Schemes and Syllabus

(For academic session 2016-17)

BACHELOR OF COMPUTER APPLICATIONS (BCA)

IEC School of Computer science and Applications

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SECTION 1
Program Outcomes and Program Specific Outcomes

Program Outcomes

PO1: Professional Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

PO2: Research/Project Orientation: Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

PO3: Entrepreneurship Capability: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

PO4: Conformist: This course enables the students to carrying out Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO5: Critical Thinking Mindset: Ability to devise and conduct experiments, interpret data and provide well-informed conclusions.

PO6: Leadership and Teamwork: Ability to work as a member or leader in diverse teams in a multidisciplinary environment.

PO7: Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

PO8: Professional Empowerment: BCA students also hold the opportunity to explore the industrial, research oriented environment with industrial collaboration that motivates them to innovate and explore.

PO9: Communication: Communicate effectively with the computing community as well as society by being able to comprehend effective documentation and presentations.

PO10: Social Responsibility and Environmental Conservation: Ability to recognize economic, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

PO11: Modern Analytical Knowledge: Ability to select modern computing tools, skills, and techniques necessary for innovative software solutions

PO12: Life Long Skills: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

Program Specific Outcomes

PSO1 Students will be able to understand, analyze and develop computer programs in the areas related to algorithm, system software, web design and networking for efficient design of computer based system.

PSO2 Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

PSO3 Student will be able to know various issues, latest trends in technology development and thereby, innovate new ideas and solutions to existing problems.

PSO4 Explore technical knowledge in diverse areas of computer applications and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.

SEMESTER WISE SCHEME

BCA 1st Year / 1st Semester

Course			Period			Evaluation Scheme					Course Total		
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits		
						MSE	CA	P	Total	ESE	Marks	Credits	
THEORY													
1	BCA-101	Fundamentals of Computer & PC - Software	3	0	0	30	15	0	45	30	75	3	
3	BCA-102	Logical Paradigm of Programming in 'C'	3	0	0	30	15	0	45	30	75	3	
5	BCA-103	Environmental Sciences And Technology	3	0	0	40	20	0	60	40	100	3	
2	BCA-104	Mathematics-I	4	0	0	40	20	0	60	40	100	4	
4	ENG-101	Professional Communication	3	0	0	30	15	0	45	30	75	3	
PRACTICAL													
1	BCA-101P	Fundamentals of Computer & PC-Software LAB	0	0	2			15	15	10	25	1	
2	BCA-102P	Logical Paradigm of Programming in 'C' LAB	0	0	4			15	15	10	25	2	
3	ENG-101P	Professional Communication LAB	0	0	2			15	15	10	25	1	
Total Credits												20	

BCA 1st Year / 2nd Semester

Sr. No.	Code	Title	L	T	P	MSE	CA	P	Total	ESE	Marks	Credits
Course			**Period**			**Evaluation Scheme**					**Course Total**	
			L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
THEORY												
2	BCA-201	Programming in 'C' & Data Structure	3	0	0	30	15	0	45	30	75	3
3	BCA-202	Digital Electronics	4	0	0	40	20	0	60	40	100	4
4	BCA-203	Operating System	3	0	0	30	15	0	45	30	75	3
1	BCA-204	Mathematics-II	4	0	0	40	20	0	60	40	100	4
5	ENG-201	Oral & Written communication	3	0	0	30	15	0	45	30	75	3
PRACTICAL												
1	BCA-201P	Programming in 'C' & Data Structure LAB	0	0	4			15	15	10	25	2
2	BCA-203P	Operating System (Linux) LAB	0	0	4			15	15	10	25	2
3	ENG-201P	Oral & Written communication LAB	0	0	2			15	15	10	25	1
Total Credits												22

BCA 2nd Year / 3rd Semester

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
THEORY												
1	BCA-301	Software Engineering	4	1	0	40	20	0	60	40	100	4.5
3	BCA-302	C++ & Advanced Data Structure	3	0	0	30	15	0	45	30	75	3
4	BCA-303	Introduction To Database System	3	0	0	30	15	0	45	30	75	3
5	BCA-304	Computer Networks	3	1	0	40	20	0	60	40	100	3.5
2	BCA-305	Numerical Analysis	4	0	0	40	20	0	60	40	100	4
PRACTICAL												
1	BCA-302P	C++ & Advanced Data Structure LAB	0	0	4			15	15	10	25	2
2	BCA-303P	Introduction To Database System LAB	0	0	4			15	15	10	25	2
Total Credits												22

BCA 2nd Year / 4th Semester

Sr. No.	Code	Title	L	T	P	MSE	CA	P	Total	ESE	Marks	Credits
Course			**Period**			**Evaluation Scheme**					**Course Total**	
			L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
THEORY												
1	BCA-401	Computer Graphics	3	0	0	30	15	0	45	30	75	3
2	BCA-402	Internet Technology	4	1	0	40	20	0	60	40	100	4.5
3	BCA-403	Mobile Computing	4	0	0	40	20	0	60	40	100	4
4	BCA-404	Introduction to Dot NET	3	0	0	30	15	0	45	30	75	3
5	BCA-405	E-Commerce	4	1	0	40	20	0	60	40	100	4.5
PRACTICAL												
1	BCA-401P	Computer Graphics LAB	0	0	4			15	15	10	25	2
2	BCA-404P	Introduction to Dot NET LAB	0	0	4			15	15	10	25	2
Total Credits												23

BCA 3rd Year / 5th Semester

Sr. No.	Code	Title	L	T	P	MSE	CA	P	Total	ESE	Marks	Credits
Course			**Period**			**Evaluation Scheme**					**Course Total**	
						Sessional Marks				**Exam Marks**	**Max. Marks Credits**	
						MSE	CA	P	Total	ESE	Marks	Credits
THEORY												
1	BCA-501	Introduction to Web Technologies	3	0	0	30	15	0	45	30	75	3
2	BCA-502	Multimedia and System	4	0	0	40	20	0	60	40	100	4
3	BCA-503	Management Information System	4	0	0	40	20	0	60	40	100	4
4	BCA-504	Computer Organization	4	0	0	40	20	0	60	40	100	4
5	BCA-505	Linux & Shell Programming	3	0	0	30	15	0	45	30	75	3
PRACTICAL												
1	BCA-501P	Mini project based on Web Technologies	0	0	4			15	15	10	25	2
2	BCA-505P	Linux & Shell Programming LAB	0	0	4			15	15	10	25	2
Total Credits												22

BCA 3rd Year / 6th Semester

Sr. No.	Code	Title	L	T	P	MSE	CA	P	Total	ESE	Marks	Credits
Course			Period			Evaluation Scheme					Course Total	
						Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
THEORY												
1	BCA-601	Advanced DBMS	3	1	0	40	20	0	60	40	100	4
2	BCA-602	Web DESIGNING – II	3	0	0	30	15	0	45	30	75	3
PRACTICAL												
1	BCA-691P	Project	0	0	28			240	240	160	400	14
2	BCA-602P	Web DESIGNING-II LAB	0	0	4			15	15	10	25	2
Total Credits												23

SECTION 3

SEMESTER WISE SYLLABUS

Program: BCA					Semester: 1st		
Course Title: Fundamentals of Computer & PC -Software					Course Code: BCA-101		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course teaches the basics of using computers. These basic technology skills are essential to obtaining employment, advancing yourself educationally and functioning more easily in today's tech-savvy world. Student will develop a vocabulary of key terms related to the computer and to software program menus .They will be able to identify the components of a personal computer system and demonstrate mouse and keyboard functions, organize files and documents on a USB/hard drive, format and edit a word document.

Course Outcomes

CO1: Be able to identify computer hardware and peripheral devices
CO2: Be familiar with software applications. Understand file management
CO3: Accomplish creating basic documents, worksheets, presentations with their properties
CO4: Experience working with email and recognize email netiquette.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Introduction to Computers: Definition of Computer; Components of Computer; Characteristics of Computers; History evolution of Computers; Generation of computers; Classification of Computers: According to Purpose, According to Technology, According to Size and Storage Capacity; Human being VS Computer; Difference between Computer and Calculator.	05 Hours
2	Input Devices: Mouse, Keyboard, Light pen, Track Ball, Joystick, MICR, Optical Mark reader and Optical Character reader. Scanners, Voice system, Web, Camera. Output Devices: Hard Copy Output Devices; Line Printers, Character Printers, Chain Printers, Dot-matrix Printers, Daisy Wheel Printer, Laser Printers, Ink jet Printers, Plotters, Soft Copy device-Monitor, Sound card and speakers. Memory and Mass Storage Devices: Characteristics of Memory Systems; Memory Hierarchy; Types of Primary Memory; RAM and ROM; Secondary and Back-up; Magnetic Disks, Characteristics and classification of Magnetic Disk, Optical Disk, Magnetic Tape.	10 Hours
3	Documentation Using MS-Word: Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-Word: Mail Merge, Macros, Tables, File	05 Hours

	Management, Printing, Styles, linking and embedding object, Template.	
4	Electronic Spread Sheet using MS-Excel: Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS-Excel: Pivot table & Pivot Chart, Linking and Consolidation.	10 Hours
5	Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.	10 Hours

TEXT BOOKS
- Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB
- Dromey, R.G., How to Solve it By Computer, PHI

REFERENCE BOOKS
- Balagurusamy E, Computing Fundamentals and C Programming, Tata McGraw Hill.
- Norton, Peter, Introduction to Computer, McGraw-Hill
- Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World Rajaraman, V., Fundamentals of Computers, PHI
- Ram, B., Computer Fundamentals, Architecture & Organization, New Age International (P) Ltd.

Assessment Process (Internal)
Mid-Term Exams (MSE) = 30 Marks
Continuous Assessment (CA) = 15 Marks in the form of:
Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	1	-	-	-	-	-	-	-	2	-	-	1	2
CO2	2	-	-	1	-	-	-	-	-	-	-	2	-	-	1	2
CO3	2	-	-	1	-	-	-	-	-	-	-	2	-	-	1	2
CO4	2	-	-	1	-	-	-	-	-	-	-	2	-	-	1	2

Program: BCA					Semester: 1st		
Course Title: Fundamentals of Computer & PC-Software LAB					Course Code: BCA-101P		
L		T	P	CH	CP	Int. A	ESE	Total
-		-	2	2	1	15	10	25

Course Description: The course introduces you to fundamental 'Computer Literacy' concepts. You will learn to use Windows 7 on the PC-compatible computers as well as MS Office 2013 which has the following applications: word processing program (MS Word), a spreadsheet program (MS Excel), a presentation program (MS PowerPoint) and Database (MS Access). Windows 7 will be used to illustrate operating system concepts and disk organization. This class is intended for students requiring 'hands-on' knowledge of computer applications.

Course Outcomes

CO1 Describe the usage of computers and why computers are essential components in business and society.
CO2 Utilize the Internet Web resources and evaluate on-line e-business system.
CO3 Solve common business problems using appropriate Information Technology applications and systems.
CO4 Identify categories of programs, system software and applications. Organize and work with files and folders.

Practical   **2Hrs/Weeks**

Sr No.	Experiment Title
1	Text Manipulations, Usage of Numbering, Bullets, Footer and Headers.
2	Usage of Spell check, and Find & Replace, Text Formatting
3	Picture insertion and alignment
4	Creation of documents, using templates ,Creation templates
5	Mail Merge Concepts
6	Copying Text & Pictures from Excel ,Cell Editing
7	Usage of Formulae and Built-in Functions, Data Sorting (both number and alphabets)
8	File Manipulations, Worksheet Preparation
9	Drawing Graphs ,Usage of Auto Formatting ,Inserting Clip arts and Pictures
10	Frame movements of the above ,Preparation of Organisation Charts
11	Insertion of new slides, Presentation using Wizards
12	Usage of design templates

Textbooks
- Microsoft Office 365 & Office 2019 Introductory
- Illustrated Microsoft Office 365 & Office 2019 Introductory
- Building a Foundation with Microsoft Office 2019 & 365
- Microsoft Office 2019 Inside Out

Reference books
- Computer Fundamental MS Office (English, Paperback, Jain Anupama)
- Microsoft Office 2019 For Dummies

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	1	-	-	-	1	-	-	-	2	-	-	1	2
CO2	2	-	-	1	-	-	-	1	-	-	-	2	-	-	1	2
CO3	2	-	-	1	-	-	-	1	-	-	-	2	-	-	1	2
CO4	2	-	-	1	-	-	-	1	-	-	-	2	-	-	1	2

Program: BCA					Semester: 1st		
Course Title: Logical paradigm of Programming in 'C'					Course Code: BCA-102		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: C programming course provides a comprehensive introduction to the ANSI C language, emphasizing portability and structured design. Students are introduced to all major language elements including fundamental data types, flow control, and standard function libraries. Thorough treatment is given to the topics of string and character manipulation, dynamic memory allocation, standard I/O, macro definition, and the C runtime library. The course explains the use of aggregate structures, unions, and pointers early on so the students can practice extensively in the hands on labs. Structured programming constructs and varargs functions are also covered. Emphasis is given to the processing of command line arguments and environment variables so students will be able to write flexible, user-friendly programs. The course also includes coverage of portability tips drawn from experienced programmers working in production environments. Comprehensive hands on exercises are integrated throughout to reinforce learning and develop real competency.

