



ROYAL SCHOOL OF INFORMATION TECHNOLOGY (RSIT)

**Learning Outcomes-based Curriculum Framework (LOCF) for
Undergraduate Programme in BCA
W.E.F 2022 - 23**

SL NO	Table of Contents	Page No
1.	Preamble	3
2.	Introduction	3
3.	Learning Outcomes based Approach to CurriculumPlanning	3
4.	Graduate Attributes in Bachelor of Computer Application	5
5.	Qualification Descriptors for BCA Programme	6
6.	Programme Learning Outcomes for BCA	7
7.	Teaching Learning Process	7
8.	Program Structure For BCA	8
9.	Detailed Syllabus of all the Courses Semester-wise	13

1. Preamble

The Assam Royal Global University is upgrading its undergraduate programmes. Higher education plays an extremely important role in promoting human as well as societal well-being and in developing India as envisioned in its Constitution - a democratic, just, socially conscious, cultured, and humane nation upholding liberty, equality, fraternity, and justice for all. Higher education significantly contributes towards sustainable livelihoods and economic development of the nation.

A holistic and multidisciplinary education would aim to develop all capacities of human beings - intellectual, aesthetic, social, physical, emotional, and moral in an integrated manner. Such an education will help develop well-rounded individuals that possess.

As India moves towards becoming a knowledge economy and society, more and more young Indians are likely to aspire for higher education, the new policy aims at making higher education multidisciplinary learning process. In other words, the curriculum will be flexible, it will allow students to take up creative subject-combinations. The new curriculum of BCA under The Assam Royal Global University will be effective from the year 2022, making it more flexible, multi-disciplinary and holistic.

2. Introduction

The objective of the BCA programme is to equip the students with a skill set that will acquaint them to industry standards as well as route them into a smooth transition to higher level of education. Keeping in line with this objective, the university has devised an outcome-oriented undergraduate course for BCA with UGC's learning outcomes- based curriculum framework (LOCF). The LOCF approach is aimed at structuring the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice.

The new curriculum of BCA is designed aimed at creating computational thinking, analytical, and problem-solving skills, encouraging the building of a creative mind-set in the students. The programme prepares the students for higher studies and research in the area of Computer Science/Applications. Understanding the needs of society and societal obligations are instilled in courses related to AI and Information security. The course focuses on providing programming skills across various platforms that are relevant to the current industry standards. It is designed to encourage students to participate in discussions and implement the theoretical concepts to solve real world problems. The mode of learning shall be a blend of the formal and the inquiry-based methods, with special focus on practical and projects.

3. Learning Outcomes based approach to Curriculum Planning

The Bachelor of Computer Applications(BCA) course is framed for the students to develop and enhance their analytical & computational thinking, and problem-solving skills. The students are tested on the basis of applicability of the theoretical concepts and implementation of practical knowledge. A student is awarded on the basis of the attainment of these outcomes at the end of the programme.

3.1 Nature and extent of the BCA programme

The most important aspect of computer science is problem solving. It spans the design, development and analysis of software and hardware used to solve problems in a variety of business, scientific and social contexts. It covers the core computer science topics like computer systems architecture, data structures, computer networks, operating systems, computer graphics and multimedia, algorithms, software engineering, database management, theory of computation, Java programming and web technology. The course also facilitates the inclusion of inter- disciplinary subjects as one can choose from a list of Generic Electives(GE) as per their field of interest; like for example one can opt for

economics, physics, chemistry, photography or videography, art, media or any other subjects offered by different departments and schools of the Assam Royal Global University. Skill enhancement courses enable students to acquire the skill relevant to employability. Choices from Discipline Specific Electives provides the student with liberty of exploring his interests within the main subject. Ability enhancement courses like Communication English, Behavioral Science and Functional Assamese honing their personalities and etiquettes and preparing them to be better communicators for better employability. The well- structured LOCF programme for BCA is designed to empower the students with skills and knowledge leading to enhanced career opportunities in various sectors of human activities.

The bachelor's degree in BCA is a 3 years degree course which is divided into 6 semesters as follows:

YEAR	SEMESTER	CREDITS
I	I	24
	II	24
II	III	24
	IV	24
III	V	26
	VI	26
	Total	148

A student pursuing 3 years BCA programme shall be awarded a bachelor degree in Computer Application on completion of 6th Semester after securing 148 Credits.

3.2 Aim of Bachelor of Computer Application Programme

The overall aims of the BCA Programme are to:

- Develop theoretical foundations in computer science.
- Teach, enhance and develop programming skills using high level programming languages across various platforms relevant to current industry standards.
- Encourage to develop skills to design, implement and document solutions for computational problems.
- Develop soft skills for effective team work
- Develop the ability to use state of the art technologies.
- To foster the analytical and creative abilities of the students to solve real-world problems by encouraging to create small as well as large software as well as hardware-based projects.
- To acquaint to the latest and upcoming technologies and proper and effective implementation of the theoretical concepts.

3.3 Graduate Attributes in Bachelor of Computer Application

Graduate attributes are the high-level qualities, skills and understandings that a student should gain as a result of the learning and experiences they engage with, while at university. This 'graduateness' is what sets them apart from those without a degree, and is the added value which graduates can enjoy and share with employers and the wider community. They equip students and graduates for lifelong personal development, learning and to be successful in society. There are 12 such identified attributes which are as follows:

- **GA1-Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
- **GA2-Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally, communicate with others using appropriate media, confidently share one's views and express herself/himself, demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
- **GA3-Critical Thinking:** Capability to apply analytic thought to a body of knowledge, analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence, identify relevant assumptions or implications, formulate coherent arguments, critically evaluate practices, policies and theories by following scientific approach to knowledge development.
- **GA4-Problem Solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
- **GA5-Analytical Reasoning:** Ability to evaluate the reliability and relevance of evidence, identify logical flaws and holes in the arguments of others, analyze and synthesize data from a variety of sources, draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
- **GA6-Research-Related Skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating, ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.
- **GA7-Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
- **GA8-Information/Digital Literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
- **GA9- Self-Directed Learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
- **GA10: Moral and Ethical Awareness/Reasoning:** Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
- **GA11: Leadership Readiness/Qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team

members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

- **GA12: Lifelong Learning:** Ability to acquire knowledge and skills, including 'learning how to learn', that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling

4 Qualification Descriptors for BCA Programme

The course structure of BCA covers a full range of the computer application domain starting from basics in computer fundamentals, data structures, various high level programming paradigms to web technologies so as to learn the overall core concepts associated with the domain. Thus, the qualification descriptors BCA are as follows:

- i. Demonstrate coherent knowledge and understanding of the logical organization of a digital computer, its components and working.
- ii. Understanding of the time and space complexities of algorithms along with the knowledge in the various categories of algorithms designed to solve computational problems.
- iii. Demonstrate programming skills in high level language and an ability to learn a new programming paradigm to implement the same for different time of problem solving aspects.
- iv. Apply knowledge of logical skills to identify and analyze problems and issues, and seek solutions to real-life problems. For example, creating mobile applications, database applications, and educative computer games.
- v. Meet one's own learning needs, drawing on a range of current research and development work and professional materials
- vi. Communication and leadership abilities and ability to do team work so as to cope up in different working environments.

5 Programme Learning Outcomes for BCA

5.1 Programme Outcomes (POs)

- **P01-Computational Knowledge:** Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.
- **P02- Communication Efficacy:** Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
- **P03- Problem Analysis:** Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.
- **P04- Design / Development of Solutions:** Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.
- **P05- Conduct Investigations of Complex Computing Problems:** Ability to devise and conduct experiments, interpret data and provide well informed conclusions.
- **P06- Modern Tool Usage:** Ability to select modern computing tools, skills and techniques necessary for innovative software solutions
- **P07- Professional Ethics:** Ability to apply and commit professional ethics and cyber regulations in a global economic environment.
- **P08- Project Management:** Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

- **PO9- Societal & Environmental Concern:** 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.
- **PO10- Individual & Team Work:** Ability to work as a member or leader in diverse teams in multidisciplinary environment.
- **PO11- Innovation and Entrepreneurship:** Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.
- **PO12- Life-long Learning:** Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

5.2 Programme Specific Outcomes (PSOs)

- **PSO1- Knowledge of Computing Systems:** An ability to understand the principles and working of computer systems.
- **PSO2- Project Development Skills:** An ability to understand the structure and development methodologies of software systems.
- **PSO3: Software Development Skills:** Familiarity and practical competence with a broad range of programming language and open-source platforms.
- **PSO4: Mathematical Skills:** An ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm

7. Teaching Learning Process

	Component of Evaluation	Marks	Frequency	Code	Weightage (%)
A	Continuous Evaluation				
I	Analysis/Class test	Combination of any three from (i) to (v) with 5 marks each	1-3	C	25%
Ii	Home Assignment		1-3	H	
Iii	Project		1	P	
Iv	Seminar		1-2	S	
V	Viva-Voce/Presentation		1-2	V	
Vi	MSE	MSE shall be of 10 marks	1-3	Q/CT	
Vii	Attendance	Attendance shall be of 5 marks	100%	A	5%
B	Semester End Examination		1	SEE	70%
	Project				100%

8. Program Structure for BCA

BCA Course Structure for the session 2022-2023

1 st SEMESTER							
Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Discipline Specific Core (DSC)							
1	CAP052C101	Fundamentals of Computer Science	3	1	0	4	4
2	CAP052C102	Introduction to C Programming	3	0	2	4	5
3	CAP052C103	Digital Logic and Computer Design	3	0	2	4	5
Generic Elective (GE)							
4	INT052G10X	GE-I	3	0	0	3	3
5	INT052G10X	GE-II	3	0	0	3	3
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A101	Developing Oral Communication and Listening Skills	1	0	0	1	1
7	BHS982A104	Concepts of Behavioural Science	1	0	0	1	1
Skill Enhancement Courses (SEC)							
8	CAP052S11X	SEC-I	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992V11X	VAC-I	2	0	0	2	2
TOTAL						24	
2 nd Semester							
Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Discipline Specific Core (DSC)							
1	CAP052C201	Computer Organisation and Architecture	3	1	0	4	4
2	CAP052C203	Object Oriented Programming using C++	3	0	2	4	5
3	CAP052C204	Data Structures and Algorithms	3	0	2	4	5
Generic Elective (GE)							
4	INT052G20X	GE-III	3	0	0	3	3
5	INT052G20X	GE-IV	3	0	0	3	3
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A201	Conversation and Public Speaking	1	0	0	1	1
7	BHS982A204	Understanding Self and Others	1	0	0	1	1
Skill Enhancement Courses (SEC)							
8	CAP052S21X	SEC-II	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992A21*	VAC-II	0	0	4	2	4
TOTAL						24	
3 rd SEMESTER							
Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Discipline Specific Core (DSC)							
1	CAP052C301	JAVA Programming	3	0	2	4	5
2	CAP052C302	Introduction to Database Management Systems	3	0	2	4	5

Discipline Specific Elective (DSE)							
3	CAP052D20X	DSE-I	3	1	0	4	4
Generic Elective (GE)							
4	INT052G30X	GE-V	3	0	0	3	3
5	INT052G30X	GE-VI	3	0	0	3	3
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A301	Career Oriented Communication	1	0	0	1	1
7	BHS982A304	Behavioural Science-III	1	0	0	1	1
Project/Internship							
8	CAP052C338	Internship	4	0	0	4	0
TOTAL						24	
4th Semester							
Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Discipline Specific Core (DSC)							
1	CAP052C401	Operating Systems	3	0	2	4	5
2	CAP052C402	Data Communication and Networks	3	0	2	4	5
Discipline Specific Elective (DSE)							
3	CAP052D40X	DSE-II	3	1	0	4	4
Generic Elective (GE)							
4	INT052G40X	GE-VII	3	0	0	3	3
5	INT052G40X	GE-VIII	3	0	0	3	3
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A401	Communication and Presentation Skills	1	0	0	1	1
7	BHS982A404	Behavioural Science-IV	1	0	0	1	1
Skill Enhancement Courses (SEC)							
8	CAP052S41X	SEC-III	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992V40X	VAC-III	2	0	0	2	2
TOTAL						24	
5th SEMESTER							
Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Discipline Specific Core (DSC)							
1	CAP052C502	Web Technology	3	0	2	4	5
2	CAP052C503	Python Programming	3	0	2	4	5
Discipline Specific Elective (DSE)							
3	CAP052D50X	DSE-III	3	1	0	4	4
4	CAP052D50X	DSE-IV	3	1	0	4	4
Ability Enhancement Compulsory Courses (AECC)							
5	CEN982A501	Ethics and Business Communication	1	0	0	1	1
6	EVS982A503	Environmental Studies & Sustainable Development I	1	0	0	1	1
Value Addition Courses (VAC)							
7	VAC992V50X	VAC-IV	2	0	0	2	2

Project/Internship							
8	CAP052C528	Minor Project	6	0	0	6	0
TOTAL						26	
6th SEMESTER							
Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Discipline Specific Core (DSC)							
1	CAP052C601	Artificial Intelligence	3	1	0	4	4
2	CAP052C602	System Analysis and Design	3	0	1	4	5
Discipline Specific Elective (DSE)							
3	CAP052D60X	DSE-V	3	1	0	4	4
4	CAP052D60X	DSE-VI	3	1	0	4	4
5	CAP052D60X	DSE-VII	3	1	0	4	4
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A601	Effective Workplace Communication	1	0	0	1	1
7	EVS982A603	Environmental Studies & Sustainable Development II	1	0	0	1	1
Skill Enhancement Courses (SEC)							
8	CAP052S51X	SEC-IV	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992V60X	VAC-V	2	0	0	2	2
TOTAL						26	

