Scan Systems Graphics monitors and work stations. Input devices: Hard copy devices. Graphics software		
Unit-2	Output primitives	8 hours
Line drawing algorithms circle generation algorithms. Ellipse Generating, Algorithm. Pixel Addressing. Filled-Area Primitives. Fill Area Function, Cell Array, Character, Generation		
Unit-3	Attributes of Output Primitives	8 hours
Line Attributes, Curve Attributes, Color and Gray-Scale levels. Area-Fill Attributes, Character Attributes. Bundled attributes. Inquiry functions. Two-dimensional geometric transformations: Basic transformations		
Unit-4	Transformation	8 hours
Homogenous coordinates, composite transformations, other transformations. Affine transformations, transformation functions, Roster methods for transformations		
Unit-5	Two-dimensional viewing	8 hours
The viewing pipeline, viewing transformation, viewing functions. Line clipping, Cohen Sutherland line clipping, Liang Barsky line clipping Polygon clipping: Sutherland-Hodgman polygon clipping, Weiler Amerton polygon clipping		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	E-Commerce	L	T	P	C
Course Code	BCAS3004	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

To provide students with a good understanding in planning, design, development, deployment and management of e-commerce systems and applications

Course Outcomes:

CO1	Understand the basic concepts and technologies used in the field of MIS and e-commerce.
CO2	Policy and regulatory issues in E-commerce.
CO3	Implement information systems and e- commerce website.
CO4	Handle security threats in electronic commerce.
CO5	Use the basic concepts and technologies used in mobile Commerce

Text Book (s):
1. Ravi Kalakota and Andrew B Whinston, Frontiers of Electronic Commerce, Add. Wesley

Reference Book (s):
1. Pete Loshin, Paul H Murphy, Electronic Commerce, II Edition, Jaico Publishers, 1996.
2. David Whiteley, E-Commerce: Strategy, Technologies and Applications, McGraw Hill, 2000.
3. Daniel Minoli & Emma Minoli – Web Commerce Technology – Tata McGraw Hill, 2002.

Unit-1	Introduction	8 hours
Infrastructure of Electronic Commerce – Networks – Packet Switched Networks – TCP/IP – Internet Protocol – Domain Name Services – Web Service Protocols – Internet Applications – Utility Programs – Markup Languages – Web Clients and Servers – Internets and Extranets – Virtual Private Network.		

Unit-2	Core Technology	8 hours
Electronic Commerce Models – Shopping Cart Technology – Data Mining – Intelligent Agents – Internet Marketing – XML and E-Commerce.		

Unit-3	Electronic Payment System	8 hours
Real World Payment Systems – Electronic Fund Transfer – Digital Payment – Internet Payment Systems – Micro Payments – Credit Card Transactions		

Unit-4	Security and Threats	8 hours
Threats to Network Security – Public Key Cryptography – Network Security Solutions –Firewalls		

Unit-5	Inter/Intra Organizational Electronic Commerce	8 hours
EDI – EDI Application in Business – Legal, Security and Privacy Issues – EDI and Electronic Commerce – Standards – Internal Information Systems		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Software Project Management	L	T	P	C
Course Code	BCAS3006	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Define and highlight importance of software project management.
2. Describe the software project management activities
3. Train software project managers and other individuals involved in software project.
4. Planning and tracking and oversight in the implementation of the software project management process
5. Describe the usefulness of software project management for Big data
6. Discuss software project management play critical role for other project

Course Outcomes

CO1	Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
CO2	Compare and differentiate organisation structures and project structures.
CO3	Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.
CO4	With increase of data size update project schedule and budget considering Big data concept.
CO5	Develop strategies to calculate risk factors involved in IT projects.

Text Book (s)

1. Clifford F. Gray, Erik W. Larson, "Project Management: The Managerial Process with MS", McGraw Hill

Reference Book (s)

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. 2. Royce, Software Project Management, Pearson Education
3. 3. Kieron Conway, Software Project Management, Dreamtech Press
4. 4. S. A. Kelkar, Software Project Management, PHI Publication.

Course Content:

Unit-1	**INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT**	8 hours
Project Definition – Contract Management – Activities Covered By SoftwareProjectManagement – Overview Of Project Planning – Stepwise Project Planning		
Unit-2	**PROJECT EVALUATION**	8 hours
Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation		
Unit-3	**ACTIVITY PLANNING**	8 hours
Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control		
Unit-4	MONITORING AND CONTROL	8 hours
Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring –Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance		
Unit-5	**MANAGING PEOPLE AND ORGANIZING TEAMS**	8 hours
Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Elective-II(1) - Multimedia System	L	T	P	C
Course Code	BCAS3008	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

Get the Knowledge about the basics concepts of multimedia and its applications. Student will get the knowledge of its relevance with internet and its future aspects

Course Outcomes:

CO1	Student will gain fundamental knowledge about multimedia and its applications
CO2	Student will Build blocks Creating & Editing Media elements
CO3	Student will understand Multimedia and the Internet
CO4	Student will understand Multimedia-looking towards Future

Text Book (s)

1. Tay Vaughan, "Multimedia: Making it work", TMH, 1999.
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications Applications",Pearson, 2001.