Course Outcomes

CO1 Understanding a functional hierarchical code organization. Ability to define and manage data structures based on problem subject domain.
CO2 Ability to work with textual information, characters and strings. Ability to work with arrays of complex objects.
CO3 Understanding a concept of object thinking within the framework of functional model. Understanding a concept of functional hierarchical code organization.
CO4 Understanding a defensive programming concept. Ability to handle possible errors during program execution.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Overview of C: History of C, Importance of C, Structure of a C Program. Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant. Input/output: Unformatted & formatted I/O function in C, Input functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().	05 Hours
2	Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associatively	05 Hours
3	Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement. Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement.	10 Hours
4	Functions: Definition, prototype, passing parameters, recursion. Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.	10 Hours

5	Arrays: Definition, types, initialization, processing an array, passing arrays to functions, Strings & arrays	10 Hours

Textbooks
  Gottfried, Byron S., Programming with C, Tata McGraw Hill
  Balagurusamy, E., Programming in ANSI C, 4E, Tata McGraw-Hill

Reference books
   Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
   Yashwant Kanetker, Let us C, BPB.
   Rajaraman, V., Computer Programming in C, PHI.
   Yashwant Kanetker, Working with C, BPB.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1
CO2	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1
CO3	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1
CO4	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1

Program: BCA					Semester: 1st		
Course Title: Logical Paradigm of Programming in 'C' LAB					Course Code: BCA-102P		
L		T	P	CH	CP	Int. A	ESE	Total
-		-	2	4	2	15	10	25

Course Description: To make the student learn a programming language. To learn problem solving techniques.To teach the student to write programs in C and to solve the problems and impart the concepts like looping, array, functions, pointers, file, structure.

Course Outcomes

CO1 Read, understand and trace the execution of programs written in C language.
CO2. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO3 Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
CO4. Write programs that perform operations using derived data types.Design graphics programs using C.

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	WAP to add two numbers.
2	WAP to swap two numbers.
3	WAP to find simple interest.
4	WAP to find simple interest.
5	WAP to check no is odd/even.
6	WAP to find greatest no. out of three numbers.
7	WAP to find greatest & second greatest out of three numbers.
8	WAP to find year is century/leap year or not.
9	WAP to find grade with percentage.
10	WAP to find income tax from total salary.
11	WAP to print day of weeks using switch statement.
12	WAP to print no of days of months using switch statement.
13	WAP to print 'n' natural numbers using while loop.
14	WAP to find number of digits in an integer using while loop.
15	WAP to find reverse of an integer using while loop.
16	WAP to check whether number is palindrome or not using while loop.
17	WAP to find sum of an integer using do-while loop.
18	WAP to find sum of an integer using do-while loop.

Textbooks
  Gottfried, Byron S., Programming with C, Tata McGraw Hill
  Balagurusamy, E., Programming in ANSI C, 4E, Tata McGraw-Hill
Reference books
   Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
  Yashwant Kanetker, Let us C, BPB.
  Rajaraman, V., Computer Programming in C, PHI.
  Yashwant Kanetker, Working with C, BPB.

Assessment Process (Internal)
Continuous Assessment (CA) = 15 Marks in the form of:
Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1
CO2	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1
CO3	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1
CO4	3	2	-	2	3	-	-	-	-	-	3	3	3	3	3	1

Program: BCA					Semester: 1st		
Course Title: ENVIRONMENTAL SCIENCE AND TECHNOLOGY					Course Code: BCA-103		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Introduction to environmental issues from a scientific perspective, focusing on physical, chemical, and biological processes within the Earth system, the interaction between humans and these processes, and the process and role of science in finding sustainable solutions. Topics include contemporary environmental issues related to resource use, pollution, and human population growth. Field trips may be required.

Course Outcomes

CO1 Design, organize and conduct scientific environmental research, and contribute to the development of innovative technologies for solving environmental problems.
CO2 Analyse dynamic interactions in complex human environment systems.
CO3 Formulate data requirements and data collection strategies and design, and apply conceptual and computational models for a better understanding of these systems.
CO4 Provide scientific advice for policy development and decision making.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	INTRODUCTION: Definition and Scope: Importance, Public awareness and education. Natural Resources: Introduction, Renewable and non-renewable, Forest, water, mineral, food, energy and land resources, Conservation of resources, Equitable use of resources.	05 Hours
2	ECOLOGY: Ecosystems, Concept, Structure, Function, Energy flow, Ecological pyramids, Forest, grassland, desert and aquatic ecosystems - Introduction, characteristic features, structure and function. Biodiversity: Genetic, Species and ecological diversity, Threats to biodiversity, Conservation of Biodiversity.	05 Hours
3	SOCIAL ISSUES & ENVIRONMENTAL LEGISLATION: Social Issues: Sustainable development, Water conservation, Climatic change, Concept of Green Computing, and Green Building	05 Hours
4	POLLUTION &WASTE MANAGEMENT Pollution: Definition, Causes, effects and control measures of the pollution – Air, soil, Noise, Water, Marine and Thermal and Nuclear Pollution. Disaster management: Flood, Earthquake, Cyclone, Landslide, Drought. Solid waste management: Waste Management hierarchy; Collection, transportation and storage of MSW; Treatment and disposal of MSW.	10 Hours
5	ENVIRONMENTAL CHEMISTRY General Chemistry: Review of concepts like oxidation-reduction, Gas laws, pH and Buffers. Water and Wastewater Chemistry: Hardness, Residual chlorine, Dissolved oxygen, BOD, COD, Solids.	10 Hours

6	Occupational Health Safety and health Management, Occupational Health Hazards, Safety and health training, Stress and Safety; importance of industrial safety, Safety Committee and function, types, effects and measures to control Radiation, Industrial Hazards; Electrical Hazards; fire hazards and hazards in Construction Industry; Accident prevention; first Aid.	05 Hours

Text Books:
Environmental Studies by J.P.Sharma.
Environmental studies by Smriti Srivastava.
Reference Books:
Environment and Ecology by H.Kaur.
Environmental Studies by Ranjit Daniels.
Fundamentals of Ecology by P. Odum.

Assessment Process (Internal)
Mid-Term Exams (MSE) = 40 Marks
Continuous Assessment (CA) = 20 Marks in the form of:
Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	-	-	-	3	-	1	-	1	-	-
CO2	1	-	-	1	-	-	-	-	-	3	-	1	-	1	-	-
CO3	1	-	-	1	-	-	-	-	-	3	-	1	-	1	-	-
CO4	1	-	-	1	-	-	-	-	-	3	-	1	-	1	-	-

Program: BCA					Semester: 1st		
Course Title: MATHEMATICS – I					Course Code: BCA-104		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: Topics in mathematics that every educated person needs to know to process, evaluate, and understand the numerical and graphical information in our society. Applications of mathematics in problem solving, finance, probability, statistics, geometry, population growth.

Course Outcomes

CO1. Demonstrate competency in the areas that comprise the core of the mathematics major
CO2. Demonstrate the ability to understand and write mathematical proofs
CO3. Be able to use appropriate technologies to solve mathematical problems
CO4. Be able to construct appropriate mathematical models to solve a variety of practical problems . Obtain a full-time position in a related field or placement

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Differentiation: Definition of Derivatives, formation of Derivatives, Law of derivatives, Delta method, chain rule, repeated derivatives, derivative of implicit functions and explicit functions. Integration: Integration, Graphical representation, Integration of algebraic Functions, logarithmic and exponential functions, integration of functions using substitution method, Integration by parts and partial fractions.	10 Hours
2	Interest: Simple Interest, Compound Interest (reducing balance & Flat Interest), Equated Monthly Installments (EMI), Problems. Profit And Loss: Terms and Formulae, Trade discount, Cash Discount, Problems involving cost price, Selling Price, Trade discount and Cash discount, Introduction to Commission and brokerage.	10 Hours
3	Matrices and Determinants: Definition of Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of Matrix, Inverse of Matrix via adjoint matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non-homogeneous System of Linear equations (not more than three variables).Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.	10 Hours
4	Permutation and Combinations: Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetition). $nPr=n!/(n-r)!$ (Without proof).Combinations of 'r' objects taken from 'n' objects.$nCr=n!/r!(n-r)!$ (Without proof) problems, Applications.	10 Hours

Text Books:
     Trivedi,Business Mathematics,1st edition,Pearson Education.
     Business Mathematics,Dr. D.R. Sharma

Reference Books:
     Raghavachari M.,Mathematics for Management,McGraw Hill Education.

Cleaves,Cheryl, and Hobbs,Margie,Business Mathematics 7th Edition,Prentice Hall.

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Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	1	3	-	-	-	-	-	2	3	1	1	1	1
CO2	2	1	-	1	3	-	-	-	-	-	2	3	1	1	1	1
CO3	2	1	-	1	3	-	-	-	-	-	2	3	1	1	1	1
CO4	2	1	-	1	3	-	-	-	-	-	2	3	1	1	1	1

Program: BCA					Semester: 1st		
Course Title: Professional Communication					Course Code: ENG-101		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Business and Professional Speech Communication, is a course which provides students the opportunity to develop skills and understandings useful in the career environment. ... This course emphasizes the theory and practice of communication as it relates particularly to business and professional settings.

Course Outcomes

CO1: Explain the Meaning and Importance of Communication
CO2: Students will apply Reading Skills their Professional life
CO3: Students will understand difference between Oral Communication and Written Communication
CO4: Students will also understand about necessary Grammatical portion like Abbreviation, Antonyms, Synonyms, Word formation: prefix, suffix.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	COMMUNICATION - Meaning of Communication , Importance of Communication & Process of Communication , Types of communication, Channels of Communication, Barriers of Communication , Role of Communication in Society ,Process of listening, Difference between hearing and listening, Feedback skills.	10 Hours
2	Reading Skills: Characteristics of reading, Types of reading, Purpose of reading, Process of reading, Rules for faster comprehension, Approach to reading, SQ3R, Comprehension (Unseen passage).	10 Hours
3	ORAL COMMINICATION - Introduction, principles of successful oral communication, two sides of effective oral communication, Non-verbal communication- Body language, personal appearance, posture, gesture, facial expression, eye contact, proxemics, haptics. WRITTEN COMMUNICATION - Principles of effective writing, writing technique, Paragraph writing , Business letters: Placing an order , Complaint Letter, Adjustment Letter	10 Hours
4	Grammar: Patterns & Parts of speech, Subject, Predicate , One word substitution, Idioms and Phrases, Capital letters(use), Abbreviation, Antonyms, Synonyms, Word formation: prefix, suffix.	10 Hours

Text Books:
- Leena Sen. *Communication Skills*. New Delhi : Prentice Hall Pub, 2007
- Asha Kaul. *Effective Business Communication*. New Delhi: Tata McGraw Hill Pub, 2007
- Sanjay Kumar and Pushp Lata. *English for Effective Communication*. OUP, 2013.

Reference Books:
- Hari Mohana Prasad and Uma Rani. *Objective English.* New Delhi: Tata Mc Graw Hill Publication, 2014. Chapters 14, 15, 19, 20, 24.
- Krishna Mohan & Meenakshi Raman.2000. *Effective English Communication*. New Delhi: Tata Mc Graw Hill Pub.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO2	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO3	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO4	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-

Program: BCA					Semester: 1st		
Course Title: Professional Communication LAB					Course Code: ENG-101P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	1	2	1	15	10	25

Course Description: Business and Professional Speech Communication, is a course which provides students the opportunity to develop skills and understandings useful in the career environment. A variety of communication situations may be analyzed, including: problem solving; discussion groups; organizational networks; interviewing; and, conference planning and speaking. This course emphasizes the theory and practice of communication as it relates particularly to business and professional settings. Readings and discussions focus upon the philosophies and practice of organizational communication. Basic concepts of effective speech communication are presented, which students can apply in their career environments.