Semester No	Credits offered in the Semester
I	24
II	24
III	24
IV	24
V	26
VI	26

Total Credits till 6th semester = 148

LIST OF DEPARTMENT SPECIFIC ELECTIVES			
El. No	Semester No	Subject Code	Name of the Elective
1	3	CAP052D301	Graph Theory
		CAP052D302	Discrete Mathematics
2	4	CAP052D401	Computer Graphics and Multimedia
		CAP052D402	Information Theory and Coding
3	5	CAP052D501	Introduction to Data Mining
		CAP052D502	Introduction to Internet of Things
4		CAP052D503	Introduction to Cloud Computing
		CAP052D504	Social Networking
5	6	CAP052D601	Introduction to Big Data Analytics
		CAP052D602	Mobile Application Development

6	CAP052D603	Mobile Computing
	CAP052D604	Introduction to Embedded System
7	CAP052D605	Cryptography and Network Security
	CAP052D606	Recent Trends in Computer Science

LIST OF SUBJECTS OFFERED UNDER GENERIC ELECTIVES

Generic No	Semester	Subject Code	Name of the Elective
GE-I	1	INT052G103	Web Development with JavaScript
GE-II		INT052G104	Multimedia Tools and Applications
GE-III	2	INT052G204	ServerSide Programming
GE-IV		INT052G205	Introduction to Cyber Scpace
GE-V	3	INT052G302	Front-End Development with React
GE-VI		INT052G303	IPR and Cyber Laws
GE-VII	4	INT052G402	Web Integration and Application
GE-VIII		INT052G403	Game Development

LIST OF SUBJECTS OFFERED UNDER SKILL ENHANCEMENT COURSES

SEC NO	Semester	Subject Code	Name of the Subject
I	1	CAP052S111	Image Editing and Animation
II	2	CAP052S211	Windows Programming using C#
III	4	CAP052S411	System Administration
IV	6	CAP052S611	Data Analytics with Python

LIST OF SUBJECTS OFFERED UNDER VALUE ADDED COURSES

VAC NO	Semester	Subject Code	Name of the Subject
I	1	VAC992V117	Office Automation
II	2	VAC992V217	Computer Hardware and Networking
III	4	VAC992V409	Disaster Management
IV	5	VAC992V507	General Awareness for Competitive Examination
V	6	VAC992V609	Intellectual Property Rights

9. Detailed Syllabus of all the Courses Semester-wise

SYLLABUS (1st SEMESTER)

Paper I/Subject Name: Fundamentals of Computer Science	Subject Code: CAP052C101
L-T-P-C – 3-1-0-4	Credit Units: 04
	Scheme of Evaluation: T

Course Objective:

The objectives of the course are to explain the basic components of a computer system and to discuss about issues related to data processing with computers and various computer software and programming.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Relate and understand both the hardware and software components of computer systems and networking.	BT 1& 2
CO 2	Identify the different types of software and use them accordingly.	BT 3
CO 3	Analyse the utility of programming languages	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Computer Systems	<p>Computer system characterization & capabilities; Speed, Accuracy, Reliability, Memory Capability, Repeatability. Block Diagram of a Computer. Types of Computers- Analog Digital & Hybrid; General and Special Purpose Computers. Characteristics of Computer Generations, Computer Systems Micros, Minis & Mainframes.</p> <p>Personal Computing- The IBM Personal Computer, Type of PC systems, Pentium PCS, Limitations of Microcomputer.</p>	12
II	Components of a Computer	<p>Input Devices, Categorizing Input Hardware, Keyboard, Direct Entry-card Reader, Scanners, Output Devices- O.M.R. Character Scanner, Character Readers, MICR, Smart Cards, Voice Input Devices, Pointing Devices-Mouse, Light Pen, impact printers, non-impact printer's plotters, computer output microfilm/microfiche system, softcopy output devices, CRT and flat screen technologies.</p> <p>Computer Storage Fundamentals, Central Proceeding Unit, ALU, register, Primary and Secondary Storage, Data Storage and Retrieval Methods- Sequential, Direct & Indexed & Sequential, Tape Storage and Retrieval Methods Tape Storage Devices, Direct Access Storage for Microcomputers- Hard Disks, Disk Cartridge, Direct Access Storage</p>	12

		Devices for Large Computer Systems, Retrieval Methods-Sequential, Direct & Indexed & Sequential, Tape Storage and Retrieval Methods Tape Storage Devices,	
III	Data Processing with Computers and Network Fundamentals	Interconnecting the units of a computer: buses, Data, data processing, data processing methods, data transmission modes, data transmission media: twisted pair, coaxial cable, optical fiber, radio transmission, microwave transmission, satellite transmission, Network topology: bus, star, ring, mesh, hybrid, types of network: LAN, WAN, MAN, PAN, Networking devices: hub, repeater, switch, bridge, router, gateway.	12
IV	Computer Software and Programming	Computer software: system software and application software, Types of System Software, Types of Operating System, Computer Programming Languages, Types of Programming Languages, Generations of programming Languages Development, Low Level Versus High Level Language, Machine Language, Assembly Language. Advantages of High Level Languages, problem Oriented Languages. Procedure Oriented Languages, Object Oriented Programming languages. Fourth Generation Languages, Device driver, BIOS, Utility Programs, File Maintenance, Language processors: Assembler, Compiler & Interpreter, Applications Software, Types of Application Software, Difference Between program and packages. System Software Versus Application Software,	12
Total			48

Text Books:

1. *Information Technology: The Breaking Wave*, Dennis P Curtain, 1st Edition, 2017, McGraw Hill.
2. *Introduction to Computers*, Peter Norton, 7th Edition, 2017, McGraw Hill.

Reference Books:

1. E. Balaguruswamy, *Fundamentals of Computers*, 1st Edition, 2009, McGraw Hill.
2. P. K. Sinha, *Computer Fundamentals*, 6th Edition, 2004, BPB.

Paper II/Subject Name: Introduction to C Programming

Subject Code: CAP052C102

L-T-P-C – 3-0-2-4

Credit Units: 04

Scheme of Evaluation: TP

Objective:

The objectives of the course are to give the students exposure to computer programming and make them capable of using the concepts to solve basic as well as advanced computing problems.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define and demonstrate the working of C programming language.	BT 1 & 2
CO 2	Apply the programming concepts to solve various problems.	BT 3
CO 3	Analyse and debug the errors while writing the programs.	BT 4
CO 4	Assess and design a new algorithm to solve a new real life problems	BT 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	C Programming Fundamentals	History and importance of C language, Basic structure of programs, programming style, execution of C programs. Character set, Tokens, Keywords and Identifiers, Constants, variables, data types, statements, comments, declaration of storage class, assigning values to variables. Basic idea of Computer Algorithms and Flow Charts. Managing I/O, reading and writing characters, formatted Input/output. Arithmetic operators, relational operators, logical operators, assignment operators, increment & decrement operators, conditional operators, bitwise operators, special operators. Arithmetic expressions, operator precedence & associativity.	12
II	Decision Making, Branching & Looping	Importance of decision making, decision making with <i>if</i> statement, <i>if-else</i> statement, nested <i>if-else</i> statements, <i>switch-case</i> statement, <i>goto</i> statement, the <i>?:</i> operator, examples. Importance of looping, the <i>while</i> statement, <i>do-while</i> statement, <i>for</i> statement, nested looping, examples.	12

III	Arrays, Strings & User-Defined Functions	Significance of Arrays, creation and use of one- & two-dimensional arrays, Dynamic arrays. Declaration and use of string variables, reading and writing strings, operations on strings. Benefits of user-defined functions, creation and use of user-defined functions, parameter passing, return types.	12
IV	Advanced Programming Concepts	Creation and use of Structures and Unions in programs. Introduction to Pointers, declaration & initialization of pointer variables, accessing a variable through its pointer. Defining, opening & closing files in C, Input/output operations on files.	12
Total			48

Text Book:

1. *Computer Fundamentals and Programming in C*, Reema Thareja, 2nd Edition, 2016, Oxford University Press, Delhi.

Reference Books:

1. E Balaguruswamy, *Computing Fundamentals and C Programming*, 1st Edition, 2017, McGraw Hill.
2. Venugopal and Prasad, *Mastering C*, 2nd Edition, 2017, Tata McGraw Hill.
3. Yashawant Kanetkar, *Let us C*, 15th Edition, 2017, BPB Publication.

Introduction to C ProgrammingLab

Objective:

The objectives of the course are to make the student learn about problem solving techniques through C programming language and to enhance the analyzing and problem-solving skills.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Relateand understand the execution of programs written in C language.	BT 1 & 2
CO 2	Apply the programming concepts to solve various problems.	BT 3
CO 3	Analyse and debug the errors while writing the programs.	BT 4
CO 4	Assess and design a new algorithm to solve a new real life problems	BT 5

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

1. Character set, Tokens, Keywords and Identifiers, Constants, variables, data types, statements, comments, declaration of storage class, assigning values to variables.
2. Managing I/O, reading and writing characters, formatted Input/output.
3. Arithmetic operators, relational operators, logical operators, assignment operators, increment & decrement operators, conditional operators, bitwise operators, special operators. Arithmetic expressions, operator precedence & associativity.
4. Importance of decision making, decision making with if statement, if-else statement, nested if-else statements, switch-case statement, goto statement, the ?: operator.
5. Importance of looping, the while statement, do-while statement, for statement, nested looping.
6. Significance of Arrays, creation and use of one & two dimensional arrays, Dynamic arrays.
7. Declaration and use of string variables, reading and writing strings, operations on strings.
8. Benefits of user-defined functions, creation and use of user-defined functions, parameter passing, return types.
9. Creation and use of Structures and Unions in programs.
10. Use of Pointers, declaration & initialization of pointer variables, accessing a variable through its pointer.
11. Defining, opening & closing files in C, Input/output operations on files.

Text Book:

1. *Computer Fundamentals and Programming in C*, Reema Thareja, 2nd Edition, 2016, Oxford University Press, Delhi.

Reference Books:

1. E Balaguruswamy, *Computing Fundamentals and C Programming*, 1st Edition, 2017, McGraw Hill.
2. Venugopal and Prasad, *Mastering C*, 2nd Edition, 2017, Tata McGraw Hill.
3. Yashawant Kanetkar, *Let us C*, 15th Edition, 2017, BPB Publication.

Paper III/Subject Name: Digital Logic and Computer Design

Subject Code: CAP052C103

L-T-P-C – 3-0-1-4

Credit Units: 04

Scheme of Evaluation: TP

Objective:

The objectives of the course are to provide an understanding to the students about the Simplification of Boolean expression, combinational and sequential circuits and their implementation through various logic gates.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define and understand the concepts of combinational and sequential circuit design	BT 1 & 2
CO 2	Apply the concepts learnt to design digital circuits.	BT 3
CO 3	Analyse the outputs produced and behaviour of the different circuits.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Fundamentals of Digital Electronics	Review of number system, Position number system- decimal, binary, octal and hexadecimal, number base conversion. Representation of negative binary numbers. Codes – BCD Gray, Excess -3. Digital signal, logic gates: AND, OR, NOT, NOR, EX-OR, EX-NOR, Universal Gates	12
II	Boolean Algebra and Logic Implementation	Axioms and basic theorem of Boolean algebra. Truth table, logic function and their realization, standard representation (canonical forms) of logic gates- SOP and POS forms, MIN terms and MAX terms. Simplification of logic function using K-map of 2, 3, 4 and 5 variables. Don't care condition. Quine Mcluskey methods of simplification. Synthesis using AND, OR and INVERT and then to convert to NAND or NOR implementation.	12
III	Combinational Logic Circuit Design	Combinational logic circuit and buildings blocks. Binary adders and subtractors. Carry Lookahead Adder, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, parity generators, etc. Realization of logic gates functions through decoders and multiplexers. ROM fundamentals, types of ROM	12

IV	Sequential Circuits	Flip flops: truth table and state table SR, JK, TD, race around condition, master slave conversion of flip-flops. Sequential shift register, sequence generator. Counters- asynchronous and Synchronous generators. Ring counters and Johnson counter, Up-Down counter, modulo-N counter. Design of Synchronous sequential circuit. Design with State Equations.	12
Total			48

Text Book:

1. *Digital Logic & Computer Design*, M. Morris Mano, 1st Edition, 2016, Prentice Hall of India.

Reference Books:

1. P. Malvino and D. K. Leach, *Digital Principles and Applications*, 8th Edition, 2014, Tata McGraw Hill.
2. S. Salivahanan and S. Pravin Kumar, *Digital Logic Circuits*, 1st Edition, 2010, Vikas Publishing House.
3. Stephen Brown and Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, 3rd Edition, 2017, McGraw Hill.
4. Sanjay Sharma, *Digital Electronics: Digital Logic Design*, 1st Edition, 2013, S K Kataria & Sons.
5. Pratima Manhas and Shaveta Thakral, *Digital Logic & Design*, 1st Edition, 2013, S K Kataria & Sons.
6. A Potton, *An Introduction to Digital Logic*, 1st Edition, 2013, Palgrave.