Reference Books

1. Keyes, "Multimedia Handbook", TMH, 2000.
2. Steve Heath, "Multimedia & Communication Systems", Focal Press, UK, 1999.
3. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, PTR, 2000.
4. Steve Rimmer, "Advanced Multimedia Programming", MHI, 2000.

Course Content:

Unit-1	Introduction and Hardware & Software	8 hours
Introduction : Multimedia - Definitions, Basic properties and medium types.(Temporal and non temporal) . Multimedia applications, Uses of Multimedia, Introduction to making multimedia - The Stages of project, the requirements to make good multimedia, Multimedia skills and training . Hardware and Software for Multimedia: Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Media software - Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.		

Unit-2	Building blocks Creating & Editing Media elements	10 hours
Text, image, Sound, animation Analog/ digital video Data Compression: Introduction, Need, Difference of lossless/lossy compression techniques. Brief overview to different compression algorithms concern to text, audio, video and images etc		

Unit-3	Multimedia and the Internet	10 hours
History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW - Web Servers, Web Browsers, Web page makers,and editors, Plug-Ins and Delivery Vehicles, HTML, Designing for the WWW -Working ,on the Web, Multimedia Applications - Media Communication, Media Consumption, Media Entertainment, Media games		

Unit-4	Multimedia-looking towards Future	10 hours
Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Virtual Reality, Digital Camera. Assembling and delivering a Multimedia project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM: The CD family, production, process, CD-i – Overview – Media Types Technology		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Elective-II(2) – Network Security	L	T	P	C
Course Code	BCAS3010	3	0	0	3
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Required for the protection of data against accidental or intentional destruction, disclosure or modification.
2. Network security refers to the technological safeguards and managerial procedure which can ensure that organizational assets and individual privacy are protected over the network.

Course Outcomes:

CO1	Describe the Network Security.
CO2	Understand different types of security threats.
CO3	Discuss the Security Mechanisms.
CO4	List of Access Control
CO5	System Security

Text Books

1. Stallings, "Cryptography & Network Security, Principles & Practice", 3rd Edition, Prentice Hall, 2002.

Reference Books

1. Bruce, Schneier, "Applied Cryptography", 2nd Edition, Toha Wiley & Sons, 1996.
2. Man Young Rhee, "Internet Security", Wiley, 2003.
3. Pfleeger & Pfleeger, "Security in Computing", 3rd Edition, Pearson Education, 2003.

Course Content:

Unit-1	**Introduction: Basic Terminology**	8 hours
Attacks, Services, Mechanisms, Conventional Encryption, Classical and Modern Techniques, Encryption Algorithms, Confidentiality		

Unit-2	**Public Key Encryption**	8 hours
RSA, Elliptic Curve Cryptography, Number Theory Concepts		

Unit-3	**Message Authentication**	8 hours
Hash Functions, Digest Functions, Digital Signatures, Authentication Protocols		

Unit-4	**Network Security Practice**	8 hours
Authentication, Applications, Electronic Mail Security, IP Security, Web Security		

Unit-5	**System Security**	8 hours
Intruders, Viruses, Worms, Firewalls Design Principles, Trusted Systems		

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	50	100	100

Name of The Course	Computer Graphics Lab	L	T	P	C
Course Code	BCAS3005	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Teach efficient storage mechanisms of graphics for an easy access.
2. Design and implementation of various basic and advanced computer graphics.
3. Introduce various techniques for representation of the graphics in the real world.
4. Learn to design user defined graphics.

Course Outcomes:

CO1	Understand variety of types of computer graphics.
CO2	Understand wide variety of computer graphics technique and use them appropriately to solve problems
CO3	Understand and implement of fundamental graphical technique & their applications

Text Books

1. D. Hearn, P. Baker, "Computer *Graphics - C Version",* 2nd Edition, Pearson Education, 1997

Reference Books

1. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995.
2. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. Mc GrawHill.
3. Shalini Govil-Pai, Principles of Computer Graphics, Springer, 2004.

List of Experiments

1.	Study of basic graphics functions defined in "graphics.h"
2.	To implement DDA(Digital Differential Algorithm) for line drawing
3.	To implement Bresenham's algorithm for line drawing
4.	To implement Bresenham's algorithm for circle drawing
5.	To implement Midpoint algorithm for circle drawing
6.	To implement Midpoint algorithm for ellipse drawing
7.	To perform 2D Rotation Transformation
8.	To perform 2-D Translation Transformation
9.	To perform 2-D Scaling Transformation
10.	To perform 2-D Reflection Transformation
11.	To perform a composite Transformation using 2D Transformation
12.	To implement Cohen-Sutherland 2D Line clipping
13.	To implement Sutherland Hodgeman Polygon clipping algorithm
14.	To implement window-viewport mapping
	Value Addition Experiments
1.	Designing simple animation using transformations

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Mobile Application Development Lab	L	T	P	C
Course Code	BCAS3007	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