Course Outcomes

CO1 Demonstrate critical and innovative thinking.
CO2 Display competence in oral, written, and visual communication.
CO3 Apply communication theories.
CO4 Show an understanding of opportunities in the field of communication.

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Group Discussion
2	Just a minutes session: Speaking Extempore for one minutes on given topics
3	Reading aloud of newspaper headlines and important articles.
4	Improving pronunciation through tongue twisters.
5	Mannerism or Etiquette.
6	Mock Interview

Textbooks
1. Anderson, P.V, **Technical Communication**, Thomson Wadsworth , Sixth Edition, New Delhi, 2007.

Reference books
1. Prakash, P, **Verbal and Non-Verbal Reasoning**, Macmillan India Ltd., Second Edition, New Delhi, 2004.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO2	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO3	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO4	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-

L		T	P	CH	CP	Int. A	ESE	Total
Program: BCA						Semester: 2nd		
Course Title: Programming in 'c' & Data Structures						Course Code: BCA-201		
L		T	P	CH	CP	Int. A	ESE	Total
3		-	-	3	3	45	30	75

Course Description: In this course, we will explore several fundamental algorithms and data structures in computer science, and learn to implement them in C. Some of the data structures we will encounter include linked lists, stacks, queues, trees, heaps, hash tables, and graphs. We will study and analyze algorithms for searching, traversing trees, hashing, manipulating priority queues, sorting, finding shortest paths in graphs, and much more.

The basic idea of this course is to help you understand many of the fundamental data structures of computer science. With an appreciation for data structures and algorithms and practical experience in implementing them you can be a much more effective designer, developer, or customer for new applications. Elegant algorithms are also a nice counterpoint to the crufty code and weird features we encounter in daily work.

Course Outcomes

CO1: Understand the concepts of Preliminaries, arrays and linked lists.
CO2: Learning about Stacks and Queues
CO3: Learning about Tress structures and Graphs
CO4: Learning about Storage System along with Sorting and Searching

Unit	Topic	Hours
1	Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notation. Strings: Introduction, Stroing strings, String operations, Pattern matching algorithms.	10 Hours
2	Arrays: Introduction, Linear arrays, Representation of linear array in memory, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, sparse metrics. Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Garbage collection, Applications of linked lists.	10 Hours
3	Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Recursion.	05 Hours
4	Queues: Introduction, Array and linked representation of queues, Operations on queues, De-que, Priority Queues, Applications of queues.	05 Hours
5	Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithms using stacks. Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs.	10 Hours

Text Books:
- Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
- Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orient Longman.

Reference Books:
- Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications",
- Mcgrraw- Hill International Student Edition, New York.
- Mark Allen Weiss Data Structures and Algorithm Analysis In C, Addison- Wesley, (An Imprint Of Pearson Education), Mexico City.Prentice- Hall Of India Pvt. Ltd., New Delhi.
- Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Prentice- Hall of India Pvt. Ltd., New Delhi.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO2	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO3	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO4	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1

Program: BCA					Semester: 1st		
Course Title: Programming in 'C' & Data Structure LAB					Course Code: BCA-201P		
L		T	P	CH	CP	Int. A	ESE	Total
-		-	2	4	3	15	10	25

Course Description: The course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures .

Course Outcomes

CO1 Develop simple C Programs using pointers and Functions
CO2 Develop C program for Linear data structure operations and its applications
CO3 Experiment with File Manipulation concepts
CO4 Develop programs using various sorting algorithms . Develop programs using different searching methods

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Write a program to search an element in a two-dimensional array using linear search.
2	Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method
3	Write a program to perform following operations on tables using functions only (a) Addition (b) Subtraction (c) Multiplication (d) Transpose
4	Using iteration & recursion concepts write the programs for Quick Sort Technique
5	Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.
6	Write a program for swapping of two numbers using 'call by value' and 'call by reference strategies.
7	Write a program to implement binary search tree. (Insertion and Deletion in Binary search Tree)
8	Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list
9	Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file.
10	Create a linked list and perform the following operations on it (a) add a node (b) Delete a node

Text Books:
- Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
- Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orient Longman.

Reference Books:
- Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications",
- Mcgrraw- Hill International Student Edition, New York.
- Mark Allen Weiss Data Structures and Algorithm Analysis In C, Addison- Wesley, (An Imprint Of Pearson Education), Mexico City.Prentice- Hall Of India Pvt. Ltd., New Delhi.
- Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Prentice- Hall of India Pvt. Ltd., New Delhi.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO2	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO3	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO4	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1

Program: BCA					Semester: 2nd		
Course Title: DIGITAL ELECTRONICS					Course Code: BCA-202		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: This course provides an introduction to the control of engineering systems using microprocessors, sensors and actuators. Within this context it introduces the fundamentals of combinational logic, Boolean algebra, digital arithmetic, sequential logic, and microprocessor instruction set architecture and I/O.

Course Outcomes

CO:1 Convert different type of codes and number systems which are used in digital transmission and computer systems.

CO:2 Apply the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

CO:3 Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO:4 Design different types of with and without memory element digital electronic circuits for particular operation, within the real time of economic, performance, efficiency, user friendly and environmental constraints.

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Number system and their inter conversion, binary addition sustraction,1's and 2's compliments and their application , BCD codes, Excess-3 codes, Gray codes.Error Detecting codes.	10 Hours
2	Logic Gates, Universal gates ,Demorgan's Law, min term and maxterm, Minimization of logic gates using K- map method.	05 Hours
3	Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, adder, decoders, encoders, multiplexers, demultiplexers.	05 Hours
4	Sequential circuits, Flip flops, SR flip flop JK flip flop.D Flip flop and T flip flop. Registers and counters: Shift registers, ripple counter, synchronous counter.	10 Hours
5	Memory and programmable logic: Introduction, Memory organisation, Classification and characteristics of memories, Sequential memories, RAM, ROM, PLA, and PAL.	10 Hours

Text Books:
- M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education

Reference Books:
- Hill & Peterson, "Switching Circuit & Logic Design", Wiley

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Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	1	2	-	-	-	-	-	2	1	-	-	-	1
CO2	2	1	-	1	2	-	-	-	-	-	2	1	-	-	-	1
CO3	2	1	-	1	2	-	-	-	-	-	2	1	-	-	-	1
CO4	2	1	-	1	2	-	-	-	-	-	2	1	-	-	-	1

Program: BCA					Semester: 2nd		
Course Title: OPERATING SYSTEMS					Course Code: BCA-203		
L		T	P	CH	CP	Int. A	ESE	Total
3		-	-	3	3	45	30	75

Course Description: Operating systems (OS) is the software that supports a computer's basic functions, such as scheduling tasks, executing applications, and controlling peripherals. Computer scientists should be aware of how kernels handle system calls, paging, scheduling, context-switching, filesystems and internal resource management. Understanding operating systems and run time systems becomes especially important when programming an embedded system without an operating system.

Course Outcomes

CO1 Identify the role of Operating System. To understand the design of control unit.
CO2 Understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems.
CO3 Describe the role of paging, segmentation and virtual memory in operating systems.
CO4 Description of protection and security and also the Comparison of UNIX and Windows based OS.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Introductory Concepts: Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service system calls, system programs.	10 Hours
2	Process management: Process concepts, Process states and Process Control Block. CPU Scheduling: Scheduling criteria, Levels of Scheduling, Scheduling algorithms, Multiple processor scheduling. Deadlocks: Deadlock characterization, Deadlock prevention and avoidance, Deadlock detection and recovery, practical considerations.	10 Hours
3	Concurrent Processes: Critical section problem, Semaphores, Classical process co-ordination problems and their solutions, Inter-process Communications.	05 Hours
4	Storage Management: memory management of single-user and multiuser operating system, partitioning, swapping, paging and segmentation, virtual memory, Page replacement Algorithms, Thrashing.	05 Hours
5	Device and file management: Disk scheduling, Disk structure, Disk management, File Systems: Functions of the system, File access and allocation methods, Directory Systems: Structured Organizations, directory and file protection mechanisms.	10 Hours

Text Books:
- Silberschatz A., Galvin P.B.,and Gagne G., "Operating System Concepts", John Wiley & Sons, Inc.,New York.
- Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.

Reference Books:
- Deitel, H.M., "Operating Systems", Addison- Wesley Publishing Company, New York.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	1	1	-	-	-	-	-	2	2	2	2	2	1
CO2	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO3	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO4	2	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1

Program: BCA					Semester: 1st		
Course Title: OPERATING SYSTEM (LINUX) LAB					Course Code: BCA-203P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: OPERATING SYSTEM (LINUX) LAB Course designed for people who are new to Linux and who want to develop a good working knowledge of the operating system using both the command-line and graphical user interface. You will explore the same tools and practice techniques used by Linux end users and system administrators every day. Areas of instruction include Linux software and hardware, the boot process, file and file system management, disk management, and working with text files. After completing this course, you should be able to competently work with any major Linux distribution.

Course Outcomes

CO1 To demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.
CO2 To evaluate the concept of shell scripting programs by using an AWK and SED commands.
CO3 To create the directory, how to change and remove the directory.
CO4 To analyze the process of how the parent and child relationships. To understand the concept of client-server communication by using sockets.

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Basic Linux Commands: NAME ls - list directory contents SYNOPSIS ls [OPTION]... [FILE]... DESCRIPTION List information about the FILEs (the current directory by default). Sort entries alphabetically if none of -cftuSUX nor --sort.
2	Mandatory arguments to long options are mandatory for short options too. -a, --all do not hide entries starting with . -A, --almost-all do not list implied . and .. --author print the author of each file -b, --escape print octal escapes for nongraphic characters --block-size=SIZE use SIZE-byte blocks
3	-B, --ignore-backups do not list implied entries ending with ~ -c with -lt: sort by, and show, ctime (time of last modification of file status information) with - l: show ctime and sort by name otherwise: sort by ctime -C list entries by columns --color[=WHEN] control whether color is used to distinguish file types. WHEN may be `never', `always', or `auto'
4	-d, --directory list directory entries instead of contents

	-D, --dired	generate output designed for Emacs' dired mode
	-f	do not sort, enable -aU, disable -lst
	-F, --classify	append indicator (one of */=@|) to entries
5	--format=WORD	across -x, commas -m, horizontal -x, long -l, single-column -1, verbose -l, vertical -C
	--full-time	like -l --time-style=full-iso
	-g	like -l, but do not list owner
	-G, --no-group	inhibit display of group information
	-h, --human-readable	print sizes in human readable format (e.g., 1K 234M 2G)
6	--si	likewise, but use powers of 1000 not 1024
	-H, --dereference-command-line	follow symbolic links on the command line
	--indicator-style=WORD	append indicator with style WORD to entry names: none (default), classify (-F), file-type (-p)
	-i, --inode	print index number of each file
7	-I, --ignore=PATTERN	do not list implied entries matching shell PATTERN
	-k	like --block-size=1K
	-l	use a long listing format
	-L, --dereference	when showing file information for a symbolic link, show information for the file the link references rather than for the link itself
	-m	fill width with a comma separated list of entries
	-n, --numeric-uid-gid	like -l, but list numeric UIDs and GIDs
8	-N, --literal	print raw entry names (don't treat e.g. control characters specially)
	-o	like -l, but do not list group information
	-p, --file-type	append indicator (one of /=@|) to entries
	-q, --hide-control-chars	print ? instead of non graphic characters
9	--show-control-chars	show non graphic characters as-is (default unless program is `ls' and output is a terminal)
	-Q, --quote-name	enclose entry names in double quotes
	--quoting-style=WORD	use quoting style WORD for entry names: literal, locale, shell, shell-always, c, escape
	-r, --reverse	reverse order while sorting
	-R, --recursive	list subdirectories recursively
	-s, --size	print size of each file, in blocks
	-S	sort by file size
10	--sort=WORD	extension -X, none -U, size -S, time -t, version -v status -c, time -t, atime -u, access -u, use -u
	--time=WORD	show time as WORD instead of modification time: atime, access, use, ctime or status; use specified time

	as sort key if --sort=time	
	--time-style=STYLE	show times using style STYLE: full-iso, long-iso, iso, locale, +FORMAT
		FORMAT is interpreted like `date'; if FORMAT is FORMAT1FORMAT2, FORMAT1 applies to non-recent files and FORMAT2 to recent files; if STYLE is prefixed with `posix-', STYLE takes effect only outside the POSIX locale
	-t	sort by modification time
11	-T, --tabsize=COLS	assume tab stops at each COLS instead of 8
	-u	with -lt: sort by, and show, access time with -l: show access time and sort by name otherwise: sort by access time
	-U	do not sort; list entries in directory order
	-v	sort by version
12	-w, --width=COLS	assume screen width instead of current value
	-x	list entries by lines instead of by columns
	-X	sort alphabetically by entry extension
13	-1	list one file per line
	--help	display this help and exit
	--version	output version information and exit

Text Books:
- Silberschatz A., Galvin P.B.,and Gagne G., "Operating System Concepts", John Wiley & Sons, Inc.,New York.
- Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.