Subject Name: Digital Logic and Computer Design Lab
--

Objective:

The objectives of the course are to make the students implement the given Boolean function using logic gates using both in POS and SOP form

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate the implementation of logic gates on the bread board.	BT 2
CO 2	Build combinational and sequential circuits based on the concepts gained.	BT 3

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

LIST OF EXPERIMENTS

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of 2-bit Magnitude Comparator using logic gates, 8 Bit Magnitude Comparator using IC 7485.
3. Design and implementation of encoder and decoder using logic gates.

4. Design and implementation of Multiplexer and De-multiplexer using logic gates.
5. Design and implementation of code converters using logic gates.
6. Implementation of combinational logic functions using standard ICs.
7. Characteristic table verification of flip-flops.
8. Construction and verification of 4-bit ripple counter and Mod-10 / Mod-12 ripple counters.
9. Design and implementation of Synchronous Counters.
10. Construction and verification of shift registers.

Text Book:

1. *Modern Digital Electronics*, R P Jain, 4th Edition, 2019, McGraw Hill.

Reference Books:

1. Gothmann W.H, *Digital Electronics: An Introduction to Theory and Practice*, 2nd Edition, 1982, PHI.
2. Kumar A. Anand, *Fundamentals of Digital Circuits*, 4th Edition, 2016, PHI.

- **Detailed Syllabus of Generic Electives (GE-I/II)**

Paper IV/Subject Name: Web Development with Java Script		Subject Code: INT052G103
L-T-P-C – 3-0-0-3	Credit Units: 03	Scheme of Evaluation: T

Objective:

The objectives of the course are to enable the students to build a robust foundation for computational thinking and make them learn client-side web development.

Prerequisites:None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basic characteristics and concepts of web development.	BT 2
CO 2	Build static web pages and manipulate data using JavaScript and work with the HTML Canvas	BT 3
CO 3	Analyse and evaluate websites in terms of its design and basic processing at the client side.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Web and creating website	The Internet: Client & Server, IP address and URL, The World Wide Web (WWW),Installing Visual Studio Code, Installing the Prettier VSCode extension,Install Ubuntu in Windows, using WSL, Install Ubuntu using virtual machine software, making and hosting website. Introduction to HTML tags, Looking inside websites using "Inspect Element"	09
II	Styling and Working with Strings	Working with modern HTML and CSS to produce an attractive, informative multi-page website based on the client's requirements, Creating a multipage website using HTML5, Control the look of a website using CSS, Formating a web page to display complex information,Adding graphical elements and maps to a website, Implement web forms to capture user input, Testing a website for compliance with standards and to ensure that it works with a range of browsers,Implementation of CSS using Bootstrap, Styling and Working with Strings:Introduction to strings, Joining strings together,Switching to the VSCode editor: Putting HTML and JS together, Adding comments to HTML and JS,Find the length of a string, Search for a string inside another string, String equality comparison, Sort a collection of strings, Split strings by a pattern,	09
III	Functions	Numbers, Booleans, Objects and Arrays, Number Data Type, Numbers Boolean Data Type, Boolean - comparisons and logical operations, Object Literals - create, read & update + nesting objects, Arrays - handling ordered values, Functions: Explicitly	09

		return a value from a function, Passing a function as an argument , introduction to Firebase.	
IV	Advanced Techniques of Javascript	Iterating over Arrays: Iterating over an array using the for Each method, Generate an HTML list from an array, Using the index of the array value during iteration, Nested Array iteration, Transforming Arrays, Generate an HTML list from an array using the map function, Using index of array value with map, Transforming Nested Arrays, Filtering Arrays: Filter an array based on some criteria, A minimal UI for filtering flight search results, Use the index of the array value with filter, Building a game with Canvas, HTML canvas element, introduction to AJAX, JSON, RESTful API.	09
Total			36

Text Book:

1. *Internet and World Wide Web How to program*, Deitel H.M. and Deitel P.J, 4th Edition, 2012, Pearson International, New Delhi
2. *Web Technology*, Gopalan N.P. and Akilandeswari J., 2nd Edition, 2014, Prentice Hall of India, New Delhi.
3. *Java How to Program*, Paul Dietel and Harvey Deitel, 8th Edition, 2014, Prentice Hall of India, New Delhi

Reference Books:

1. Uttam K. Roy, *Web Technologies*, 2010, Illustrated Oxford University Press.
2. Godbole A. S. & Kahate A., *Web Technologies*, 2nd Edition, 2006, TMH, New Delhi.

- Detailed Syllabus of Generic Elective-II

Paper V/Subject Name: Multimedia Tools and Applications	Subject Code: INT052G104
L-T-P-C – 3-0-0-3	Credit Units: 03
	Scheme of Evaluation: T

Objective:

The objectives of the course are to make the students understand the concept of multimedia entails, Interactive Multimedia, Hypermedia and Multimedia Authoring processes and techniques.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand basic of multimedia concepts	BT 2
CO 2	Utilise tools for developing Multimedia projects.	BT 3
CO 3	Apply the Multimedia compression technologies to image, audio, animation and video.	BT 3
CO 4	Compare and contrast IT tools for authoring 2D and 3D Drawings.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Introduction to multimedia Types of multimedia information Characteristics of multimedia systems Multimedia applications, Steps to multimedia authoring Parameters of authoring systems' evaluation Fundamentals of content authoring tools, Fundamentals of authoring for sharing	09
II	Design and development process of Multimedia project and documentation	Multimedia project, Multimedia project evaluation process, Factors that affect multimedia project management, Steps of multimedia project development, Practical Assignments	09
III	Design and development process of Multimedia Applications	Introduction to multimedia design models, Screen Model based design, Content synchronization-based models, Introduction to media interactivity, Classification of multimedia application, Distribution of multimedia applications	09
IV	Compression and encoding techniques	Compression and encoding techniques for a. Image b. Animation c. Audio d. Video Information format:	09

	and methods for multimedia information	Presentation of digital images, Presentation of digital audio, Presentation of digital video	
Total			36

Text Book:

1. *Digital Multimedia*, Chapman, Nigel and Chapman, Jeny, 2ndEdition, 2004, John Wiley & Sons.
2. *Multimedia and Interactive Technologies*, Nuno Ribeiro, 5thEdition. FCA

Reference Books:

- 1 Douglas Vaz, Suelen Silva de Andrade, *Multimedia Authoring: the use of multimedia tools in the educational field*. Cenecista college Osório (FACOS).

- **Detailed Syllabus of Ability Enhancement Compulsory Courses(AEEC-I/II)**

Paper VI/Subject Name: Developing Oral Communication and Listening Skills Subject Code: CEN982A101		
L-T-P-C – 1-0-0-1	Credit Units: 01	Scheme of Evaluation: TP

Objective:

The objectives of the course are to develop and enhance the students’ oral communication skills in English by engaging them to meaningful discussion and interactive activities.

Prerequisites: Basic knowledge of English language

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basics of written and oral communication.	BT 2
CO 2	Apply the concepts learnt in day-to-day life.	BT 3

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Basics of Communication-Introduction	Communication-Definition, Meaning, Elements. Basics of Communication- Communication Process, Importance of Communication, Components of Communication, Types/ Forms of Communication (Oral-Written, Formal-Informal (Grapevine), Interpersonal-Intrapersonal, Mass-Group, Verbal-Non Verbal External Communication, Organisational, Upward, Downward, Horizontal, Diagonal). Non-Verbal Communication-Introduction, Body Language, Personal Appearance, Postures, Gestures, Eye-contact, Facial Expressions, Paralinguistic Features-Rate, Pause, Volume, Pitch/ Intonation/Voice/modulation, Proxemics, Haptics, Artifacts, Chronemics	3
II	Listening Process	Types of Listening-Superficial, Appreciative, Focused, Evaluative, Attentive, Emphatic, Listening with a Purpose, Barriers to Communication, Barriers to Listening	3
III	Focussing on Oral Group Communication	Nature of Group Communication, Characteristics of successful Group Communication Selection of Group Discussion,-Subject, Knowledge, Leadership Skills, Team Management, Group Discussion Strategies	3
IV	Language Styles- Oral and Written Communication	Technical Style, ABC of Technical Communication- Accuracy, using Exact Words and Phrases, Brevity, Clarity. Objectivity of Technical Writing, Impersonal Language, Objectivity in Professional Speaking, Formal Language, Practice	3
Total			12

Text Books:

1. *Effective Technical Communication*, Rizvi, M.A., 11 reprint, 2008, Tata McGraw Hill. New Delhi

Reference Books:

1. Koneru, Aruna. *Professional Communication*, 1st Edition 2014, Tata McGraw Hill, India
2. Hair, Dan O., Rubenstein, Hannah and Stewart, Rob, *Pocket guide to public speaking*, 5th Edition, 20015, Bedford/St. Martin's.

Paper VII/Subject Name: Concepts of Behavioural Science	Subject Code: BHS982S104
L-T-P-C – 1-0-0-1	Credit Units: 01
	Scheme of Evaluation: T

Objective:

The objectives of the course are to make the students understand the various elements of behavioral science, the way it is conducted and applied in different researches.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the various elements of behavioural science.	BT 2
CO 2	Apply the concepts learnt in their real life.	BT 3

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Western Philosophy to present Behavioral Science	Brief history Sources of knowledge The problem of reliable knowledge Dynamics of development in the Behavioural and Social Sciences	3
II	Behavioral and Social Science Disciplines	Understanding various behavioural and social science disciplines like Psychology, Sociology, Anthropology, Economics, Political Science, Geography, History and Statistics	3
III	Modes and Methods	Experimentation Statistical control Statistically uncontrolled observation	3
IV	Applications	Three fundamental features of basic research in Behavioural Sciences Exploring examples of behavioural science research	3
Total			12

Text Books:

1. Adams, R. M., Smelser, N. J. & Treiman, D. J., *Behavioral and social science research: A national resource(Part I)*, Washington: National Academy Press.

Reference Books:

1. O'Grady, M. *An introduction to behavioural science*, 2001, Gill & Macmillan, London.

• **Detailed Syllabus of Skill Enhancement Course (SEC-I)**

Paper VIII/Subject Name: Image Editing and Animation	Subject Code: CAP052S111
L-T-P-C - 0-0-4-2	Credit Units: 02 Scheme of Evaluation: P

Objective:

The objectives of the course are to introduce the students with the concepts and practical skills of Graphics and Animation Development and open-source tools which are freely available for downloading.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate the basic idea behind image enhancement, modelling and animation	BT 2
CO 2	Experiment with image enhancement with the concepts learnt.	BT 3
CO3	Analyse and assess any given image for its quality along with the 2D/3D modelling of various architectures.	BT 4& 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Fundamentals of Graphics Designing and editing	Fundamentals of Graphics Designing and its application areas, GIMP Software Installation, Introduction to Toolbox, Advanced Tools and options, Image editing and enhancement, Overview of Filters, Advanced Filters	06
II	Image Enhancement	Black and White to Color Image Conversion, Layers and Layer Properties, Layer Effects, Text Effects, Paths and Channels, Publishing for the web, image composition, button creation, Assignment	06
III	Architectures	Overview of Animation techniques, Blender Software Installation, Overview of IDE (Integrated Development Environment), Architectural Modeling Architectural Modeling and Character Modeling, Modeling assignment	06
IV	Computer Modelling and Animations	Rigging, Rendering and Publishing, Google SketchUp Installation, Overview of working environment, 3D Modeling	06
Total			24

Text Books:

1. *Computer Graphics & Animation*, M.C. Trivedi, 1st Edition, 2009, Jaico Publishing House.
2. *Acting for Animators*, Ed Hooks, 2nd Edition, 2017, Routledge.

Reference Books:

1. Pakhira Malay K., *Computer Graphics Multimedia & Animation*, 2nd Edition, Prentice Hall of India.

- **Detailed Syllabus of Value Addition Course (VAC-I)**

Paper IX/Subject Name: Office Automation	Subject Code: VAC992V117
L-T-P-C - 0-0-4-2	Credit Units: 02 Scheme of Evaluation: P

Objective:

The objectives of the course are to make the students work with the basic tools under MS office Suite.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the working of the applications under the MS Office Suite.	BT 2
CO 2	Build sheets, presentations, word documents and will be able to work with databases.	BT 3

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

- To create a Memo in MS-Word.
- To create a resume in MS-Word including some tables, formatting styles, etc.
- To create a greeting card in MS-Word including some formatting styles, etc.
- To create a cover page for a project report in MS-Word.
- To create a mail merger letter in MS-Word.
- To create a Macro for inserting a picture formatting the text in MS-Word.
- To create a simple presentation using MS-PowerPoint.
- To create some worksheets using MS-Excel.
- To create a report containing pay details of employees using MS-Excel.
- To create a student result sheet using MS-Excel.
- To create some charts/diagrams using MS-Excel.
- To create some worksheets that import data from databases.
- To create query table for the result processing table.
- To create a form to update/modify the result processing table.
- To design a report to print the result sheet and marks card for the result.

Text Books:

1. *PC Software: Made Simple*, S. C. Jain, 1st Edition, 2004, BPB.
2. *PC Software Made Easy (Sixteen-In-One)*, Ramesh Bangia, 2009 Edition, 2014, Arihant.