1. Teach efficient storage mechanisms of mobile application for an easy access.
2. Design and implementation of various basic and advanced mobile application.
3. Introduce various techniques for representation of the mobile application in the real world.
4. Learn to design user defined mobile application

Course Outcomes

CO1	Understand variety of types of mobile application.
CO2	Understand wide variety of mobile application and use them appropriately to solve problems
CO3	Understand and implement of fundamental mobile application

Text Books

1. Pogue, iPhone: The Missing Manual (4th ed.) , Pogue Press, 2010. ISBN: 978-1449393656

Reference Books

1. Guy Hart-Davis, How to Do Everything iPod, iPhone & iTunes (5th ed.), McGraw-Hill Osborne Media, 2009. ISBN: 978-0071630245
2. W. Frank Ableson; Robi Sen; Chris King; C. Enrique Ortiz, Android in Action (3rd ed.), Manning Publications, 2012. ISBN: 978-1-61729-050-3 ISBN: 978-0-13-705842-6

List of Experiment:

Sr. No.	Title of Lab Experiments
1	Create an Android application that display an image and give description below it
2	Create an Android app that take name as input from TextBox and Toast a message "Welcome name"
3	Create an Android program for Calculator app
4	Write an android program for Camera app Using Implicit Intents
5	Write an Android program for Quiz app
6	Write an Android app For Registration Form
7	Write An Android program for Time and Date Picker
8	Write an Android app for selecting country using spinner
9	Write an android program for Progress Bar
10	Write an Android app for Rating Bar
11	Write a program for creating contact list using SQLite
12	Write a android App that display x, y, z plane movement of mobile using accelerometer Sensor
13	Write an android app for movement of an image on mobile screen
14	Publish Quiz App and use google analytics
	Value Added Experiments
15	Create an App for calculating Body mass index (BMI)
16	Create an application to call specific entered number by user in the EditText.
17	Write an android program for sending SMS using Implicit Intents.

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Elective II lab (1) - Multimedia System Lab	L	T	P	C
Course Code	BCAS3009	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:
1. Teach efficient mechanisms of multimedia for an easy access.
2. Design and implementation of various basic and advanced multimedia systems.
3. Introduce various techniques for representation of the multimedia in the real world
4. Learn to design multimedia system

Course Outcomes:

CO1	Understand variety of types of multimedia.
CO2	Understand wide variety of multimedia and use them appropriately to solve problems
CO3	Understand and implement of fundamental multimedia & their applications

Text Book (s)
1. Tay Vaughan, "Multimedia: Making it work", TMH, 1999.
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications Applications",Pearson, 2001.

Reference Books
1. Keyes, "Multimedia Handbook", TMH, 2000.
2. Steve Heath, "Multimedia & Communication Systems", Focal Press, UK, 1999.
3. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, PTR, 2000.
4. Steve Rimmer, "Advanced Multimedia Programming", MHI, 2000.

List of Experiments:

1. Write a program to justify a text entered by the user on both left and right hand side justified in 30 columns.
2. Study the notes of a Piano and simulate them using the keyboard and store them in a file.
3. Write a program to read a paragraph and store it to a file.
4. Devise a routine to produce the animation effect of a square transforming to a triangle and then to a circle.
5. Write a program to show a bitmap image on your computer screen
6. Create a webpage for a clothing company which contain all the details of that company and at least five links to other web pages.
7. Write a program by which we can split mpeg video into smaller pieces for the purpose of sending it over the web and then joining them at the destination.
8. Write a program to simulate the game of Pool table.
9. Write a program to simulate the game of Mine Sweeper.
10. Write a program to 'play' wave or 'midi' format sound files.

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100

Name of The Course	Elective II lab (2) –Network Security Lab	L	T	P	C
Course Code	BCAS3011	0	0	2	1
Prerequisite					
Co requisite					
Ant requisite					

Course Objectives:

Learn to implement the algorithms DES, RSA,MD5,SHA-1

Learn various Network security techniques

Course Outcomes:

CO1	At the end of the course, the student should be able to:
CO2	Implement the cipher techniques
CO3	Develop the various security algorithms
CO4	Use different open source tools for network security and analysis

Text Book (s)
1. Stallings, "Cryptography & Network Security, Principles & Practice", 3rd Edition, Prentice Hall, 2002.

LIST OF EXPERIMENTS:

1. Study of Network Security fundamentals - Ethical Hacking, SocialEngineering practices.
2. Implement the following SUBSTITUTION TECHNIQUES
a) Caesar Cipher   b) Playfair Cipher   c) Hill Cipher
3. Implement the Rail fence – row & Column Transpostition Techniques
4. Implement the DES Algorithm
5. Implement the RSA Algorithm
6. Implement the Diffiee-Hellman Algorithm
7. Implement the MD5 Algorithm   e) SHA-1
8. Implement the Signature Scheme - Digital Signature Standard
9. Study and Implement Various IP Security Techniques
10. Study and Implement Various Web Security Techniques
11. Implement system firewall for network security
12. Study of system attacks and prevention methods

Continuous Assessment Pattern:

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (MTE)	Total Marks
50	-	50	100