Reference Books:
- Deitel, H.M., "Operating Systems", Addison- Wesley Publishing Company, New York.

Assessment Process (Internal)
Continuous Assessment (CA) = 15 Marks in the form of:
Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	1	1	-	-	-	-	-	2	2	2	2	2	1
CO2	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO3	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO4	2	2	-	1	2	-	-	-	-	-	2	2	2	2	2	1

Program: BCA					Semester: 2nd		
Course Title: MATHEMATICS- II					Course Code:BCA-204		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: Topics include the real number system; first degree equations and inequalities; polynomials; applications of factoring, statistics, probability and geometry; functions; relations; graphs, quadratic equations and inequalities. Students will master algebraic skills essential for the study of higher mathematics.

Course Outcomes

CO1: Apply the concepts of sets, relations and functions to simple problems arising from information systems.
CO2: Relate set theoretic concepts and logical concepts to solve probabilistic problems and simple systems understand the partial derivatives of a function of several variables at a point; be able to find these; and understand the relationship between these notions.
CO3: Find the co ordinates of the midpoint of a line. Understand the relationship between parallel and perpendicular lines.
CO4: Apply concepts and solve a variety of applied real-world problems using appropriate multiple-variable calculus tools and techniques.

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Propositions and logical operators, Truth tables and propositions generated by a set. Equivalence and implications, Laws of logic, Mathematical system, Proposition over a universe, Mathematical induction, Quantifiers	10 Hours
2	Binary operations on a non empty set, Groups, Subgroups, Normal Subgroups, Cosets, Factor groups, Rings, Sub rings, Ideals, Factor rings, Prime ideals, Minimal ideal, Fields, direct product of groups, Isomorphism of groups and rings (definitions and examples only)	10 Hours
3	Addition and multiplication of matrices, Laws of matrix algebra, Singular and non singular matrices, Inverse of a matrix	05 Hours
4	Rank of a matrix, Rank of the product of two matrices, Systems of linear equations i.e. AX=0 and AX=B , Characteristic equations of a square matrix, Cayley-Hamilton Theorem, Eigen values and eigen vectors,	05 Hours
5	Eigen values and eigen vectors of symmetric skew symmetric, Hermitian and skew – Hermitan matrices, Diagonalization of a square matrix.	10 Hours

Text Books:
      Babu Ram : Discrete Mathematics
      Shanti Naryana : A text book of matrices

Reference Books:
      Babu Ram : Discrete Mathematics
      Shanti Naryana : A text book of matrices

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	2	-	-	-	-	-	2	2	2	2	2	2
CO2	3	2	-	2	2	-	-	-	-	-	2	2	2	2	2	2
CO3	3	2	-	2	2	-	-	-	-	-	2	2	2	2	2	2
CO4	3	2	-	2	2	-	-	-	-	-	2	2	2	2	2	2

Program: BCA					Semester: 2nd		
Course Title: Oral & Written communication					Course Code: ENG-201		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Students practice the techniques of critical reading and thinking, of expository writing, and of oral expression. They develop and apply these skills through introductory study of a broad range of globally relevant issues. Satisfies GE category A1 (Written and Oral Analysis). Prerequisites: completion of GE categories A2 and A3. The course is also a lower division requirement for students majoring in Global Studies. The class is made up, therefore, of two groups: Global Studies majors and students from other majors seeking to fulfill the Area A1 General Education requirement. To meet the needs of both groups, the course focuses on the development of skills in oral presentation and writing intended to prepare all students for successful upper division study in any field. To meet the special needs of the Global Studies majors, the vehicle for developing these general skills is material related to international affairs and intercultural understanding.

Course Outcomes

CO1 To practice and improve effective listening, writing, and speaking.
CO2 To present an oral message clearly and effectively using relevant and adequate supporting evidence;
CO3 To express and advocate ideas clearly and effectively both orally and in writing and enhance skills in reading, understanding, and discussing texts
CO4 To support oral and written arguments with relevant and adequate evidence, distinguish information that is empirical, from information that is subjective and interpretive, enhance ability to effectively use print and web sources.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Developing Writing skills: Paragraph Writing -Prewriting, writing, post writing, Note-making, Précis Writing, Meetings: Agenda & Minutes, Advertising; Purpose, Types, Tips ,E-mail writing, Business letters- claim and adjustment letters, inviting quotations/tenders.	10 Hours
2	Personality Development: Personality–Meaning, Types, Significance of Communication in Personality Development, Role of body language. Stress Management- Introduction to Stress, Causes of Stress, Remedies. Motivation- Introduction to Motivation, Relevance and types of Motivation, Principles. Leadership- Concept, Function, Communication a key to Leadership.	10 Hours
3	Oral Presentation Techniques: Objectives, Structure (Planning, Preparation, Practice, Performance) ,Tips for a successful presentation. Telephonic skills - Dealing with difficult calls and callers, skills for making& receiving calls, Problems of telephonic conversation.	10 Hours
4	Report Writing: structure, types, formats, drafting of various types of report, Presentation of reports. Resume Writing: planning, organizing contents, layout, guidelines for good resume. Covering Letter.	10 Hours

Text Books:
- N.D. Turton and J.B. Healon. Dictionary of Common Errors. Glassgow: Longman Publishers, 1996.
- Alan, Barker. Improve Your Communication Skills. New Delhi: Kogan Page India Ltd., 200
- Lesikar, Petit, Business Communication, All India Traveler bookseller.
- Pal, Rajendra & Korlahalli, Essentials of Business Communication, Sultan Chand & Sons
- Bovee, Thill and Chaturvedi, Business Communication, Pearson Education

Reference Books:
- John Sealey. The Oxford Guide to Effective Writing and Speaking. London: Oxford Press, 1987.
- Krishna Mohan and Meera Benerji. Developing Communication Skills. New Delhi: McMillan, 1990.
- Allan, Pease. Body Language. London, Sheldon Press. Reprinted in India, Competition Review, New Delhi, 2007.
- Lillian, Chaney, Intercultural Business Communication, Pearson Education.
- Chaturvedi, Mukesh, Business Communication: Concepts, Cases & Applications, Pearson Education.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO2	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO3	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO4	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-

Program: BCA					Semester: 2nd		
Course Title: Oral & Written communication LAB					Course Code: ENG-201P		
L		T	P	CH	CP	Int. A	ESE	Total
-		-	1	2	1	15	10	25

Course Description: To provide tools that are critical for effective oral & written communication, develop 'musts' of effective communication skills including email communication, assertive skills – i.e. the art of being pleasantly polite, To develop the skill to write in a clear, reader friendly way which give results and enable the participants to learn the technology of fine writing emails.

Course Outcomes

CO1: Improvement in language competence and Acquisition of language inside and outside the classroom
CO2: Removal of barriers between languages; and between languages and subjects.
CO3: Better understanding of socio-cultural codes resulting in individual, aesthetic and moral growth
CO4 Use correct mechanics such as grammar, spelling, and punctuation. Select and incorporate appropriate supporting materials and effectively adjust their writing styles to appropriately address the audience

Sr No.	Experiment Title
1	Group Discussion
2	Just a minutes session: Speaking Extempore for one minutes on given topics
3	Reading aloud of newspaper headlines and important articles.
4	Improving pronunciation through tongue twisters.
5	Mannerism or Etiquette.
6	Mock Interview
7	Preparing PPTs

Text Books:
- Anderson, P.V, Technical Communication, Thomson Wadsworth , Sixth Edition, New Delhi, 2007.
- Lesikar, Petit, Business Communication, All India Traveler bookseller.
- Pal, Rajendra & Korlahalli, Essentials of Business Communication, Sultan Chand & Sons
- Bovee, Thill and Chaturvedi, Business Communication, Pearson Education

Reference Books:
- Prakash, P, Verbal and Non-Verbal Reasoning, Macmillan India Ltd., Second Edition, New Delhi, 2004
- Lillian, Chaney, Intercultural Business Communication, Pearson Education.
- Chaturvedi, Mukesh, Business Communication: Concepts, Cases & Applications, Pearson Education.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO2	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO3	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-
CO4	1	-	-	1	-	-	-	-	3	-	-	2	-	-	-	-

Program: BCA					Semester: 3rd		
Course Title: Software Engineering					Course Code: BCA-301		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	5	4.5	60	40	100

Course Description: Software Engineering (SE) comprises the core principles consistent in software construction and maintenance: fundamental software processes and life-cycles, mathematical foundations of software engineering, requirements analysis, software engineering methodologies and standard notations, principles of software architecture and re-use, software quality frameworks and validation, software development, and maintenance environments and tools. An introduction to object-oriented software development process and design. Topics include: iterative development, interpretation of requirements and use case documents into code; application of design notation in UML and use of commonly-used design patterns. Current industry-strength programming languages, technologies and systems feature highly in the practical components, electives and projects of the course, but they are also taught with a view to understanding and applying principles underlying their more ephemeral character.

Course Outcomes:

CO1. Knowledge of basic SW engineering methods and practices, and their appropriate application. . A general understanding of software process models such as the waterfall and evolutionary models.

CO2. Understanding of software requirements and the SRS documents. Understanding of the role of project management including planning, scheduling, risk management, etc.

CO3. Describe data models, object models, context models and behavioural models. Understanding of different software architectural styles.

CO4. Understanding of implementation issues such as modularity and coding standards. Understanding of approaches to verification and validation including static analysis, and reviews. Understanding of software testing approaches such as unit testing and integration testing and describes software measurement and software risks.

Unit	Topic	Hours
1	Software Crisis – problem and causes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models. Software Project Planning: Cost estimation: COCOMO model, Putnam Resource Allocation Model, Risk management, project scheduling, personnel planning, team structure, Software configuration management, quality assurance, project monitoring.	10 Hours
2	Software Requirement Analysis and Specifications: Structured Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements	10 Hours
3	Software Design: Design fundamentals, problem partitioning and abstraction, design methodology, Cohesion & Coupling, Classification of Cohesiveness & Coupling.	05 Hours

	Coding: Programming style, structured programming.	
4	Software Testing: Testing fundamentals, Functional testing: Boundary Value Analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Control flow based and data flow based testing, loop testing;	05 Hours
5	Software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing. Software Maintenance: Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.	10 Hours

Text Books:
- Pressman R. S., "Software Engineering – A Practitioner's Approach", Tata McGraw Hill.
- Jalote P., "An Integrated approach to Software Engineering", Narosa.

Reference Books:
- Sommerville, "Software Engineering", Addison Wesley.
- Fairley R., "Software Engineering Concepts", Tata McGraw Hill.
- James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	2	1	1	-	-	1	2	2	2	2	2	1
CO2	3	2	-	2	2	1	1	-	-	1	2	2	2	2	2	1
CO3	3	2	-	2	2	1	1	-	-	1	2	2	2	2	2	1
CO4	3	2	-	2	2	1	1	-	-	1	2	2	2	2	2	1

Program: BCA					Semester: 3rd		
Course Title: C++ and Advanced Data Structure					Course Code: BCA-302		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Data Structures are used to store and manage data in an efficient and organised way for faster and easy access and modification of Data. Some of the basic data structures are Arrays, Linked List, Stacks, and Queues etc.
This page will contain some of the complex and advanced Data Structures like Disjoint Sets, Self-Balancing Trees, and Segment Trees etc.