Reference Books:

1. Raja Raman, *Fundamentals of Computers*, 5th Edition, 2010, Prentice Hall of India.
2. Gautam Roy, *PC Software and IT Tools*, 1st Edition, 2008, S. Chand.

SYLLABUS (2nd SEMESTER)

Paper III/Subject Name: Computer Organisation and Architecture	Subject Code: CAP052C201
L-T-P-C - 3-1-0-4	Credit Units: 04
	Scheme of Evaluation: T

Objective:

The objectives of the course are to make the students understand the machine instruction, basic computer organization and memory hierarchy with pipelining processing.

Prerequisites: Basics of Digital Logic and Computer Design

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/O	BT 2
CO 2	Experiment with and analyse the performance of commercially available computers	BT 3& 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Computer Hardware and Digital Logic	Introduction to computer hardware- what is computer hardware, History of computing, the digital computer, PC versus workstation. Gates, circuits, and combinational logic- Analog and digital systems, Fundamental gates, applications of gates, Introduction to Digital Works, introduction to Boolean algebra, Special-purpose logic elements, Programmable logic, Sequential logic, Combinational Circuits..	12
II	Machine Instruction	Instruction Set Architecture, Assembly language Programming, Addressing modes, Instruction cycle, Registers and storage, RISC versus CISC architecture, Inside CPU.	12
III	Computer Arithmetic & Information Representation	Bits, bytes, words, and characters, Number bases, Number base conversion, Special-purpose codes, Error-detecting codes, Data-compressing codes, Binary arithmetic- half-adder, full-adder, addition of words, Signed numbers- Sign and magnitude representation, Complementary arithmetic, Two's complement representation, One's complement representation, Floating point numbers- Representation, Normalization, Floating point arithmetic, Multiplication and division.	12
IV	CPU, Buses, Peripherals and Memory	Input-Output device such as Disk, CD-ROM, Printer etc., Interfacing with IO device, Keyboard & Display Interface. Buses and input/output mechanisms- The bus, I/O fundamentals, Direct Memory Access, Parallel and serial interfaces. Computer memory- Static and Dynamic memory, Random and Serial Access Memories, Memory hierarchy, Memory technology, Cache memory	12
Total			48

Text Book:

1. *Computer System and Architecture*, Moris Mano, 3rd Edition, 2007, PHI.
2. *Structured Computer Organization*, A. S. Tanenbaum, 5th Edition, 2009, Prentice Hall of India

Reference Books:

1. V. C. Hamacher, Z. G. Vranesic and S. G. Zaky, *Computer Organization*, 5th Edition, 2002 McGraw Hill.
2. J. L. Hennessy and D. A. Patterson, *Computer Architecture: A Quantitative Approach*, 4/e, 2006, Morgan Kaufmann.
3. D. V. Hall, *Microprocessors and Interfacing*, 2nd Edition, 2006, McGraw Hall.

Paper II/ Subject Name: Object Oriented Programming using C++ Subject Code: CAP052C202

L-T-P-C – 3-0-2-4

Credit Units: 04

Scheme of Evaluation: TP

Objective:

The objectives of the course are to teach the basic concept and techniques which form the object-oriented programming paradigm.

Prerequisites: Basics of Programming

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basic concepts of OOP.	BT 2
CO 2	Build C++ programs and find errors in it.	BT 3
CO 3	Analyse a problem and construct a C++ program that solves it.	BT 4
CO 4	Criticise a C++ program and describe ways to improve it.	BT 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Introduction, Need, Characteristics, Difference between POP and OOP, Basic concepts of OOP, Features, Applications of OOP Revision of topics like data types, keywords, identifiers, tokens, reference variables, different operators, conditional and loop control structures.	12
II	Classes and Objects	Definition of class, object, Difference between class and structure, class definitions, member functions, access specifiers. Objects Dynamic Creation and initialization, Passing and Returning objects, Object assignment and array of objects Constructors Types, Destructors, Nesting member function, Private member function , Inline functions Static class members, Function prototyping, Call by reference, Return by reference, Default Argument, Friend functions, this pointer.	12
III	Inheritance and Polymorphism	Types of Inheritance; Base and Derived classes, Syntax of derived classes, access to the base class; Types of Inheritance, Multiple inheritance, Virtual Base classes, Constructors and Destructors in Inheritance, Container classes, Abstract Classes. Polymorphism: Compile time(Early/Static binding), Overloading functions and operators, Overloading new and delete operators, Run time polymorphism(Late/Dynamic Binding), Virtual functions, Pure Virtual functions, Virtual Destructors, Review of Virtual base classes,	12

IV	Templates, Exception and File Handling	Templates–Uses, Generic classes, Class templates, Function templates, Advance templates. Examples. Exception handling-Advantages, Try catch and throw clauses, Examples, Manipulators, different examples of manipulators. Pointer types-uses; Dynamic memory allocation techniques, garbage collection, Linked list, generic pointers; Files Open, Close, Read and Write; File attributes, File management	12
Total			48

Text Books:

1. *Programming with Java: A Primer*, E. Balagurusamy, 3rd Edition, 2005, Tata McGraw-Hill, New Delhi
2. *Thinking in Java*, Bruce Eckel, 4th Edition, 2006, PHI.

Reference Books:

1. Maurice Naftalin et al, *Java Generics and Collections*, 1st Edition, 2006, O'REILLY Publication.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, *The Unified Modeling Language User Guide*, 2nd Edition, 2005, Pearson Education.
3. Herbert Schildt, *The Complete Reference Java*, 7th Edition, 2007, Tata McGraw-Hill, New Delhi

Object Oriented Programming using C++ Lab
--

Objective:

The objectives of the course are to make the student learn C++ programming language to solve various real life problems.

Prerequisites: Basics of Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define and interpret the basic concepts of OOP	BT 1 & 2
CO 2	Solve problems by writing C++ programs.	BT 3
CO 3	Analyse and evaluate programs for its efficiency.	BT 4 & 5

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

- Write a C++ program to display "HELLO WORLD".
- Write a C++ program that will ask the temperature in Fahrenheit and display in Celsius
- Write a C++ program to print the following output using for loop.

1
2 2
3 3 3
4 4 4 4

- Write a C++ program to reverse a number using do-while loop
- Write a C++ program to find out the factorial of a number using while loop
- Write a C++ program to read an integer array and display it.
- Write a C++ program to read a character array and display it.
- Write a C++ program to find out the maximum of three number using if-else statement
- Write a C++ program to implement the concept of static data member in class.
- Write a C++ program to implement the concept of static function in class.
- Write a C++ program using function with default argument.
- Write a C++ program to illustrate the use of objects as function arguments (which performs the addition of time in the hour and minutes format)
- Write a C++ program to illustrate the use of friend function.
- Write a C++ program to illustrate how an object can be created (within a function) and returned to another function
- Write a C++ program to illustrate the use of constructors and destructors.
- Write a C++ program to illustrate the use of copy constructor.
- Write a C++ program to implement single inheritance (private/public)
- Write a C++ program to implement multilevel inheritance
- Write a C++ program to implement multiple inheritances.
- Write a C++ program to illustrate the use of virtual base class.
- Write a C++ program to overload unary minus operator
- Write a C++ program to overload binary „+“ operator
- Write a C++ program to illustrate how an operator can be overloaded using friend function.
- Write a C++ program to illustrate the use of run time polymorphism.
- Write a C++ program to swap two variable using function template
- Write a C++ program to implement try(), catch(), throw() function.
- Write a C++ program to implement this pointer
- Write a C++ program to illustrate the use of pointers to derived objects
- Write a C++ program to illustrate the use of virtual function
- Write a C++ program to open and close a file using open(), close() function
- Write a C++ program to illustrate the use of read(), write() function

Text Books:

1. *Object Oriented Programming With C++*, E. Balaguruswamy, 4th Edition, 2011, Tata McGraw Hill.
2. *C++, The Complete Reference*, Herbert Schildt, 4th Edition, 2017, McGraw Hill Education.

Reference Books:

1. Deital and Deital, *C++ How To Program*, 9th Edition, 2016, Pearson Education India.
2. R. Lafore, *Object Oriented Programming In Turbo C++*, 4th Edition, 2013, Galgotia, New Delhi

Paper III/Subject Name: Data Structures and Algorithms	Subject Code: CAP052C204
L-T-P-C – 3-0-2-4	Credit Units: 04
	Scheme of Evaluation: TP

Objective:

The objectives of the course are to expose the students with the concepts of algorithm design and various types of data structures.

Prerequisites: Basics of C Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basic constructs of data structure, implementation and application.	BT 2
CO 2	Utilise the appropriate data structures to solve a given problem.	BT 3
CO 3	Analyze and evaluate the pseudocodes for their complexity analysis.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Data Structure Basics	Introduction, Terminologies, Data Structures Classification, Operations on Data Structures, Abstract Data Types. Algorithms Efficiency, Time and Space Complexity, Time and Space Tradeoff, Asymptotic Notations	12
II	Linear Data Structures	Arrays- Introduction, Memory Representation of One Dimensional and Two Dimensional Arrays, Various operations on array, Sparse Matrices. Linked Lists- Introduction, Memory Representation, Various Types of Linked Lists, Operations and Applications of Linked Lists. Stacks- Introduction, Array and Linked Representation of Stacks, Operations on Stacks, Applications of Stacks. Queues- Introduction, Array and Linked Representation of Queues, Operations on various types of Queues, Types of Queues, Applications of Queues.	12
III	Non-Linear Data Structures	Trees- Introduction, Basic Definitions, Types of Trees, Memory Representations, Binary Tree Traversal, Binary Search Trees, Operations on Binary Search Trees, AVL Trees, applications of Trees. Graphs- Introduction, Basic Definitions, Memory Representations, Graphs Vs Trees, Minimum Spanning Trees, Applications of Graphs	12
IV	Searching and Sorting	Searching- Introduction, Linear Search, Binary Search, Complexity Analysis Sorting- Introduction, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Radix Sort, Heap Sort, Complexity Analysis	12

Total			48

Text Book:

1. *Data Structures Using C*, Reema Thareja, 2nd Edition, 2014, Oxford University Press.

Reference Books:

1. Seymour Lipschutz, *Data Structures*, 1st Edition (reprint) 2017, McGraw Hill Education.
2. Yashavant P. Kanetkar, *Data Structure through C*, 2nd Edition, 2003, BPB Publications.
3. E. Balagurusamy, *Data Structures Using C*, 1st Edition, 2017, McGraw Hill Education.

Subject Name: Introduction to Data Structures Lab
--

Objective:

The objectives of the course are to make the students develop skills to design and analyze programs with simple linear and non-linear data structures and analyze their complexities.

Prerequisites: Basics of C Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the application of elementary data structures such as stacks, queues, linked lists, trees and graphs	BT 2
CO 2	Utilize appropriate data structures to solve various problems.	BT 3
CO 3	Analyze and evaluate algorithms for its efficiency.	BT 4 & 5

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

1. Some common programs of C as revision.
2. Programs on Arrays- Traversal, Insertion, Deletion, Polynomial Representation, etc.
3. Programs on Linked List- Creation Insertion, Deletion, Polynomial Representation, etc.
4. Programs on Stacks-Creation, Push Pop, Infix to Postfix Conversion, Evaluation.
5. Programs on Queues-Creation, Insertion, Deletion, etc.
6. Programs on Trees- Binary Tree Creation, Tree Traversal, BST
7. Programs on Searching- Linear Search, Binary Search
8. Programs on Sorting- Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort.

Text Book:

1. *Data Structures Using C*, Reema Thareja, 2nd Edition, 2014, Oxford University Press.

Reference Books:

1. Seymour Lipschutz, *Data Structures*, 1st Edition (reprint) 2017, McGraw Hill Education.
2. Yashavant P. Kanetkar, *Data Structure through C*, 2nd Edition, 2003, BPB Publications.
3. E. Balagurusamy, *Data Structures Using C*, 1st Edition, 2017, McGraw Hill Education

- **Detailed Syllabus of Generic Elective (GE-III/IV)**

Paper IV/Subject Name: Server Side Programming	Subject Code: INT052G204
L-T-P-C – 3-0-0-3	Credit Units: 03 Scheme of Evaluation: T

Objective:

The objectives of the course are to teach students the process to build web applications using the Ruby on Rails framework.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the process of building web applications using Rails database	BT 1 & 2
CO 2	Build dynamic web applications.	BT 3
CO 3	Compare and criticise the design of web applications.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Using of GitHub, collaboration of code with others using the git tool, an introduction to Ruby, set up a developer environment and VSCode for Ruby and use irb, basics of Ruby programming language, the use of Ruby hashes and how to write recursive methods, POSIX command line and best practices of git	09
II	Object oriented Programming and Database	Introduction to object-oriented programming, define classes and also understand the difference between two types of relationships between classes - Composition and Inheritance Introduction to databases and set up a PostgreSQL database connect to a database from a Ruby application Active Record models to manipulate data. RubyGems development of Rails application and connection to the PostgreSQL database	09
III	HTML, CSS & ERB Pipeline	Basics of the CRUD pattern, designing their HTML pages with CSS and experimenting with using classes, selectors and layouts, basics of the MVC pattern, render dynamic data inside their HTML pages using ERB templates,	09
IV	HTML forms and Rails form helpers & User	Accept user input on their application via form element in HTML and also using Rails form helper creation of resources using forms, and learn about Cross Site Request Forgery (CSRF), authenticity tokens, ActiveRecord association, migration and validation	09

	Authentication	password storage and play around with browser cookies, sessions, user authentication	
Total			36

Text Book:

1. *Learn Rails 6: Accelerated Web Development with Ruby on Rails*, Adam Notodikromo ,1stEdition, 2020, Apress

Reference Books:

1. Joseph Joyner, *Ruby on Rails For Beginners: Rails Web Development Programming and Coding Tutorial*, 2nd Edition, 28 September 2015, Minhails Konoplovs

Paper V/Subject Name: Introduction to Cyber Space	Subject Code: INT052G205
L-T-P-C – 3-0-0-3	Credit Units: 03
	Scheme of Evaluation: T

Objective:

The objectives of the course are to make the students understand the concept of Cyber Security and its related issues and challenges as well as to make them aware of the e-commerce applications.

Prerequisites: Basics of Computer Network, Web technology

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate the different forms of Cyber Security threats and vulnerabilities.	BT 2
CO 2	Experiment with the adverse effect of social media on people.	BT 3
CO 3	Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Cyber Security	Defining Cyberspace and Overview of Computer and Web technology, Architecture of cyberspace, Communication and web technology, Internet, Worldwide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of Cyber Security, Issues and challenges of Cyber Security	09
II	Cybercrime and Cyber law	Classification of cybercrimes, Common cyber-crime targeting computers, cybercrime against woman and children, financial frauds, social engineering attacks, malware, and ransomware attacks, zero day and zero click attacks., Cybercriminals modus-operandi, reporting of cybercrimes, Remedial and mitigation measures.	09
III	Social Media Overview and Security	Introduction to Social networks. Types of social media, social media platforms, social media monitoring, Hashtag, Viral content, social media marketing, social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media	09
IV	E-Commerce	Electronic Commerce definition, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce	09

		security best practices, Introduction to digital payments, Digital payment related common frauds and preventive measures. RBI guidelines on digital payment and customer protection in unauthorised banking transactions.	
Total			36

Text Book:

1. *Cyber Crime Impact in the New Millennium*, Marine R. C, 2nd Edition 2017, Auther Press.
2. *Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd

Reference Books:

1. Henry A. Oliver, *Security in the Digital Age: Social Media Security Threats and Vulnerabilities*, Create Space Independent Publishing Platform.
2. Elias M. Awad, *Electronic Commerce*, 1st Edition, 2001, Prentice Hall of India Pvt Ltd.

- **Detailed Syllabus of Ability Enhancement Compulsory Courses(AECC-III/IV)**

Paper VI/Subject Name: Conversation and Public Speaking	Subject Code: CEN982A201
L-T-P-C – 1-0-0-1	Credit Units: 01
	Scheme of Evaluation: TP

Objective:

The objectives of the course are to give students a platform to enhance their speaking and conversational skills in English by engaging them in meaningful discussions and interactive activities.

Prerequisites: Basic understanding of conversation and speaking in public.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Explain various skills of speaking at different levels.	BT 2
CO 2	Apply the skills learnt in their day-to-day life.	BT 3

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Speaking Skills	Speaking-The Art of Speaking, Goals, Speaking Styles, Speaking Process, Importance of Oral Communication, Choosing the form of Communication, Principles and Guidelines of Successful Oral Communication, Barriers to Effective Oral Communication, Three aspects of Oral Communication-Conversing, Listening and Body Language, Intercultural Oral Communication	3
II	Conversational Skills: Listening and Persuasive Speaking	Introduction, Conversation- Types of Communication, Strategies for Effectiveness, Conversation Practice, Persuasive Functions in Conversation, Telephonic Conversation and Etiquette, Dialogue Writing, Conversation Control	3
III	Transactional Analysis	The Role of Intonation, Strokes, Psychological Characteristics of Ego States (The Parent, The Adult, The Child), Structure and Aspects of Human Personality, Analysis Transactions-Complementary Transactions, Crossed Transactions, Duplex or Ulterior Transactions, How to Identify the Ego States of the Interacting Individuals, How to Manage Conversations, Structural Analysis, Certain Habits of Ineffective Conversationalists	3
IV	Business Presentation and Public Speaking	Business Presentation and Speeches–Difference, Elements of a Good Speech-Planning, Occasion, Audience, Purpose, Thesis, Material, Organising and Outlining a Speech Outline, Types of	3

		Delivery, Guidelines for Delivery-Verbal Elements, Non-Verbal Elements, Vocal Elements, Visual Elements, Controlling Nervousness and Stage Fright	
TOTAL			12

Text Books:

1. *Business Communication*, Raman Meenakshi and Prakash Singh. Oxford University Press. Page 123-165
2. *Technical Communication*, Raman Meenakshi and Sangeeta Sharma. Oxford University Press. Page 137-148

Reference Books:

1. Sengupta Sailesh, *Business and Managerial Communication*. PHI Learning Pvt. Ltd. Page 136-153
2. Mehra Payal, *Business Communication for Managers*, Pearson, Page 75-83

Paper VII/Subject Name: Understanding Self and Others	Subject Code: BHS982A204
L-T-P-C – 1-0-0-1	Credit Units: 01
	Scheme of Evaluation: T

Objective:

The objectives of the course are to provide the students insight into the various aspects of self and how one perceives and comprehends other's behaviour in the light of their present appearance

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand and visualise one's own self.	BT 2
CO 2	Develop one's own behaviour.	BT 3
CO3	Analyse other's behaviour in the light of their present appearance.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Self and Identity	Separated and Connected perspective Immersed and Distal perspective Self-concept, self-esteem and self-efficacy Personal and social identity	3
II	Structure and Functions of Identity	Continuity and differentiation Identity crisis: Erikson and Marcia Quarterlife crisis- a new concept of understanding young people's difficulties in transitioning to adulthood	3
III	Social Perception	Making sense and categorizing information from environment Person schemas and group stereotypes	3
IV	Attribution	Attribution theory Dispositional versus situational attributions Inferring dispositions from acts Co-variation model of attribution Attributions for success and failure Bias and error in attribution Over-attribution to dispositions Focus of attention bias Actor observer difference Motivational biases Cultural basis of attributions	3
TOTAL			12

Text Books:

1. Baron, R. A.& Branscombe, N. R., *Social Psychology*, 13th Edition, 2012, US Pearson.
2. Baumeister, R. F., *Self-concept, self-esteem and identity.*, In Varerian, J. D., Barbara, W. A. & Warren, J. H. (Eds), *Personality: Contemporary Theory and Ethnicity*, (pp. 339-375). US: Nelson-Hall Publishers

Reference Books:

1. Leary, M.R. & Tangney, J. P., Handbook of Self and Identity, 2012, New York: The Guilford Press.
- **Detailed Syllabus of Skill Enhancement Courses(SEC-II)**

Paper VIII/Subject Name: Windows Programming using C#	Subject Code: CAP052S211
L-T-P-C - 0-0-4-2	Credit Units: 02 Scheme of Evaluation: P

Objective:

The objectives of the course are to enable the students to learn concepts on C# and .NET framework

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand introductory programming concepts using C#	BT 2
CO 2	Apply logical alternatives with C# decision structures utilizing iteration, class methods, fields, and properties.	BT 3
CO3	Simplify forms, classes, and controls into C# solutions utilizing arrays and file/database access methods	BT 4

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

- **Introduction to .Net framework:** Installation, Components of .NET , Common Language Specification (CLS), Common Language Runtime (CLR), Microsoft Intermediate Language ("MSIL" or "IL"), The Common Type System (CTS), .NET Framework Base Classes, Web Services, Web Forms, and Windows Forms, The .Net Languages
- **Introduction to C #:** Execution of Sample Programs, Command Line Arguments, Programming Examples, And Multiple Main Methods. Keywords, Identifiers, Literals, Variables, Data Types, Boxing and Unboxing. Operator Precedence and Associativity, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Type Conversions.
- **Branching and Looping:** Decision Making Statements, The Switch Statement, The? Operator, Decision Making and Looping, Jumps in Loops, Labelled Jumps
- **Structure, Arrays and Strings:** Single Dimensional Arrays, Multidimensional Arrays, Jagged Arrays, System. Array Class, Array List Class, Strings, Regular Expressions
- **Methods in C#:** Declaring Methods, Main Method, Invoking Methods, Nesting of Methods, Method Parameters
- **Structures and Enumerations:** Defining a Structure, Assigning Values to Members, Copying Structures, Structures with Methods, Nested Structures, Classes Vs Structures, Guidelines to use Structures; Enumerations- Enumerator Initialization, Enumerator Base Types, Enumerator Type Conversion.\

- **Classes and Objects:** Constructors & Destructors, Member Initialization, 'this' Reference Variable, Nesting of Classes, Members, Properties
- **Inheritance and Polymorphism:** Classical Inheritance, Containment Inheritance, defining a Subclass, Visibility Control, Subclass Constructor, Method Overriding, Hiding Methods, Abstract Classes, Abstract Methods, Sealed Classes, Sealed Methods, Polymorphism
- **Exception Handling:** Exceptions – An Overview, Exception Handling Syntax, Multiple Catch Statements, The Exception Hierarchy, General Catch Handler, Using 'Finally', Nested Try Blocks, User Defined Exceptions, Operators – Checked and Unchecked.
- **Interfaces, Delegates and Events:** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Explicit Interface Implementation, Abstract Classes and Interfaces, Delegates, Multicast Delegates, Events
- **Windows Application:** The Console Class, Console Input and Output, Formatted Output, Custom Numeric Format. Developing Windows Applications, Developing Web Applications.

Text Book:

1. *Programming in C#*, E Balagurusamy, 3rd Edition, 2010, Tata McGraw Hill , New Delhi

Reference Books:

1. Poul Klausen, *Introduction to programming and C# Language*, Bookbon, 1st 2012, New Delhi.

- Detailed Syllabus of Value Addition Course (VAC-II)

Paper IX/Subject Name: Computer Hardware and Networking	Subject Code: VAC992V211
L-T-P-C – 1-0-1-2	Credit Units: 02 Scheme of Evaluation: P

Objective:

The objectives of the course are to explain the different hardware components of a computer system and learn its assembling and disassembling along with various networking devices.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand basic idea of installation process and components of a PC	BT 2
CO 2	Experiment with some hardware components to assemble a computer system.	BT 3
CO3	Analyse and evaluate different networks to decide for setting up small networks	BT 4& 5

Detailed Syllabus:

Module s	Topics	Course content	Periods
I	Basics of Computer	Basic Introduction About (Hardware & Software) OS installation (Windows & Linux) , Operating Systems (Edition, Requirement, Types of Installation, Driver Installation) Dual OS installation, Dos Command, Backup and Restore, User Control, Control Panel Computer Peripherals – (Input and Output Devices, Primary Component, Computers Language, Serial and parallel Communication, SMPS) Motherboard (Type, form factor, BUS, IRQ, Chipset, I/O Ports and Connectors, CMOS) Memory (Type, Memory Modules, Development of RAM Comparison of RAM, Virtual Memory, BIOS, POST) Hard Disc (Type, Port, File systems, jumper Setting, Disk Type, Components) Processor (Type, ZIF and SEC, Supports, Virtual Support, Cache, Cores information) External Drives (CD and DVD Drive, Blue-ray, Floppy Disk, Modem, and Printers) Ubuntu (H/W Requirement, basic Command, installation)Assembling and Dis-assembling components, Component upgrade Troubleshooting	12

II	Basics of Computer Networking	Introduction (Types of Networks, Topology, protocols, and Ports) Networking devices (Routers, Switches, Hub, Repeater, NIC Cards, Bridge) Networking Media (Wire, Wireless, Cables, Crimping, UTP) Networking Layers (OSI, TCP/IP) IP Addresses (Version, Classes, Types) Subnetting (VLSM, FLSM, CIDR, Super netting) Setting IP addresses, Sharing files and folders. Network troubleshooting with PING test, ipconfig etc.	12
III	Combinational Logic Circuit Design	Routing, Routing Components, Ports, Network Simulators (CISCO Packet Tracer), Networking Functions (Static, and Default Routing, Password) Dynamic Routing 1 (RIP1, RIP2, Troubleshooting Commands) Dynamic Routing 2 (IGRP, EIGRP, and OSPF) Routing Security (Standard, Extended, Named ACL) Switching 1 (Types, Command, Password, VLAN, and Commands) Switching 2 (Inter VLAN and Commands, Trunking Protocol, VTP, STP) WAN Security (Static Dynamic, and PAT NAT), Basic Network Troubleshooting	12
IV	Servers	Basics of configuring NFS, NIS, DNS, FTP, Squid Proxy, DHCP server Mail server, Web server(Apache), File server(Samba), ip tables and firewall	12
Total			48

Text Book:

1. Computer Hardware & Networking With Free CD, A Panel of Authors, 2nd Edition, 2021, Computech Publications

Reference Books:

1. Ajit Mittal and Ajay Rana, *Mastering Pc Hardware And Networking*, 1st Edition, 2014, Khanna Book Publishing.
2. Joginder Singh Saini and Jagdeep Singh Saini, *Royal new pattern computer hardware & network maintenance*, 1st Edition, 2017, Royal Book Dept.