Course Outcomes

CO1 Understand the classification of data structures and Knowledge of basic and dynamic data structures. Compare and contrast various data structures and design

CO2 Techniques in the area of Performance and Memory Representation. Ability to evaluate algorithms and data structures in terms of

CO3 Time and complexity of basic operations. Ability to analyze algorithms for stack, queue and linked list, Trees, and graphs and compare their Performance and tradeoffs. Incorporate data structures into the applications such as binary search trees, AVL tree and B trees. Ability to implement Data Structure Traversal such as Array,

CO4 Apply and implement learned algorithm design techniques Data structures to solve problems. Understand the various searching and sorting techniques.

Theory		**3Hrs/Weeks**
Unit	Topic	Hours
1	Tree: Header nodes, Threads, Binary search trees, Searching, Insertion and deletion in a Binary search tree, AVL search trees, Insertion and deletion in AVL search tree, m-way search tree, Searching, Insertion and deletion in an m-way search tree, B-trees, Searching, Insertion and deletion in a B-tree, Huffman's algorithm, General trees.	10 Hours
2	Graphs: Warshall's algorithm for shortest path, Dijkstra algorithm for shortest path, Operations on graphs, Traversal of graph, Topological sorting.	05 Hours
3	Sorting: Internal & external sorting, Radix sort, Quick sort, Heap sort, Merge sort, Tournament sort, Comparison of various sorting and searching algorithms on the basis of their complexity.	10 Hours
4	Files: Introduction Attributes of a file, Classification of files, File operations, Comparison of various types of files,	05 Hours
5	File organization: Sequential, Indexed-sequential, Random-access file. Hashing: Introduction, Collision resolution	10 Hours

Text Books:
1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orientlongman.

Reference Books:
1. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications",Mcgrraw- Hill International Student Edition, New York

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2
CO2	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2

Program: BCA					Semester: 3rd		
Course Title: C++ & Advanced Data Structure LAB					Course Code: BCA-302P		
L		T	P	CH	CP	Int. A	ESE	Total
-		-	2	4	2	15	10	25

Course Description: C++ Data Structures: A Laboratory Course exemplifies the active learning experience. With a dynamic learn-by-doing focus, this laboratory manual encourages students to explore data structures by implementing them, a process through which students discover how data structures work and how they can be applied. Providing a framework that offers feedback and support, this text challenges students to exercise their creativity in both programming and analysis. Topics covered include: Text ADT, BlogEntry ADT, Stack ADT, Heap ADT, Weighted Graph ADT, and much more!

Course Outcomes

CO1: Implement List ADTs and their operations.
CO2: Develop programs for sorting.
CO3: Develop programs for implementing trees and their traversal operations.
CO4: Implement graph traversal algorithms. Apply algorithm design techniques.

Sr No.	Experiment Title
1	What are the minimum and maximum numbers of elements in a heap of height h?
2	Given a min-heap, how would you find the max element? What is the complexity of such an algorithm?
3	Insert the following numbers into a heap for an in-place sort in descending order: 3, 5, 2, 9, 20
4	Algorithms for inserting and deleting an entry in a heap?
5	Algorithms for inserting, deleting and finding a key in a splay tree?
6	Discuss the sorting algorithms covered in the class.
7	Give an efficient algorithm to find the first non-repeated character in a string.
8	Give an efficient algorithm to find the first repeated character in a string.
9	Given a directed graph, give an algorithm to detect whether there is a cycle.
10	Given an undirected graph, give an algorithm to detect whether there is a cycle.

Text Books:
1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orientlongman.

Reference Books:
1. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications",Mcgrraw- Hill International Student Edition, New York

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2
CO2	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	2

Program: BCA						Semester: 3rd		
Course Title: Introduction To Database System						Course Code: BCA-303		
L		T	P	CH	CP	Int. A	ESE	Total
3		-	-	3	3	45	30	75

Course Description: The course covers fundamental techniques for developing data management and data analytics applications. The main part of the course deals with traditional relational database processing, including the theory and practice of modelling and querying a database.

Course Outcomes

CO1: Give an introduction about DBMS, data models, a schema, E-R diagram, relational database and benefits of database.

CO2: Able to design a good database using normalization, decomposition and functional dependency. Understand the concepts of database architecture, client server architecture, parallelism concepts and distributed database concepts

CO3: Learn about indexes, sequences, data integrity, creating and maintaining tables and user privileges.

CO4: Understand the basic concepts of PL/SQL programming, cursors, triggers, packages, procedures, functions and transactions

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Basic Concepts – Data, Information, Records and files. Traditional file –based Systems-File Based Approach-Limitations of File Based Approach, Database Approach-Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Advantages and Disadvantages of DBMS.	10 Hours
2	Roles in the Database Environment - Data and Database Administrator, Database Designers, Applications Developers and Users. Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances. Data Independence – Logical and Physical Data Independence. Classification of Database Management System,	10 Hours
3	Centralized and Client Server architecture to DBMS. Data Models: Records- based Data Models, Object-based Data Models, Physical Data Models and Conceptual Modeling.	10 Hours
4	Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams., Basic Concepts of Hierarchical and Network Data Model.	05 Hours

5	Relational Data Model:-Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations, Base Tables and Views.	05 Hours

Text Books:
- Elmasri & Navathe, "Fundamentals of Database Systems", 5th edition, Pearson Education.

Reference Books:
- Thomas Connolly Carolyn Begg, "Database Systems", 3/e, Pearson Education
- C. J. Date, "An Introduction to Database Systems", 8th edition, Addison Wesley N. Delhi.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO2	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2

Program: BCA					Semester: 3rd		
Course Title: Introduction to Database System LAB					Course Code: BCA-303P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

Course Outcomes

CO1 Apply the basic concepts of Database Systems and Applications.
CO2.Use the basics of SQL and construct queries using SQL in database creation and interaction.
CO3 Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
CO4 Analyze and Select storage and recovery techniques of database system.

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Create Table, SQL for Insertion, Deletion, Update and Retrival using aggregating functions.
2	Write Programs in PL/SQL, Understanding the concept of Cursors.
3	Write Program for Join, Union & intersection etc.
4	Creating Views, Writing Assertions, Triggers.
5	Creating Forms, Reports etc.
6	Writing codes for generating read and update operator in a transaction using different situations.
7	Implement of 2PL concerning central algorithm. Developing code for understanding of distributed transaction processing.

Text Books:
- Elmasri & Navathe, "Fundamentals of Database Systems", 5th edition, Pearson Education.

Reference Books:
- Thomas Connolly Carolyn Begg, "Database Systems", 3/e, Pearson Education
- C. J. Date, "An Introduction to Database Systems", 8th edition, Addison Wesley N. Delhi.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3) Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO2	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2

Program: BCA					Semester: 3rd		
Course Title: Computer Networks					Course Code: BCA-304		
L	T	P	CH	CP	Int. A	ESE	Total
3	1	-	4	3.5	60	40	100

Course Description: This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in layered network architecture, error detection and correction mechanisms in Data Link layer, multiple access protocols, ip addressing, routing in Network layer, different routing protocols, concepts of process to process delivery in Transport layer, congestion control techniques, different Application layer protocols and some modern techniques of communication. The course is supplemented by a practical component covered in CS692 concurrently.

Course Outcomes

CO1 Describe the basis and structure of an abstract layered protocol model. Independently understand basic computer network technology.

CO2 Identify the different types of network topologies and protocols. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

CO3 Identify the different types of network devices and their functions within a network .Understand and building the skills of subnetting and routing mechanisms.

CO4 Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation. Understand how the Internet works today. Conversant with primitives of network application programming

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Introduction to Computer Communications and Networking Technologies; Uses of Computer Networks; Network Devices, Nodes, and Hosts; Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; Network Applications and Application Protocols; Computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server Model, Peer-to-Peer Model, Web-Based Model, Network Architecture and the OSI Reference Model; Example Networks: The Internet, X.25, Frame Relay, ATM;	12 Hours
2	Analog and Digital Communications Concepts: Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Digital Carrier Systems; Guided and Wireless Transmission Media; Communication Satellites; Switching and	08 Hours

	Multiplexing; Dialup Networking; Analog Modem Concepts; DSL Service;	
3	Data Link Layer: Framing, Flow Control, Error Control; Error Detection and Correction; Sliding Window Protocols; Media Access Control: Random Access Protocols, Token Passing Protocols; Token Ring;	10 Hours
4	Introduction to LAN technologies: Ethernet, switched Ethernet, VLAN, fast Ethernet, gigabit Ethernet, token ring, FDDI, Wireless LANs; Bluetooth; Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways;	05 Hours
5	Network Layer and Routing Concepts: Virtual Circuits and Datagrams; Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, Hierarchical Routing; Congestion Control Algorithms; Internetworking; Network Security Issues: Security threats; Encryption Methods; Authentication; Symmetric –Key Algorithms; Public-Key Algorithms;	05 Hours

Text Books:
- Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", CENGAGE Learning.
- Andrew S. Tanenbaum, "Computer Networks", Pearson Education.

Reference Books:
- James F. Kurose, Keith W. Ross, "Computer Networking", Pearson Education
- Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	1	1	2	2	-	1	2	2	2	2	2	2
CO2	3	2	1	2	1	1	2	2	-	1	2	2	2	2	2	2
CO3	3	2	1	2	1	1	2	2	-	1	2	2	2	2	2	2
CO4	3	2	1	2	1	1	2	2	-	1	2	2	2	2	2	2

Program: BCA					Semester: 3rd		
Course Title: Numerical Analysis					Course Code: BCA-305		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: Treatment of numerical methods including numerical integration, numerical solution of equations and systems of equations, approximation of functions, numerical solution of differential equations, applications and computer implementation of numerical methods.

Course Outcomes

CO1 Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
CO2 Apply numerical methods to obtain approximate solutions to mathematical problems.
CO3 Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
CO4 Analyse and evaluate the accuracy of common numerical methods.

Theory   **4Hrs/Weeks**

Unit	Topic	Hours
1	Finite Differences operators and their relations. Finding the missing terms and effect of error in a difference tabular values, Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals: Newton's divided difference, Lagrange's Interpolation formulae, Hermite Formula.	10 Hours
2	Central Differences: Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula. Probability distribution of random variables, Binomial distribution, Poisson's distribution, Normal distribution: Mean, Variance and Fitting.	10 Hours
3	Numerical Differentiation: Derivative of a function using interpolation formulae as studied in Sections –I & II. Eigen Value Problems: Power method, Jacobi's method, Given's method, House-Holder's method, QR method, Lanczos method.	10 Hours
4	Numerical Integration: Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one- third and three-eighth rule, Chebychev formula, Gauss Quadrature formula. Numerical solution of ordinary differential equations: Single step methods-Picard's method. Taylor's series method, Euler's method, Runge-Kutta Methods. Multiple step methods; Predictor-corrector method, Modified Euler's method, Milne-Simpson's method.	10 Hours

Text Books:
- M.K. Jain, S.R.K.Lyengar, R.K. Jain : Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996
- M.K. Jain, S.R.K. Lyengar, R.K. Jain : Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999
- C.E. Froberg : Introduction to Numerical Analysis (2nd Edition).

Reference Books:
- Melvin J. Maaron : Numerical Analysis-A Practical Approach, Macmillan Publishing Co., Inc., New York
- R.Y. Rubnistein : Simulation and the Monte Carlo Methods, John Wiley, 1981

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	2
CO2	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	2
CO3	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	2
CO4	3	2	-	1	2	-	-	-	-	-	2	2	2	2	2	2

BCA 2nd Year / 4th Semester

Program: BCA					Semester: 4th		
Course Title: Computer Graphics					Course Code: BCA-401		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Computer graphics are an intrinsic component of many modern software applications and are often essential to the success of these applications. The main objective of this module is to introduce to the students the concepts of computer graphics. It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics.

Course Outcomes

CO1 Have knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.

CO2 Have knowledge and understanding of geometrical transformations and 3D viewing.

CO3 Have knowledge and understanding of techniques for representing 3D geometrical objects.