SYLLABUS (3rd SEMESTER)

Paper I/Subject Name: JAVA Programming

Subject Code: CAP052C301

L-T-P-C – 3-0-2-4

Credit Units: 04

Scheme of Evaluation: TP

Objective:

The objectives of the course are to teach the concepts and implementations of object-oriented programming using JAVA language.

Prerequisites: Basics of Procedural or Object-Oriented Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand basic idea of installation process and components of a PC	BT 2
CO 2	Apply the concepts of Java, multithreading and Exception handling to develop efficient and error free codes.	BT 3
CO3	Analyse and evaluate programs for reusability.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	A look at procedure-oriented programming, Object-oriented paradigm, Basic concepts of object-oriented programming (OOP) (encapsulation, inheritance, polymorphism), How Java differs from C and C++, Applications of OOP. Overview of JAVA, Use of math functions, comments, Constructing a java program, Introduction of JVM, Command line argument, Data types, Variables: declaration, scope, Type Conversion and Type Casting, Constants, Operators, Evaluation of Expression, Precedence of Operators, Control statements: selection, iteration and jump.	12
II	Classes and Objects	Class: definition and example, Declaring objects, Method overloading and overriding, Binding : concept of binding, static vs. dynamic binding, Using this and super keywords, Access Control, Inheritance: Extending a class, Final, Abstract classes, Constructors Arrays: one-dimensional and multi-dimensional, Strings : string processing functions	12
III	Packages, Interfaces, Exception Handling	Defining a package, accessing a package and using a package, Interfaces: multiple inheritance, Defining interfaces, implementing interfaces and extending interfaces. Exception handling fundamentals, Exception type: using try...catch, Multiple catch clauses, Throw and Throws	12

		Creating threads, Extending the thread class, Stopping and blocking a thread, Life cycle of thread, Threads methods, Thread exceptions	
IV	Applets and Files	Introduction: local and remote applets, How to write applets, Building applet code, Applet life cycle, Creating an executable applet I/O basics, concept of streams, Stream classes: byte stream classes, character stream classes, I/O exceptions, Creation of files, Random access files	12
Total			48

Text Books:

1. *Programming with Java: A Primer*; Balagurusamy E., 3rd Edition, 2005, Tata McGraw-Hill, New Delhi
2. *Thinking in Java*, Eckel B., 4th Edition, 2006, PHI.

Reference Books:

1. Maurice N. et al, *Java Generics and Collections*, 1st Edition, 2006, O'REILLY Publication.
2. Booch G., Rumbaugh J.Jacobson I., *The Unified Modeling Language User Guide*, 2nd Edition, 2005, Pearson Education.
3. Schildt H., *The Complete Reference Java*, 7th Edition, 2007, Tata McGraw-Hill, New Delhi

JAVA Programming Lab

Objective:

The objectives of this course are to make the students understand and analyze practically the utility of JAVA programming language.

Prerequisites: Basics of Procedural or Object-Oriented Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the concepts of Java programming.	BT 2
CO 2	Utilize an integrated development environment to write, compile, run, and test simple object-oriented Java programs.	BT 3
CO3	Analyse and evaluate problems for better solutions	BT 4 & 5

Detailed Syllabus:

- Write a program in java that outputs your name in giant letters.
- Write a program in Java to find the day of the week of a given date.
- Write a program in Java called GradesStatistics, which reads in n grades (of int between 0 and 100, inclusive) and displays the average, minimum, maximum, and standard deviation.
- Write a program in Java to compute execution time by generating random numbers.
- Write a program in Java to implement the following:
 - a. Tokenize the paragraph into single word.

- b. Find the number of word in a paragraph?
 - c. Find the number of similar words from the input word.
 - d. Find the number of occurrence of each word.
- Write a program in Java to implement some inheritance hierarchy.
- Design and implement an address book object that contains a person's name, home address and phone number, business address and phone number, and numbers for their fax machine, cellular phone, and pager. Write a program in Java to this test plan for the object and implement a driver [finally prepare a package].
- Write a program in Java to demonstrate the use of try, catch, finally throw and throws keywords and demonstrate the following points in the program.
 - a. Multiple catch blocks.
 - b. try-catch-finally combination.
 - c. try-finally combination.
 - d. Exception propagation among many methods.
 - e. Use of getMessage(), printStackTrace() function of Throwable class.
 - f. Nested try blocks
- Write a program that does the following.
 - a. Prompts the user for an input file name through a dialog box.
 - b. Prompts the user for an output file name through a dialog box.
 - c. Copies the input file into the output file, subject to the removal of the space characters listed below from each line.
 - i. The leading space characters
 - ii. The trailing space characters
 - iii. The space characters that are preceded by space characters
- Write a program in Java to design forms.
- Write a program in Java to design a student information form to enter data into the database.
- Write a program in Java to connect some form designed with the back-end database and test them by inserting some records.

Text Books:

1. *Programming with Java: A Primer*; Balagurusamy E., 3rd Edition, 2005, Tata McGraw-Hill, New Delhi
2. *Thinking in Java*, Eckel B., 4th Edition, 2006, PHI.

Reference Books:

1. Maurice N. et al, *Java Generics and Collections*, 1st Edition, 2006, O'REILLY Publication.
2. Booch G., Rumbaugh J. Jacobson I., *The Unified Modeling Language User Guide*, 2nd Edition, 2005, Pearson Education.
3. Schildt H., *The Complete Reference Java*, 7th Edition, 2007, Tata McGraw-Hill, New Delhi

Paper II/Subject Name: Introduction to Database Management Systems Subject Code: CAP052C302

L-T-P-C – 3-0-2-4

Credit Units: 04

Scheme of Evaluation: TP

Objective:

The objectives of the course are to make the students learn about databases and the process of designing and constructing data models.

Prerequisites: C/C++, Concepts of Data Structures.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basic concepts and applications of database systems	BT 2
CO 2	Apply the basic concepts of MySql and write queries using it.	BT 3
CO3	Analyse the designed database for normalisation.	BT 4
CO 4	Evaluate the process of transaction processing and concurrency control	BT 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Introduction to Data System, Drawbacks of Conventional File System, Purpose of database systems, DBMS Components, Architecture, Data Independence, Data modeling, Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modeling using the Entity Relationship Model.	12
II	Relational Databases	Relational databases, relational algebra, relational calculus. Data definition with SQL, insert, delete and update statements in SQL, views, data manipulation with SQL, triggers and assertions, cursors, Embedded SQL	12
III	Normalization	Relational Database Design guidelines, Integrity Constraints, Domain Constraints, Referential integrity, Functional Dependency, Normalization using Functional Dependencies, Normal forms (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies and Forth Normal Form, Join Dependencies and Fifth Normal Form, Pitfalls in Relational Database Design, Lossless Non-additive Join Property of Decomposition, Dependency Preserving Decomposition	12

IV	Transaction Processing, Concurrency and Recovery	Introduction. ACID Properties, Schedules and Recoverability - Serializability of Schedules- Concurrency Control, Database Recovery Concepts- Caching, Checkpoints, Transaction Rollback, Case Study-Recovery Techniques in DBMS	12
Total			48

Text Book:

1. *Fundamentals of Database System*, Elmasri, Navathe, 7th Edition, 2016, Pearson Education Asia
2. *Database System Concepts*, Korth H.F., Silberschatz A.; 6th Edition, 2013, Mc Graw Hill.
3. *Introduction to Database Management System*, Kahate A., 1st Edition, 2004, Pearson Educations
4. *DataBase Management System*, Paneerselvam, 2nd Edition, 2011, PHI Learning

Reference Books:

1. Date C.J., *An Introduction to Database Systems*, 8th Edition, 2003, Pearson Education Asia
2. Desai B.C., *An Introduction to Database Systems*, Revised Edition, 2012, Galgotia Publications

Introduction to Database Management Systems Lab
--

Objective:

The objectives of the course to teach the student database design and query processing through MySQL.

Prerequisites: C/C++, Concepts of Data Structures

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Illustrate a database schema for a given problem-domain.	BT 2
CO 2	Build queries in MySQL with the concepts learnt.	BT 3
CO3	Analyse and evaluate the queries for its correctness.	BT 4& 5

Detailed Syllabus:

- Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
- Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET,
- Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
- Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

- Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
- Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
- Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
- Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
- Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
- Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
- Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
- Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

Text Book:

1. *Fundamentals of Database System*, Elmasri, Navathe, 7th Edition, 2016, Pearson Education Asia
2. *Database System Concepts*, Korth H.F., Silberschatz A., 6th Edition, 2013, Mc Graw Hill.

Reference Books:

1. Date C.J., *An Introduction to Database Systems*, 8th Edition, 2003, Pearson Education Asia
2. Desai B.C., *An Introduction to Database Systems*, Revised Edition, 2012, Galgotia Publications

- Detailed Syllabus of Department Specific Elective (DSE-I)

Paper III/Subject Name: Graph Theory	Subject Code: CAP052D301
L-T-P-C – 3-1-0-4	Credit Units: 04
	Scheme of Evaluation: T

Objective:

The objectives of the course are to explain the fundamental concepts in graph theory such that it can be used to solve practical problems.

Prerequisites: Concepts of Data Structures and Discrete Mathematics

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand mathematical definitions of objects in graph theory.	BT 2
CO 2	Apply mathematical concepts to solve graph-related problems.	BT 3
CO3	Utilize a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.	BT 3
CO 4	Analyse and critically assess a mathematical proof.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Definition of Graph, Application of Graphs Finite and Infinite graphs, Incidence and degree of a graph, Isolated Vertex, Pendent Vertex, Null Graph. Isomorphism; Sub graphs and Union of Graphs, walks, Paths and Circuits, Connected Graphs, disconnected graphs and components, Eulerian graph, Chinese postman problem, Konigsberg Bridge Problem, Operations on Graphs, Arbitrarily traceable graphs, Fleury’s algorithms, Hamilton graph-necessary and sufficient conditions, Complete Graph, Traveling salesman, bipartite graph	6
II	Trees	Definition of tree, Properties of tree, Pedant vertices in a tree; Center of a tree, Rooted binary trees, On counting trees, Fundamental circuits; Spanning trees, Spanning algorithms Spanning trees of a weighted graph, algorithms for shortest Spanning tree.	13
III	Cut Sets and Vertices, Planar Graph and Matrix Representation	Cut-sets and cut-vertices; Some properties of Cut-Set, Fundamental Circuits and cut-sets, Connectivity and separativity and different theorems; Network flow, max-flow min-cut theorem, 1-isomorphism and 2-isomorphism.	14

	of Graph	Combinatorial and geometric graphs, planar graphs, Geometric and Combinatorial dual; Kuratowski graph; detection of planarity; Thickness and crossings. Incidence; Adjacency; Circuit, Cut-Set, Path matrices and their properties	
IV	Graph Coloring, Directed Graphs and Enumeration of Graphs	Chromatic number; Chromatic Partitioning, Chromatic polynomial, Coverings, minimization of Switching Functions. Four Color theorem, five color theorems Digraphs, different types of digraphs, Binary relations, Directed graphs and connectedness, Euler Digraph, Tree with directed graph, Arborescence an Polish method. Types of Enumerations, Counting labeled an Unlabelled trees, Counting Methods, Polay Counting Theory.	15
Total			48

Text Book:

1. *Graph Theory with applications to Engineering and Computer Science*, Narasingh Deo, New Edition, PHI Publications.
2. *Graph Theory*, Franck Harary, 2001, Narosa Publising House

Reference Books:

1. Bondy, J. A. and Murty, U.S.R., *Graph Theory with Applications*, 2008, Springer
2. C.L. Liu, *Elements of Discrete Mathematics*, 2nd Edition, 2000, Tata McGraw Hill
3. Harikishan, Shivraj Pundir and Sandeep Kumar, *Discrete Mathematics*, 7th Edition, 2010, Pragati Publication

Paper III/Subject Name: Discrete Mathematics**Subject Code: CAP052D302****L-T-P-C – 3-1-0-4****Credit Units: 04****Scheme of Evaluation: T****Objective:**

The objectives of the course are to make the students learn fundamental concepts of mathematical relations, functions, number theory and graph theory and their use in the field of IT.

Prerequisites:Basic Mathematical Foundations

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the concept of logic, sets, relations and functions to solve problems.	BT 2
CO 2	Apply the concepts learnt to solve computer science related problems.	BT 3
CO3	Analyse and evaluate the solutions.	BT 4

Detailed Syllabus:

Modules	Topics	Course Contents	Hours
I	Sets, Relations and Functions	Operations and Laws of Sets, Binary, Relation, Partial Ordering Relation, Equivalence Relation, Functions, Inverse and Composite Function, Finite and infinite Sets, Countable and uncountable Sets, Poset, Lattice. The Well-Ordering Principle, The Division algorithm: Prime numbers, The Greatest Common Divisor, The least common multiple, Euclidean Algorithm, The Fundamental Theorem of Arithmetic, Congruence, Euler's phi function.	12
II	Graph Theory and Combinatory	Graphs and their properties, Degree, subgraphs, walks, paths and circuits, connected and disconnected graphs, Isomorphism, Eulerian and Hamiltonian graphs, Complete graphs, Bipartite graph, Trees, Properties of trees, Pendant vertex, Distance and Centers, Binary tree, Spanning trees, Planar graphs, Matrix representation of graphs, Chromatic number, Chromatic polynomial, Five colours theorem. Pigeon-hole principle, permutation and combination, Recurrence relations, Generating functions.	12
III	Propositional Logic	Proposition, connectives, tautology, contradiction, logical equivalence, normal forms-DNF, CNF, argument, Validity of argument, fallacy, Rules of Inference, Quantifiers. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function.	12
IV	Algebraic Structures	Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields.	12
TOTAL			48

Text Books:

1. *A text book of Discrete Mathematics*, Sarkar S. K., Revised Edition, 2016, S Chand & Co Ltd.

Reference Books:

1. Deo N; *Graph Theory with applications to engineering and computer science*, New Edition, 2009, PHI Learning Private Limited.
2. Chandrasekaran N. and Umavathi, *Discrete Mathematics*, Eastern Economic Edition, 2013, PHI
3. Rosen, K.H., *Discrete Mathematics and its Applications*, 6th Edition, 2006, McGraw Hill.
4. Tremblay, J.P. and Manohar, R., *Discrete Mathematical Structures with Applications to Computer Science*, 35th Reprint, 2007, Tata McGraw Hill

- **Detailed Syllabus of Generic Elective (GE-V/VI)**

Paper IV/Subject Name:Front-End Development with React	Subject Code: INT052G302
L-T-P-C – 3-0-0-3	Credit Units: 03
	Scheme of Evaluation: T

Objective:

The objectives of the course are to teach the students about React & Type Script to enable them to create web pages.

Prerequisites: Fundamentals of Web Development and Server Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand static types and know how to port untyped JavaScript	BT 2
CO 2	Apply the concepts learnt to create Single Page Web Applications (SPA) using React, Typescript and Tailwind CSS.	BT 3
CO 3	Inspect different elements of front-end development	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	React Fundamentals and State Management	Introduction to TypeScript by setting up a development environment, the TypeScript programming language and the React framework, and demonstrates some of the basic concepts that underpin the use of React for building dynamic reactive user interfaces. the Hooks feature of React on the usage of call-back functions and how to use them to build dynamic components that maintain an internal state. Standard hooks and the creation and use of custom hooks. This module also demonstrates state management by building a form and accepting user input.	09
II	Client-side routing	The concept of client-side routing as a separate behaviour from server-side route management. Demonstration of the various aspects of client-side routing such as the use of path parameters, query parameters, programmatic navigation and the operation of links and URLs that are handled client-side.	09
III	Modelling and managing complex states	Managing complex states using the state reducer pattern, and then demonstrates the pattern by implementing it using Reacts use Reducer hook. Introduction to APIs to interface client-side code with the server-side, creating model types to allow interaction to take place, maintain a session with the backend, and working with pageable APIs	09
IV	Production React	Front-end development including the importance of	09

	Apps	accessibility and WAI-ARIA standards, and use of third-party packages from the NodeJS ecosystem. Production-specific optimizations of a React application, build & deployment process, and configuration of a progressive web app.	
Total			36

Textbooks:

1. *Learn React with TypeScript 3: Beginner's guide to modern React web development with TypeScript 3*, Carl Rippon, 2018, Pact Publishing.
2. *Full-Stack React, TypeScript, and Node: Build cloud-ready web applications using React 17 with Hooks and GraphQL*, David Choi, 2020, Packt Publishing Limited.

Reference Books:

1. Frank Zammetti, *Modern Full-Stack Development: Using TypeScript, React, Node.js, Webpack, Python, Django, and Docker*, 2nd Edition, 2022, APress

Paper V/Subject Name:IPR and Cyber Law	Subject Code: INT052G303
L-T-P-C – 3-0-0-3	Credit Units: 03
	Scheme of Evaluation: T

Objective:

The objectives of the course are to enlighten the students with various legal, social and international issues and the various remedies available under the Information Technology Act for the breach and commission of offence in cyber space.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basic concept and idea behind IPR and cyber laws	BT 2
CO 2	Identify the various legal, social and international issues and the various remedies available under the Information Technology Act for the breach and commission of offence in cyber space	BT 3
CO 3	Analyse the risks around Cyber Security when trading and doing business online.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	Introduction to Intellectual Property Rights	Introduction, History of IPR in India, Overview of Laws related to Intellectual Property Rights in India, Major forms of IPR- Copyright, Patent.	9
II	Advanced issues in IPR	Other forms of IPR- Trademark, Designs, Geographical Indications of Goods, Semiconductor Integrated Circuits Design, Biological Diversity, Protection of Plant Varieties and Farmer Rights, Undisclosed Information. Indian Intellectual Property- Administrative Machinery. The Agreement of Trade Related Aspects of Intellectual Property Rights (TRIPS). World Intellectual Property Organization (WIPO). Intellectual Property Treaties. Commercialization of Intellectual Property Rights.	9
III	Introduction to the Cyberspace and Cyber Laws	Introduction- History of Internet and World Wide Web, Need for cyber law, Cyber-crime on the rise, Important terms related to cyber law. Cyber law in India- Need for cyber law in India, History of cyber law in India, Information Technology Act, 2000, Overview of other laws amended by the IT Act, 2000, National Policy on Information Technology 2012. Overview of the Information Technology Act, 2000, Overview of Rules issued under the IT Act, 2000.	9

		Electronic commerce, Electronic contracts.	
IV	Cyber Crimes & Legal Framework	Cyber-crimes or Cyber Frauds- Definition of cyber crime, First Cyber crime, Types of cyber frauds, Cyber frauds in India, Preventive measures, Cyber crimes, Who commits cyber-crimes, Penalties and offences under the IT Act, 2000, Offences under other legislations, Investigation of cyber-crimes in India. Regulatory Authorities.	9
Total			36

Text Book:

1. *IPR and Cyber Laws*, Sunil N. Shah, 1st Edition, 2016, Himalaya Publishing House
2. *Intellectual Property*, William Cornish, 1st Edition, 2014, Oxford University Press

Reference Books:

1. Pankaj Sharma, *Information Security and Cyber Laws*, Reprint Edition, 2013, S K Kataria & Sons Publication

• **Detailed Syllabus of Ability Enhancement Compulsory Courses (AECC-III/IV)**

Paper VI/Subject Name: Career Oriented Communication	Subject Code: CEN982A301
L-T-P-C – 1-0-0-1	Credit Units: 01
	Scheme of Evaluation: TP

Objective:

The objectives of the course are to prepare students to adopt different communication strategies and meet the competitive market of employment by considering relevant information related to job requirements.

Prerequisites: Basic understanding of the need to groom oneself for employment and the need for preparation of the same.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the requirement of the job market.	BT 2
CO 2	Build oneself for the competitive market of employment with the concepts learnt.	BT 3

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Perfecting the Art of Speaking	Informative Speaking Types of informative speaking, Informative versus persuasive topics, techniques of informative speaking, Sample informative speech and its Analysis Persuasive Speaking Characteristics of Persuasion, Categorizing types of persuasion, Creating the Persuasive Message, Adapting to the Audience, Building Credibility as a Speaker, Sample Persuasive Speech and its analysis	3
II	Employment communication for Internship and Campus placement	Employability versus employability, filling the industry-academia gap, Enhancing Employability : A five step approach (SWOT, JOHARI, Gathering job related information through research, Planning for employment, writing job suitability statement, reaching out to the prospective employer, preparing for the recruitment and selection process)	3
III	Learning the Written Process	Principles of effective writing Different forms of written communication used in organisations – <ul style="list-style-type: none"> • Business Letters- parts of business letters, Order, acceptance & cancellation, complaint & adjustment letters. • Project report – format and elements Internal office communication - office order, circular, notice, agenda, minutes.	3

IV	Communication for Employment	Preparing Resumes, Job Cover letter, Objectives of Interviews, Types of Interviews, Preparing for the Job interview, Different types of questions asked in Job interview, Qualifying the English Language Test (Synonyms And Antonyms, Confusing Words, Idioms and Phrases, Sentence Completion, Spellings, Grammar, Reading Comprehension, Verbal logic)	3
Total			12

Text Book:

1. *Business Communication: Essential Strategies for twenty-first century Managers*, Verma, Salini. 2nd Edition, 2015, Vikas Publishing House Pvt Ltd. pp 59-86, 119-165, 191-232, 243-259..

Reference Books:

1. Dufrene, Sinha, *BCOM: An Innovative Approach to learning and teaching Business Communication*, Lehman, 2011, Cengage Learning Pvt. Ltd.pp.399-405, 332-355

Paper VII/Subject Name: Behavioral Science-III

Subject Code: BHS982A304

L-T-P-C – 1-0-0-1

Credit Units: 01

Scheme of Evaluation: TP

Objective:

The objectives of the course are:

SYLLABUS (4th SEMESTER)

Paper I/Subject Name: Operating Systems

Subject Code: CAP052C501

L-T-P-C – 3-0-1-4

Credit Units: 04

Scheme of Evaluation: TP

Objective:

The objectives of the course are to teach the basic concepts and functions of operating systems and make them understand the principles of concurrency.

Prerequisites: Concepts of Computer Organization and Architecture

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the basic concepts of Operating systems.	BT 2
CO 2	Apply the principles of scheduling, and concurrency to solve various problems.	BT 3
CO 3	Analyze and evaluate the execution of simultaneous processes for deadlock.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course Contents	Hours
I	Operating Systems Overview	Introduction and history of Operating systems, structure and operations; processes and files. Computer System Overview - Basic Elements, Instruction Execution, Interrupts Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview -objectives and functions, Evolution of Operating System.- Computer System Organization- Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot	12
II	Process Management And Concurrency Control	Processes -Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads- Overview, Multicore Programming, Multithreading Models; Thread and SMP Management. Process Synchronization – Critical Section Problem, Mutex Locks, Semaphores, Monitors; CPU Scheduling and scheduling algorithms. Deadlocks - Shared resources, resource allocation and scheduling, resource graph models, deadlock detection, deadlock avoidance, deadlock prevention algorithms	12

III	Storage Management	Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging, Virtual Memory: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing. 32 and 64 bit architecture Examples; Allocating Kernel Memory, OS Examples	12
IV	I/O and File Systems	I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Overview of mass storage structure- disks and tapes. Disk structure – accessing disks, Swap Space. Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache. Disk Protection- Goals, Principles, Domain. File System Interface: File Concepts – Attributes – operations – types – structure – access methods. File system mounting. Protection. File system implementation. Directory implementation – allocation methods. Free space Management.	12
TOTAL			48

Text Books:

1. *Operating System Concepts*, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, 9th Edition, 2012, John Wiley and Sons Inc.

Reference Books:

1. William Stallings, *Operating Systems – Internals and Design Principles*, 7th Edition, 2011, Prentice Hall.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, 2nd Edition, 2001, Addison Wesley.
3. D M Dhamdhare, *Operating Systems: A Concept-Based Approach*, 2nd Edition, 2007, Tata McGraw-Hill Education.

Operating Systems Lab

Objective:

The objectives of the course are to make the students learn about process and disc scheduling practically along with the working of system calls.

Prerequisites: Fundamentals of Computer Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand and implement basic services and functionalities of the operating system using system calls.	BT 2
CO 2	Utilize modern operating system calls and synchronization libraries in software/ hardware interfaces.	BT 3

CO 3	Analyze various Scheduling algorithms to better usage of the CPU.	BT 4
-------------	--	-------------

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

1. Basic Linux Commands and Overview.
2. Write Shell Script for followings
 - To find the global complete path for any file.
 - To broadcast a message to a specified user or a group of users logged on any terminal.
 - To copy the file system from two directories to a new directory in such a way that only the latest file is copied in case there are common files in both the directories.
 - To compare identically named files in two different directories and if they are same, copy one of them in a third directory
 - To delete zero sized files from a given directory (and all its sub- directories).
 - To display the name of those files (in the given directory) which are having multiple links.
 - To display the name of all executable files in the given directory.
 - Write a script to display the date, time and a welcome message (like Good Morning etc.). The time should be displayed with “a.m.” or “p.m.” and not in 24 hours notation.
 - Write a script to display the directory in the descending order of the size of each file.
3. Implementation of FCFS (First Come First Serve) CPU Scheduling.
4. Implementation of SJF (Shortest Job First) CPU Scheduling.
5. Implementation of Round Robin (RR) CPU Scheduling.
6. Implementation of Priority CPU Scheduling Algorithm.
7. Implementation of FIFO Replacement Algorithm.
8. Implementation of Optimal Page Replacement Algorithm.
9. Implementation of LRU Page Replacement Algorithm by Stack method
10. Implement the producer-consumer problem using threads.

Text Books:

1. *Operating System Concepts*, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, 9th Edition, 2012, John Wiley and Sons Inc.

Reference Books:

1. William Stallings, *Operating Systems – Internals and Design Principles*, 7th Edition, 2011, Prentice Hall.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, 3rd Edition, 2009, Addison Wesley.
3. D M Dhamdhare, *Operating Systems: A Concept-Based Approach*, 2nd Edition, 2007, Tata McGraw-Hill Education.

Paper II/Subject Name: Data Communication and Networks	Subject Code: CAP052C402
L-T-P-C – 3-0-2-4	Credit Units: 04
	Scheme of Evaluation: TP

Objective:

The objectives of the course are to make the students understand the significance and concepts of computer networks along with the layered architecture.