CO4 Have knowledge and understanding of interaction techniques.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Overview of Computer Graphics: Historical background of Computer Graphics; Applications of Computer Graphics; Popular Graphics Software; Display devices: Pixel, Resolution, Aspect Ratio; Raster-Scan Systems and Display : CRT, Refresh Rate and Interlacing; Bit Planes, Color Depth and Color Palette, Frame Buffer, Video Controller, Raster-Scan Display Processor, Lookup Table, RGB Color Model, Color CRT monitors; Random-Scan Displays; Flat Panel Display : LCD, Plasma Panel; Graphics Monitors and Workstations; Popular Graphics Input Devices; Hard-Copy Devices;	10 Hours
2	Coordinate Representations; Graphics Primitives: Line Drawing Algorithms- DDA Algorithm, Bresenham's Algorithm; Different Line Styles; Circle-Generating Algorithms- Properties of Circles, Circle Drawing using Polar Coordinates, Bresenham's Circle Drawing Algorithm; Ellipse- Generating Algorithms; Anti-aliasing;	10 Hours
3	Geometric Transformations: Scaling, Translation, Rotation; Matrix Representations and Homogeneous Coordinates; Rotation Relative to an Arbitrary Point; Reflection; Shearing; Coordinate Transformation; Inverse	10 Hours

	Transformation; Affine Transformation; Raster Transformation; Composite Transformations; Fixed-point Scaling; Input Techniques: Pointing, Positioning, Rubber-band method, Dragging;	
4	Two-Dimensional Viewing: Window-to-Viewport Coordinate Transformation; Zooming; Panning; Clipping: Point Clipping, Line Clipping- Cohen-Sutherland line clipping, Mid-point Subdivision Line Clipping; Polygon Clipping – Sutherland-Hodgeman Polygon Clipping; Text Clipping;	05 Hours
5	Graphics in Three Dimensions: Displays in Three Dimensions, 3-D Transformations; 3-D Viewing: Viewing Parameters, Projections, Parallel and Perspective projection; Hidden Surfaces: Z-Buffer Method, Painter's Algorithm;	05 Hours

Text Books:
- "Computer Graphics", Donald Hearn, M. Pauline Baker, PHI
- "Computer Graphics", Apurva A. Desai, PHI, 2010

Reference Books:
- "Principles of Interactive Computer Graphics", Newmann & Sproull, McGraw Hill
- "Computer Graphics Principles & Practice", Foley etc. Addison Wesley.
- "Procedural Elements of Computer Graphics", Rogers, McGraw Hill.
- "Computer Graphics", Zhigang Xiang, Roy Plastock, Tata McGraw Hill.
- "Fundamentals of Computer Graphics and Multimedia", D.P. Mukherjee, PHI.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	2	2	-	-	-	-	-	2	2	2	2	2	-
CO2	3	-	1	2	2	-	-	1	-	-	2	2	2	2	2	1
CO3	3	-	1	2	2	-	-	1	-	-	2	2	2	2	2	1
CO4	3	-	1	2	2	-	-	1	-	-	2	2	2	2	2	1

Program: BCA					Semester: 4th		
Course Title: Computer Graphics LAB					Course Code: BCA-401P		
L		T	P	CH	CP	Int. A	ESE	Total
-		-	2	4	2	15	10	25

Course Description: This course contains 2D geometric transformations, Algorithms for clipping, 3D geometric and modeling transformation, Illumination models and surface rendering methods etc.

Course Outcomes

CO1: Using OpenGL for Graphics & programming User-interface issues
CO2: Concepts of 2D & 3D object representation, Implementation of various scan & clipping algorithms
CO3: 2D modelling & Implementation of illumination model for rendering 3D objects
CO4: Visibility detection & 3D viewing. Implementation of a project based on learned concepts

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Write a C program to implement Bresenhams line drawing algorithm.
2	Write a C program to implement the Line, Circle and ellipse attributes by drawing "House".
3	Write a C program to do two Dimensional transformations - Translation, Reflection, and Shear.
4	Write a C program to do two Dimensional transformations - Rotation (With and without pivot point), Scaling (With and without pivot point).
5	Write a C program to do composite 2D Transformations – Translation, Scaling, Rotation.
6	Write a C program to do composite 2D Transformations –fixed point scaling, fixed point rotation.
7	Write a C program to implement Cohen Sutherland 2D line clipping algorithm.
8	Write a C program to implement Sutherland – Hodgeman Polygon clipping Algorithm.
9	Write a C program to implement Bresenhams circle drawing algorithm.

Text Books:
    "Computer Graphics", Donald Hearn, M. Pauline Baker, PHI.
   "Computer Graphics", Apurva A. Desai, PHI, 2010

Reference Books:
   "Principles of Interactive Computer Graphics", Newmann & Sproull, McGraw Hill.
   "Computer Graphics Principles & Practice", Foley etc. Addison Wesley.
  "Procedural Elements of Computer Graphics", Rogers, McGraw Hill.

"Computer Graphics", Zhigang Xiang, Roy Plastock, Tata McGraw Hill.
"Fundamentals of Computer Graphics and Multimedia", D.P. Mukherjee, PHI.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	2	2	-	-	-	-	-	2	2	2	2	2	-
CO2	3	-	1	2	2	-	-	1	-	-	2	2	2	2	2	1
CO3	3	-	1	2	2	-	-	1	-	-	2	2	2	2	2	1
CO4	3	-	1	2	2	-	-	1	-	-	2	2	2	2	2	1

Program: BCA					Semester: 4th		
Course Title: Internet Technology					Course Code: BCA-402		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	5	4.5	60	40	100

Course Description: Internet Technologies presents the student with an introduction to the Internet and its services, applications and tools.World Wide Web and its facilities, applications and tools. Topics include Internet history, a survey of Internet-based facilities and applications (e.g., e-mail, web browsers, file transfer utilities, list servers, etc), and Web-based research and information resources. The World Wide Web service is emphasized and basic Web page creation with HTML is introduced.

Course Outcomes

CO1: To understand the internet applications, various tools for networking and internet connectivity.
CO2: Describe the models used to organize Internet technologies. Explain how the Internet is governed and the standards that are used.
CO3: A knowhow about how search engines work and produce results.
CO4 An insight to various internet protocols which help in internet.

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Internet and TCP/IP: Introduction to the Internet; Internet History, Internet Administration; Internet and Intranet; Internet Services; TCP/IP model and its protocols; IP addresses: IPv4; Subnetting IPv4addresses; Supernetting; Next generation Internet Protocol (IPv6); The need for IPv6; Packet Format; IPv6 Addresses; Extension Headers;	10 Hours
2	TCP/IPs Transport and Network Layer Protocols: Role of TCP, UDP, IP, and Port numbers; Format of TCP, UDP and IP; TCP services; TCP connection management; Remote Procedure Call; SCTP;	10 Hours
3	IP address resolution- DNS; Domain Name Space; DNS mapping; Recursive and Iterative resolution; Resource records; Mapping Internet Addresses to Physical Addresses; ARP, RARP, BOOTP, DHCP; ICMP; IGMP;	05 Hours
4	TCP/IP Application Level Protocols: Electronic Mail : Architecture; SMTP, MIME, POP, IMAP; Web Based Mail; File Access and Transfer: FTP, Anonymous FTP, TFTP, NFS; Remote Login using TELNET; Voice and Video over IP: RTP, RTCP, IP Telephony and Signaling, Resource Reservation and Quality of Service, RSVP;	10 Hours
5	Routing in Internet: RIP, OSPF, BGP; Internet Multicasting; Mobile IP; Private Network Interconnection: Network Address Translation (NAT), Virtual Private Network (VPN); Internet Management: SNMP; Internet Security: IPSec, E-Mail Security; Web Security; Firewalls; Digital Signatures;	05 Hours

Certificates;		

Text Books:
- Douglas E. Comer, "Internetworking with TCP/IP Volume – I, Principles, Protocols, and Architectures", Fourth Edition, Pearson Education.
- Andrew S. Tanenbaum, "Computer Networks", Pearson Education.

Reference Books:
- Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill.
- Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", CENGAGE Learning.
- James F. Kurose, Keith W. Ross, Computer Networking, a Top-Down Approach Featuring the Internet, Pearson Education.
- "Introduction to Data Communications and Networking", Wayne Tomasi, Pearson Education.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	-	-	-	1	-	2	1	2	2	2	2	1
CO2	2	1	1	2	-	-	-	1	-	2	1	2	2	2	2	1
CO3	2	1	1	2	-	-	-	1	-	2	1	2	2	2	2	1
CO4	2	1	1	2	-	-	-	1	-	2	1	2	2	2	2	1

Program: BCA					Semester: 4th		
Course Title: Mobile Computing					Course Code: BCA-403		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: With the increasing popularity of mobile devices, mobile computing has become part of our daily life. This course will cover various topics of mobile computing, networking, and systems, including but not limited to: applications of smartphones, cellular networks, embedded sensor systems, localization systems, energy efficiency of mobile devices, wearable and vehicular mobile systems, mobile security, virtual reality and augmented reality. We will discuss research papers from top conferences, brainstorm cool ideas, and build real mobile systems through team projects.

Course Outcomes

CO1 To understand concepts of Mobile Communication (Understand) and analyse next generation Mobile Communication System.
CO2 To understand network and transport layers of Mobile Communication.
CO3 Analyze various protocols of all layers for mobile and ad hoc wireless communication networks.
CO4 To understand IP and TCP layers of Mobile Communication.

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Introduction, issues in mobile computing, Characteristics of Mobile Computing, Structure of Mobile Computing, overview of wireless telephony: cellular concept.	05 Hours
2	GSM: air-interface, channel structure, CDMA, GPRS. Wireless Networking, Wireless LAN Overview: MAC issues, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP.	10 Hours
3	Data management issues, Hoarding techniques, data replication for mobile computers, adaptive clustering for mobile wireless networks, file system.	05 Hours
4	Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. The Future of Mobile Computing.	10 Hours
5	Mobile Adhoc networks (MANETs), Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV).	10 Hours

Text Books:
- J. Schiller, Mobile Communications, Addison Wesley.
- Charles Perkins, Mobile IP, Addison Wesley.

Reference Books:
- Charles Perkins, Ad hoc Networks, Addison Wesley.
- Upadhyaya, "Mobile Computing", Springer

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Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	2	1	1	-	1	-	-	1	-	2	2	2	-
CO2	2	-	-	2	1	1	-	1	-	-	1	-	2	2	2	-
CO3	2	-	-	2	1	1	2	1	-	2	1	-	2	2	2	-
CO4	2	-	-	2	1	1	2	1	-	2	1	-	2	2	2	-

Program: BCA					Semester: 4th		
Course Title: Introduction To .NET					Course Code: BCA-404		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course will cover the practical aspects of multi-tier application development using the .NET framework. The goal of this course is to introduce the students to the basics of distributed application development. We will introduce the students to Web Service development and .NET remoting. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, C#, ASP.NET, and ADO.NET. We will also cover service oriented architecture, design, performance, security, content managements systems and deployment issues encountered in building multi-tier distributed applications.

Course Outcomes

CO1 Understand the Microsoft .NET Framework and ASP.NET page structure
CO2 Design web application with variety of controls and access the data using inbuilt data access tools
CO3 Use Microsoft ADO.NET to access data in web Application and Configure, deploy Web Application
CO4 Develop secured web application

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	The Framework of .Net: Building blocks of .Net Platform (the CLR, CTS and CLS), Features of .Net, Deploying the .Net Runtime, Architecture of .Net platform, Introduction to namespaces & type distinction. Types & Object in .Net, the evolution of Web development.	10 Hours
2	Class Libraries in .Net, Introduction to Assemblies & Manifest in .Net, Metadata & attributes. Introduction to C#: Characteristics of C#, Data types: Value types, reference types, default value, constants, variables, scope of variables, boxing and unboxing.	10 Hours
3	Operators and expressions: Arithmetic, relational, logical, bitwise, special operators, evolution of expressions, operator precedence & associativity. Control constructs in C#: Decision making, loops. Classes & methods: Class, methods, constructors, destructors, overloading of operators & functions.	10 Hours
4	Inheritance & polymorphism: visibility control, overriding, abstract class & methods, sealed classes & methods, interfaces.	05 Hours

5	Advanced features of C#: Exception handling & error handling, automatic memory management, Input and output (Directories, Files, and streams).	05 Hours

Text Books:
- Introduction to C# using .NET By Robert J. Oberg, PHI, 2002.
- Programming in C# By E. Balaguruswamy, Tata McGraw Hill

Reference Books:
- The Complete Guide to C# Programming by V. P. Jain

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	-
CO2	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	3	1	2	3	1	1	-	-	-	2	2	2	2	2	3

Program: BCA					Semester: 4th		
Course Title: Introduction to Dot NET LAB					Course Code: BCA-404P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: The course builds upon the procedural and object-oriented programming logic tools from earlier courses. This course covers C# development using Visual Studio .NET and focuses on C# syntax, logic constructs, application development using windows forms, and the object-oriented nature of the language. Through the experience of creating these programs and methods the student will learn the fundamentals of C# programming to solve problems in various domains. Introduce to .Net IDE Component Framework, Programming concepts in .Net Framework, and creating website using ASP.Net Controls.

Course Outcomes

CO1 To know the framework of .NET and to review the OOPs concepts To understand the fundamental concepts of C#.NET and create user interactive web pages using ASP.Net.

CO2 Create simple data binding applications using ADO.Net connectivity. To utilize the XML and ADO.NET for web development and to produce dynamic

CO3 Performing Database operations for Windows Form and web applications.

CO4 Web pages to built web services for other applications

Practicle   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Write a simple program in c# to write a string on the screen
2	Write a program in C# to prompt the user for some input and then take some action.
3	Write a program in C# to demonstrate different kinds of arrays including jagged arrays.
4	Write a program to demonstrate boxing
5	Write a program to demonstrate how unary operators are used.
6	Write a program in C# to demonstrate how binary operators work
7	Write a program in C# to find out the range of number from 1-10 or 11-20 or 21-30 or less than 1
8	Write a program in C# to find out the number entered between 1 -3
9	Write a program in C# to override a method which calculates pay of an

	employees to take bonus into account.
10	Write a program in C# to ask a user to enter a choice to add, delete, modify or view address using methods for each functionality.
11	Write a program in C# to demonstrate and verify that the static constructor runs only one time, even though two instances of Class are created, and that it runs before the instance constructor runs.

Text Books:
- Introduction to C# using .NET By Robert J. Oberg, PHI, 2002.
- Programming in C# By E. Balaguruswamy, Tata McGraw Hill

Reference Books:
- The Complete Guide to C# Programming by V. P. Jain

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	2	2	1	1	-	-	-	2	2	2	2	2	-
CO2	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	1	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	3	1	2	3	1	1	-	-	-	2	2	2	2	2	3

Program: BCA					Semester: 4th		
Course Title: E-Commerce					Course Code: BCA-405		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	5	4.5	60	40	100

Course Description: This course focuses on principles of e-commerce from a business perspective, providing an overview of business and technology topics, business models, virtual value chains and social innovation and marketing strategies. In addition, some of the major issues associated with e-commerce—security, privacy, intellectual property rights, authentication, encryption, acceptable use policies, and legal liabilities—will be explored. Students will build their own web presence and market it using an online platform.

Course Outcomes

CO1 Understand the complexity of e-commerce and its many facets.
CO2 Explore how e-business and e-commerce fit together.
CO3 Identify the impact of e-commerce. Recognise the benefits and limitations of e-commerce.
CO4 Identify the main barriers to the growth and development of e-commerce in organizations

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Introduction: Electronic Commerce - Technology and Prospects, Definition of E- Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-commerce on business.	10 Hours
2	Network Infrastructure for E-Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY).	10 Hours
3	Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.	10 Hours
4	Encryption: Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.	05 Hours

	5	Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.	05 Hours

Text Books:
- Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.

Reference Books:
- Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	2	-	2	1	-	1	1	-	-	-	-	-	2
CO2	2	-	2	2	-	2	1	-	1	1	-	1	-	-	1	2
CO3	2	-	-	2	-	2	1	-	1	1	-	1	-	-	1	2
CO4	2	-	2	2	-	2	1	-	1	1	-	1	-	-	1	2

BCA 3rd Year / 5th Semester

Program: BCA					Semester: 5th		
Course Title: Introduction To Web Technologies					Course Code: BCA-501		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	5	4.5	60	40	100

Course Description: The focus in this course is on the World Wide Web as a platform for interactive applications, content publishing and social services. The development of web-based applications requires knowledge about the underlying technology and the formats and standards the web is based upon. In this course you will learn about the HTTP communication protocol, the markup languages HTML, XHTML and XML, the CSS and XSLT standards for formatting and transforming web content, interactive graphics and multimedia content on the web, client-side programming using Javascript.

Course Outcomes

CO1 Understand, analyze and apply the role of languages like HTML, DHTML,CSS, XML, JavaScript, VBScript, ASP, PHP and protocols in the workings of the web and web applications. Analyze a web project and identify its elements and attributes in comparison to traditional projects.

 CO2 Understand, analyze and create web pages using HTML, DHTML and Cascading Styles Sheets.

CO3 Understand, analyze and build dynamic web pages using JavaScript and VB Script (client side programming). Understand, analyze and build interactive web applications.

CO4 Understand, analyze and build web applications using PHP. Understand, analyze and create XML documents and XML Schema.

Theory		4 Hrs/Weeks
Unit	Topic	Hours
1	Introduction: Introduction to web, protocols governing the web, Cyber Law, web project, web team, Search Engines, Designing Strategies.	05 Hours
2	HTML: Introduction & History of HTML, list, table, images, forms, frames.	05 Hours
3	CSS: Introduction of CSS, External Style Sheet, CSS code, Properties. XML: XML, XML Schema, DTD, DOM, SAX.	10 Hours
4	Scripting: Java script: -Introduction, documents, forms, statements,	10

		Hours
5	Introduction of JSP, Introduction of COM / DCOM, Introduction of ASP, Introduction of PHP. Case Study: Implementing Web technologies in higher education.	10 Hours

Text Books:
- Xavier, C, " Web Technology and Design" , New Age International
- Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication.

Reference Books:
- Ramesh Bangia, "Internet and Web Design" , New Age International
- Bhave, "Programming with Java", Pearson Education

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	-
CO2	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	3	2	2	3	1	1	-	-	-	2	2	2	2	2	3

Program: BCA	Semester: 4th
Course Title: Mini project based on Web Technologies	Course Code:BCA-501P

Course Description: Students will gain experience in the development of Web based systems using an object oriented programming language and SQL. Students will learn to develop a web based system through an intensive hands-on project that requires students to apply real-world problem-solving skills to meet the challenge of developing a web based information system. Students will learn the basic principles of web based applications, MVC application design, how to apply object oriented design patterns, design a relational database, and write SQL queries to create, retrieve, update, and delete information in a database. The World Wide Web and its underlying technologies are increasingly gaining importance for the development of interactive Web applications using HTML5 CSS Javascript Bootstrap and more technologies. We have the widest list of innovative web based projects. Web based searching to web based project ideas for your research.

Course Outcomes

CO1 Students will be able to create an application using PHP and MySQL.
CO2 Students will be able to design and implement a user registration and management process for a web application.
CO3 Students will be able to demonstrate fundamental concepts in web application development such as Model View Control (MVC) and other OOP design patterns
CO4 Students will be able to demonstrate the ability to collaborate using source code management software.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3	2	1	1	-	-	2	2	2	3	2	2
CO2	3	3	2	2	2	2	1	1	-	-	2	1	2	3	2	1
CO3	3	3	2	2	3	2	1	1	-	-	2	2	2	3	2	2
CO4	3	3	2	2	3	2	1	1	-	-	2	2	2	3	2	2

Program: BCA						**Semester:** 5th		
Course Title: Multimedia System						**Course Code:** BCA-502		
L		T	P	CH	CP	Int. A	ESE	Total
4		-	-	4	4	60	40	100

Course Description: Multimedia data has become an indispensable part of our daily life and modern research projects. It's also one of the critical links in the ongoing unification of computing and communications. In this course, students will be introduced to principles and current technologies of multimedia systems, multimedia standards, and gain hands-on experience in this area. Issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image and video will be addressed.

Course Outcomes

CO1 Describe the types of media and define multimedia system.
CO2 Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).
CO3 Use and apply tools for image processing, video, sound and animation.
CO4 Apply methodology to develop a multimedia system and acquired knowledge in the field of multimedia in practice and independently continue to expand knowledge in this field.

Theory		**4 Hrs/Weeks**
Unit	Topic	Hours
1	Multimedia Basics, Multimedia Authoring and Tools: What is Multimedia?, Multimedia and Hypermedia, World Wide Web, Overview of Multimedia Software Tools, Further Exploration, Multimedia Authoring, Some Useful Editing and Authoring Tools, VRML. Graphics and Image Data Representation: Graphics/Image Data Types 60, Popular File Formats.	10 Hours
2	Concepts in Video and Digital Audio: Color Science, Color Models in Images, Color Models in Video. Types of Video Signals, Analog Video, Digital Video, Digitization of Sound, MIDI: Musical Instrument Digital Interface, Quantization and Transmission of Audio.	05 Hours
3	Image Compression Standards: The JPEG Standard, The JPEG2000 Standard, The JPEG-LS Standard, Bilevel Image Compression Standards. Basic Video Compression Techniques: Introduction to Video Compression, Video Compression Based on Motion Compensation, Search for Motion Vectors, H.261, H.263 303.	10 Hours
4	MPEG Video Coding: Overview, MPEG-1, MPEG-2, Object-Based Visual Coding in MPEG-4, Synthetic Object Coding in MPEG, MPEG-4 Object types, Profiles and Levels, MPEG-4 Part10/H.264, MPEG-7. Basic	10 Hours

	Audio & MPEG Audio Compression Techniques: ADPCM in Speech Coding, G.726 ADPCM, Vocoders, Psychoacoustics, MPEG Audio, Other Commercial Audio Codecs, future: MPEG-7 and MPEG-2.	
5	Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD), Multimedia over Wireless Networks. Content-Based Retrieval in Digital Libraries: How Should We Retrieve Images?, C-BIRD— A Case Study, Synopsis of Current Image Search Systems, Relevance Feedback. Quantifying Results, Querying on Videos, Querying on Other Formats, Outlook for Content-Based Retrieval.	05 Hours

Text Books:
1. Ze-Nian Li and M. S. Drew, "Fundamental of Multimedia", Pearson Education.
2. V. S. Subrahmanian, "Principles of Multimedia Database Systems", Morgan Kaufmann Punlication.

Reference Books:
1. K. R. Rao, Zoran S. Bojkovic, D. A. Milovanovic, "Introduction to Multimedia Communications", Wiley.
2. R. Steinmetz and K. Nahrstedt "Multimedia: Computing, Communication & Applications, Pearson Education.
3. C. T. Bhunia, "Multimedia and multimedia Communications", New Age International Publishers.
4. Prabhat K. Andheigh, Kiran Thakrar, "Multimedia Systems design', PHI.
5. Koegel Buford, "Multimedia Systems", Pearson Eduaction.
6. J. D. Gibson, 'Multimedia Communications: Directions and Innovations', Academic Press, Hard-court India.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4

CO1	2	-	-	2	-	-	1	-	-	-	1	1	-	-	-	2
CO2	2	-	-	2	1	-	1	-	-	-	1	1	-	-	-	2
CO3	2	1	2	2	-	-	1	2	-	-	1	1	1	1	1	2
CO4	2	1	2	2	-	-	1	2	-	-	1	1	1	1	1	2

Program: BCA					Semester: 5th		
Course Title: MANAGEMENT INFORMATION SYSTEM					Course Code: BCA-503		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: This course helps students see the connection between information systems (IS) and business performance. The use of information and communication technologies (ICT) by individuals and organisations dominates the business world. There is a fundamental change going on in the way that organisations run businesses and interact with each other. New types of infrastructure and applications are developed and utilized such as ERP (enterprise resource planning), IOS (inter-organisational systems), RFID (radio frequency identification), CRM (customer relationship management), to name a few.

Course Outcomes

CO1 Relate the basic concepts and technologies used in the field of management information systems.

CO2 Compare the processes of developing and implementing information systems. Outline the role of the ethical, social, and security issues of information systems.

CO3 Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.

CO4 Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Introduction to system and Basic System Concepts, Types of Systems, The Systems Approach, Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making, Sub-Systems of an Information system: EDP and MIS management levels, EDP/MIS/DSS.	10 Hours
2	An overview of Management Information System: Definition & Characteristics, Components of MIS, Frame Work for Understanding MIS: Information requirements & Levels of Management, Simon's Model of decision-Making, Structured Vs Un-structured decisions, Formal vs. Informal systems.	10 Hours
3	Developing Information Systems: Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development.	10 Hours
4	Functional MIS: A Study of Personnel, Financial and production MIS, Introduction to e-business systems, ecommerce – technologies, applications,	05 Hours

5	Decision support systems – support systems for planning, control and decision-making	05 Hours

Text Books:
- J. Kanter, "Management/Information Systems", PHI.
- Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.

Reference Books:
- James A. O'Brien, "Management Information Systems", Tata McGraw-Hill.
- James A. Senn, "Analysis & Design of Information Systems", Second edition, McGraw Hill.
- Robert G. Murdick & Joel E. Ross & James R. Claggett, "Information Systems for Modern Management", PHI.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	2	1	-	-	-	1	1	2	2	1	2
CO2	2	1	1	2	1	2	1	-	-	-	1	1	2	2	1	2
CO3	2	1	1	2	1	2	1	-	-	-	1	1	2	2	1	2
CO4	2	1	1	2	1	2	1	-	-	-	1	1	2	2	1	2

Program: BCA					Semester: 5th		
Course Title: Computer Organization					Course Code: BCA-504		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: This course qualitatively and quantitatively examines computer design trade-offs and teaches the fundamentals of computer architecture and organization, including CPU, memory, registers, arithmetic unit, control unit, and input/output components.

Course Outcomes

CO1 Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
CO2 Understand the principles and the implementation of computer arithmetic.
CO3 Learn about Primary and Secondary storage System.
CO4 Learn about parallel computer structure and Pipelining

Theory   **4 Hrs/Weeks**

Unit	Topic	Hours
1	Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement, Historical Perspective	10 Hours
2	Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing,	05 Hours
3	Machine Instructions and Programs *contd*.: Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions	05 Hours
4	Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB	10 Hours
5	Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control	10 Hours

Text Books:

- Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, TMH, 2002

Reference Books:

- Computer Organization & Architecture, William Stallings, 7th Edition, PHI, 2006.
- Computer Systems Design and Architecture, Vincent P. Heuring & Harry F. Jordan, 2nd Edition, Pearson Education, 2004.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	0	0	2	-	-	-	-	-	-	1	1	2	1	1	1
CO2	2	0	0	2	-	-	-	-	-	-	1	1	2	1	1	1
CO3	2	0	0	2	-	-	-	-	-	-	1	1	2	1	1	1
CO4	2	0	0	2	-	-	-	-	-	-	1	1	2	1	1	1

Program: BCA					Semester: 5th		
Course Title: Linux & Shell Programming					Course Code: BCA-505		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course explains the fundamental ideas behind the open source operating system approach to programming. Knowledge of Linux helps to understand OS level programming. Like the successful computer languages that came before, Linux is the blend of the best elements of its rich heritage combined with the innovative concepts required by its unique environment. This course involves kernel concepts, basics commands, shell scripting, file processing ,Socket programming ,Processes, Inter process communication. This course is presented to students by power point projections, course handouts, lecture notes, assignments, objective and subjective tests

Course Outcomes

CO1 Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.

CO2 Ability to write Shell Programming using Linux commands.

CO3 Ability to design and write application to manipulate internal kernel level Linux File System. Ability to develop IPC-API's that can be used to control various processes for synchronization.

CO4 Ability to develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Introduction to Linux: Linux distributions, Linux/Unix operating system, Linux/Unix architecture, Features of Linux/Unix, Accessing Linux system, Starting and shutting down system, Logging in and Logging out	10 Hours
2	Commands in Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands, etc.	10 Hours
3	Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, etc.,grep, sed. introducing regular expressions. Linux/Unix file system: Linux/Unix files, inodes and structure and file system, file system components, standard file system, file system types, file system mounting and unmounting	10 Hours
4	Processes in Linux : starting and stopping processes, initialization	05

		Processes, mechanism of process creation, rc and init files, job control - at, batch, cron, time, Signal handling.	Hours
5		Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating shell scripts.	05 Hours

Text Books:

- John Goerzen: Linux Programming Bible, IDG Books, New Delhi.
- Sumitabha Das: Your Unix - The Ultimate Guide, TMH.
- Richard Petersen: The Complete Reference – Linux, McGraw-Hill
- Yashwant Kanetkar: Unix & Shell programming - BPB

Reference Books:

- M.G.Venkateshmurthy: Introduction to Unix & Shell Programming, Pearson Education

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	2	2	1	1	1	2	-	1	1	2	-	-	2	2
CO2	3	-	2	2	1	1	1	2	-	1	1	2	-	-	2	2
CO3	3	-	2	2	1	1	1	2	-	1	1	2	-	-	2	2
CO4	3	-	2	2	1	1	1	2	-	2	2	2	2	2	2	2

Program: BCA					Semester: 5th		
Course Title: Linux & Shell Programming LAB					Course Code: BCA-405P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: Analyze, design, write, test, and debug shell scripts. Students learn basic shell scripting techniques and develop scripting skills needed for Unix/Linux System Administration courses. The bash shell is used

Course Outcomes

CO1 To know the basic concepts of Linux Operating System. Familiar with Linux commands.
CO2 Understand shell programming
CO3 Familiar with system administration
CO4 Understand various types of servers

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Study Experiment- UNIX basics
2	Basic Shell Programming (Fibonacci Series generation, Factorial of a given number, Checking for Armstrong number)
3	Designing a Arithmetic calculator
4	Generation of Multiplication table
5	Base Conversion (Decimal to Binary, Binary to Decimal)
6	Checking for a Palindrome of a number
7	Finding the information about the Login name and File name
8	Students Evaluation
9	Process Creation (Basics, Arithmetic operations on processes,
10	Displaying process ID, Creation of grandchild processes)
11	System calls (Usage of link(), Usage of dup(), Renaming a file)

Text Books:
- John Goerzen: Linux Programming Bible, IDG Books, New Delhi.
- Sumitabha Das: Your Unix - The Ultimate Guide, TMH.
- Richard Petersen: The Complete Reference – Linux, McGraw-Hill
- Yashwant Kanetkar: Unix & Shell programming - BPB

Reference Books:

- M.G.Venkateshmurthy: Introduction to Unix & Shell Programming, Pearson Education

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	2	2	1	1	1	2	-	1	1	2	-	-	2	2
CO2	3	-	2	2	1	1	1	2	-	1	1	2	-	-	2	2
CO3	3	-	2	2	1	1	1	2	-	1	1	2	-	-	2	2
CO4	3	-	2	2	1	1	1	2	-	2	2	2	2	2	2	2

Program: BCA					Semester: 2nd		
Course Title: Advanced Database Management Systems					**Course Code:** BCA-601		
L	T	P	CH	CP	Int. A	ESE	Total
3	1	-	4	4	60	40	100

Course Description: The course presupposes a basic knowledge of conceptual modelling for data base systems and implementation using relational DBMS and SQL. The course aims to a more profound understanding of database theories, models, and methods and an ability to use these in different situations.

Course Outcomes

CO1 Describe the fundamental elements of relational database management systems .Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

CO2 Design ER-models to represent simple database application scenarios.

CO3 Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

CO4 Improve the database design by normalization. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing

Theory   **3Hrs/Weeks**

Unit	Topic	Hours
1	Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.	10 Hours
2	Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializablity by Locks, Locking system with multiple lock modes, architecture for Locking scheduler.	10 Hours
3	Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.	05 Hours
4	Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line,	10 Hours

	Concepts in Orphan and Inconsistent Messages.	
5	Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques.	05 Hours

Text Books:
- Silberschatz, Korth and Sudershan, Database System Concept', Mc Graw Hill
- Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill
- Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education

Reference Books:
- Ceei and Pelagatti,'Distributed Database', TMH
- Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	1	1	2	-	1	2	2	2	2	2	2
CO2	3	3	2	2	2	1	1	2	-	1	2	2	2	2	2	2
CO3	3	3	2	2	2	1	1	2	-	1	2	2	2	2	2	2
CO4	3	3	2	2	2	1	1	2	-	1	2	2	2	2	2	2

Program: BCA					Semester: 2nd		
Course Title: Web Designing– II					Course Code:BCA-602		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Web Design explores the historical and rapidly changing trends in the field of web designing. Through design projects, students develop problem-solving and critical thinking skills, artistic perception, critique and self-reflection. With the awareness of design solutions throughout history, students will understand the impact of the arts and design on human experience. Students will learn methods and theory such as elements and principles of design, to enhance their own artistic vision and style. Design critiques and presentations will provide opportunities for students to become and grow as design artists. All experiences will be project-based and will focus on developing perception and the application of the elements of art and principle of design through contemporary design applications and web design. This course includes a broad series of lessons and activities that offer a variety of modalities for ultimate student engagement and content retention. Each unit contains a series of lessons that include introduction of content, virtual demonstration of that content, and repeated opportunity to practice that content, along with a quiz per lesson, exam per unit, and final exam at the end of the course.

Course Outcomes

CO1 Structure and implement HTML/CSS. Apply intermediate and advanced web development practices.
CO2 Implement basic JavaScript. Create visualizations in accordance with UI/UX theories.
CO3 Develop a fully functioning website and deploy on a web server.
CO4 Find and use code packages based on their documentation to produce working results in a project. Create webpages that function using external data.

Theory		**3Hrs/Weeks**
Unit	Topic	Hours
1	Brief Introduction to Interactivity tools: CGI; Features of Java; Java Script; Features of ASP; VBScript; Macromedia Flash; Macromedia Dreamweaver; PHP;	05 Hours
2	Introduction and Features of Adobe Photoshop; Microsoft FrontPage Introduction; Features; Title Bar; Menu bar; FrontPage Tool Bar; Style, FontFace andFormatting Bar; Scroll Bars;	10 Hours
3	Introduction to DHTML and its features; Events; Cascading Style Sheets: Creating Style Sheets; Common Tasks with CSS: Text, Fonts, Margins, Links, Tables, Colors; Marquee; Mouseovers; Filters and Transitions; Adding Links; Adding Tables; Adding Forms; Adding Image and Sound;	10 Hours
4	Extensible Mark-up Language(XML): Introduction; Features; XML	10

5	Support and Usage; Structure of XML Documents; Structures in XML; Creating Document Type Declarations; Flow Objects; Working with Text andFont; Color and Background properties;	Hours 05 Hours

Text Books:
- Internet and Web Technologies, Raj Kamal, Tata McGraw-Hill.
- Multimedia and Web Technology, Ramesh Bangia, Firewall Media.
- Internet and Web Design, ITLESL Research and Development Wing, Macmillan India .

Reference Books:

- Web Design: The Complete Reference , 4/e, Thomas A. Powell, Tata McGraw-Hill

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	-
CO2	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	3	2	2	3	1	1	-	-	-	2	2	2	2	2	3

Program: BCA					Semester: 4th		
Course Title: Web Designing-II LAB					Course Code: BCA-602P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Course Outcomes

CO1 Analyze a web page and identify its elements and attributes.
CO2 Create web pages using XHTML and Cascading Style Sheets.
CO3 Build dynamic web pages using JavaScript (Client side programming).
CO4 Create XML documents and Schemas.

Practical   **2 Hrs/Weeks**

Sr No.	Experiment Title
1	Create an application in which you are required to get the user profile information with help of standard asp.net server controls.
2	Extend the User profile Application which allow user to select the Material Status and Hobbies.
3	Implement the calculator with the help of the Command argument and command name properties of the button control.
4	Create Run time Table Control as per user requirement and display it on the page.
5	Create An Application which has Image, Image map and Image Button
6	Extend the user Profile Application in which user is Allowed to select the Date of Birth from the Calendar Control.
7	Extend the User Profile Application where User must have to Pass All the validation.
8	i) Create A master page and content Page Application for the University which enables user to see the faculty list according to department. ii) Create an application in which user is allowed to upload the file on the server.
9	I) Create an application in which user has to display records in the Grid View Control from Table created in access data base. (With the Help of Oledb Classes or Access Data Source Control)

	ii) An Application which stores user information to the database
10	Create the Sign In, Sign Up and Update Application.

Text Books:
- Internet and Web Technologies, Raj Kamal, Tata McGraw-Hill.
- Multimedia and Web Technology, Ramesh Bangia, Firewall Media.
- Internet and Web Design, ITLESL Research and Development Wing, Macmillan India .

Reference Books:

- Web Design: The Complete Reference , 4/e, Thomas A. Powell, Tata McGraw-Hill

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	-
CO2	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO3	3	2	2	2	2	1	1	-	-	-	2	2	2	2	2	2
CO4	3	3	2	2	3	1	1	-	-	-	2	2	2	2	2	3