Prerequisites: Basics of internet technologies and graph theory

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the significance and concepts of computer networks	BT 2
CO 2	Identify the layered model for computer networking.	BT 3
CO 3	Analyse and evaluate basic protocols and design issues for layered model.	BT 4& 5

Detailed Syllabus:

Modules	Topics	Course Contents	Hours
I	Data Link Layer and Medium Access Sub-layer	Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, Data link protocols: HDLC and PPP Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm	12
II	Network Layer	Design issues, IPv4 classful and classless addressing, subnetting, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms	12
III	Transport Layer	Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison	12
IV	Application Layer	World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), SMTP, HTTP, Introduction to	12

	Network security	
TOTAL		48

Text Books:

1. *Data and Computer Communication*, William Stallings, 10th Edition, 2013, PHI.
2. *Data Communications and Networking*, Behrouz A Forouzan, 4th Edition, 2017, Tata McGraw Hill
3. *Computer Networks*, Tannenbaum, 3rd Edition, 1996, Pearson Education.

Reference Books:

1. L.L. Peterson & B.S. Davie, *Computer Networks: A Systems Approach*, 5th Edition, 2011, Morgan Kaufmann
2. Anuranjan Misra, *Computer Networks*, 2006, Acme Learning, Morgan Kaufman Publication, New Delhi
3. Bhushan Trivedi, *Computer Networks*, Reprint Edition, 2011, Oxford press

Data Communication and Networks Lab

Objective:

The objectives of the course are to make the students learn socket programming and to make them familiar with simulation tools.

Prerequisites: Fundamentals of Computer Programming and Data Communication

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate the various working of various protocols and understand the utility of socket programming	BT 2
CO 2	Utilize simulation tools for network programming	BT 3
CO 3	Analyze the performance of the routing algorithms and protocols in different layers.	BT 4

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

- To study various topologies for establishing computer networks.
- To learn the usage of various basic tools (crimping, krone etc.) used in establishing a LAN.
- To familiarize with switch and hub used in networks.
- To learn the usage of connectors and cables (cabling standards) used in networks
- To make certain copper and fiber patch cords using different standards.
- To familiarize with routers & bridges
- Use commands like ping, ipconfig for trouble shooting network related problems.
- NIC Installation & Configuration (Windows/Linux)
- TCP/UDP Socket Programming
- Multicast & Broadcast Sockets
- Develop a program to compute the Hamming Distance between any two code words.
- Develop a program to compute checksum for an m bit frame using a generator polynomial.
- IPC (Message queue)

- Implementation of a Prototype Multithreaded Server
 - Implementation of o Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window)
 - Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check)
 - Data Link Layer Error Control Mechanism (Selective Repeat, Go Back N)

Text Books:

1. *Data and Computer Communication*, William Stallings, 10th Edition, 2013, PHI.
2. *Data Communications and Networking*, Behrouz A Forouzan, 4th Edition, 2017, Tata McGraw Hill
3. *Computer Networks*, Tannenbaum, 3rd Edition, 1996, Pearson Education.

Reference Books:

1. L.L. Peterson & B.S. Davie, *Computer Networks: A Systems Approach*, 5th Edition, 2011, Morgan Kaufmann
2. Anuranjan Misra, *Computer Networks*, 2006, Acme Learning, Morgan Kaufman Publication, New Delhi
3. Bhushan Trivedi, *Computer Networks*, Reprint Edition, 2011, Oxford press

- **Detailed Syllabus of Department Specific Elective (DSE-II)**

Paper III/Subject Name: Computer Graphics and Multimedia	Subject Code: CAP052D401
L-T-P-C – 3-1-0-4	Credit Units: 04
	Scheme of Evaluation: T

Objective:

The objectives of the course are to provide a comprehensive knowledge on the concepts of computer graphics.

Prerequisites: Concepts of Computer Programming and Basic Mathematics

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Illustrate pictures & interact with pictures for presentations	BT 2
CO 2	Apply the concepts learnt to implement various shape drawing algorithms, 2D/3D transformations, homogeneous coordinates and	BT 3
CO 3	Examine the applications of multimedia and the various multimedia elements.	BT 4
CO 4	Analyse the various image, audio, video formats and different compression and decompression standards.	BT 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Overview of Graphics Systems	Representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table, Video Display Devices, Refresh Cathode Ray Tubes, Raster-Scan and Random-Scan Systems, Input Devices, Hard-Copy Devices and Graphics Software. Points, Line Drawing Algorithms (DDA and Bresenham's Line Drawing Algorithm), Circle- Generating Algorithms (Bresenham's and Midpoint Circle Algorithms), Ellipse-Generating Algorithms (Midpoint Ellipse Algorithm only), Filled- Area Primitives: Scan-Line Polygon Fill Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm.	12
II	Two Dimensional Transformation and Viewing	Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Reflection and Shear, Transformations between Coordinates Systems, Raster Methods for	12

		Transformations. The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-View Port Coordinate Transformation, Clipping- Point, Line(Cohan-OSutherland Line Clipping and Liang –Barsky Line Clipping and Nicholl-Lee-Nicholl Line Clipping) and Polygon Clipping(Sutherland- Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping).	
III	Three Dimensional Transformation and Viewing	Translation, Rotation, Scaling, Reflection and Shears, Composite Transformations, Modeling and Coordinate Transformations. Viewing Pipeline, Viewing Coordinates, Projections and Clipping	12
IV	Multimedia Systems Design	Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Data Interface Standards, the Need for Data Compressions, Multimedia Database. Medium, Main Properties of a Multimedia Stream, Multimedia System Definition, Combination of Media. Rich –Text Format, TIFF File Format, RIFF, MIDI File Format, JPEG DIB File Format, MPEG Standards. Animation types, techniques, key frame animation, utility, morphing. Virtual Reality concepts	12
Total			48

Text Book:

1. *Computer Graphics*, C Version, Hearn D., Baker M. P., 2nd Edition, 2006, Pearson Education, New Delhi
2. *Multimedia Systems*, Koegel Buford J. F., 1st Edition, 2006, Pearson Education, New Delhi

Reference Books:

1. Plastock R.A. et.al, *Computer Graphics*, 2nd Edition; 2006; TMH, New Delhi.
2. Foley J.D., *Computer Graphics*, 2nd Edition, 2004, Pearson Education, New Delhi
3. Mukherjee D.P., *Fundamentals of Computer Graphics and Multimedia*, 1st Edition, 1998, PHI.

Paper III/Subject Name: Information Theory and Coding	Subject Code: CAP052D402
L-T-P-C – 3-1-0-4	Credit Units: 04
	Scheme of Evaluation: T

Objective:

The objectives of the course are to teach different coding techniques for information and also give an insight on entropy.

Prerequisites: Concepts of Basic Mathematics

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand different Information coding schemes	BT 2
CO 2	Apply error control coding techniques while receiving information	BT 3
CO 3	Apply number theory concepts in encryption and decryption techniques	BT 3
CO 4	Analyze the basic encryption and decryption standards.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Information Coding	Entropy: Information source and entropy, mutual information, information measures for continuous random variables. Source coding: the source coding theorem, Kraft inequality, Shannon-Fano codes, Huffman codes, Arithmetic Codes, Lempel-Ziv Welch algorithm, universal source codes; channel capacity: channel capacity; noisy channel coding theorem for discrete memoryless channels; channel capacity with feedback; continuous and Gaussian channels;	12
II	Error Control Coding	Error control coding: linear block codes and their properties, hard-decision decoding, convolution codes and the Viterbi decoding algorithm, iterative decoding; turbo codes and low-density-parity-check codes. Rate distortion theory: rate distortion function, random source codes; joint source-channel coding and the separation theorem;	12

III	Introduction to Cryptography	Basic concepts on cryptography and cryptoanalysis, security issues; private-key encryption algorithms- stream ciphers, block ciphers, Shannon's theory;	12
IV	Number Theory & Public Key Encryption	Introduction to number theory: modular arithmetic, exponentiation, and discrete logarithms in Galois field; Public-key encryption algorithms: Diffie-Hellman public-key distribution scheme, RSA public-key cryptosystem; Message authentication, hashing functions, digital signatures.	12
Total			48

Textbook:

1. *Information Theory, Coding and Cryptography*, R. Bose, 2002, Tata McGraw Hill
2. *Introduction to cryptographs*, J.ABuchman, 2ndEdition Spinger, 2004

Reference Books:

1. W. Stalling, *Cryptography and Network security*, 7th Edition, 2017, PHI
2. T. M. Cover and J. A. Thomas, *Elements of Information Theory*, 2nd Edition, 2006, John Wiley & Sons

- **Detailed Syllabus of Generic Elective (GE-VII/VIII)**

Paper IV/Subject Name: Web Integration and Application	Subject Code: INT052G402
L-T-P-C – 3-0-0-3	Credit Units: 03
	Scheme of Evaluation: T

Objective:

The objectives of the course are to teach the students the use of pull requests, maintain workflow, and enable them to find appropriate JS language for projects.

Prerequisites: Basics of Web Development and Server Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the process of integrating websites to applications.	BT 2
CO 2	Utilize pull requests to perform development work.	BT 3
CO 3	Choose between popular JS flavours and pick one that is suitable for a task.	BT 3

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Workflow using pull-requests	Introduction to workflow, usage of git in development teams, norm to develop on branches, perform peer-reviews, re-work based on reviews before merging. to open a pull request, make changes, submit work for review and then update code based on review using online tools	09

II	JS Bundling and languages	Introduction to JS ecosystem, the general methodology. "Import maps" feature. JS languages, their uses, differences and compilation environments	09
III	Testing & Integration	Importance of testing, the different approaches to testing such as unit testing, integration testing, and hybrid testing. Popular libraries that are used to help with testing, Common pitfalls in the practice of testing and how to avoid them. Process of setting up an automated system Linking the Test results to deployment of code that passes its test suite to a remote server. different environments to run an application, concept of a staging environment which acts as a gateway to the production environment	09
IV	Containerization & Error logging	Introduction to containerization, use of the popular Docker (OCI) standard, use the i18n framework to customise their web application for another locale. practice of logging and notification of runtime errors that occur on a deployed application, the process that is followed to detect the source of a bug, testing to ensure a fix and to prevent recurrences	09
Total			36

Textbook:

1. *Modern Full-Stack Development: Using TypeScript, React, Node.js, Webpack, Python, Django, and Docker*, Frank Zammetti, 2nd Edition, 2022, APress
2. *Full-Stack React, TypeScript, and Node: Build cloud-ready web applications using React 17 with Hooks and GraphQL* David Choi , 2020, Packt Publishing Limited.

Reference Books:

1. Sammie Smith, *Full Stack Web Development Guide: Everything HTML 5, CSS 3, Bootstrap 4, JavaScript, jQuery, GIT, GITHUB, and Version Control for Modern Web Development*, 2022, Independently Published.

Paper V/Subject Name: Introduction to Game Design and Development **Subject Code: INT052G403**

L-T-P-C - 3-0-0-3

Credit Units: 03

Scheme of Evaluation: T

Objective:

The objectives of the course are to enable the students to identify and apply principles of design and modelling along with making them aware of the various issues associate with it.

Prerequisites: Basics of Web Development and Server Programming

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Demonstrate the fundamental skills and concepts in game design and development.	BT 2
CO 2	Apply the concepts learnt to design a new game.	BT 3
CO 3	Analyze the designed games for improvement.	BT 4

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction to Video Games	Games Overview; History of Games. History and Generations of Video Games,what is a Games? & Game Genre Overview Game Genres I, Game Genres II Game Genres III	09
II	Principles of Game Design	Layers of Game Design, Empathy, Motivation, Feedback, Agency, Pacing Immersion, Realism, Consistency, Freedom. Genre Specific Game Design Fundamentals I: Action, RPG, Adventure. Genre Specific Game Design Fundamentals II: Strategy,	09

		Simulation, Sports. Genre Specific Game Design Fundamentals III: Fighting, Casual, God, Educational, Puzzle, online. Trade-Offs in Game Design. Indicators of Poor Game Design. Game Development Cycle.	
III	Overview of Game Engines	Game Engines, Game Systems and Elements; Map and Level Editors Overview of Unity Overview of Unreal	09
IV	Game Development	Game development using Unity (RPG Core Combat Creator, Mobile Game Development	09
Total			36

Textbook:

1. *Game Development: Gaming Design & Programming*, K.Patinson, 2021, Code Academy
2. *Mastering Game Design with Unity*, Scott Tykoski, 2022, BPB Publications.

Reference Books:

1. Hammad Fozi , Gonçalo Marques , David Pereira (Author), Devin Sherry , *Game Development Projects with Unreal Engine*, 2020, Packt Publishing Limited

- **Detailed Syllabus of Ability Enhancement Compulsory Courses (AECC-III/IV)**

Paper VI/Subject Name: Communication and Presentation Skills	Subject Code: CEN982A401
L-T-P-C – 1-0-0-1	Credit Units: 01
	Scheme of Evaluation: TP

Objective:

The objectives of the course are to prepare students to develop report writing skills, deliver effective presentation and be informed about technology-enabled communication in the 21st century.

Prerequisites: Basic writing skills in English.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Interpret the skills required for giving presentations.	BT 2
CO 2	Build reports, make presentations and have basic understanding of technology-enabled communication in the 21 st century.	BT 3

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Writing Reports, Business Proposals and Business Plans	Formats of reports Developing a report outline Report planning Writing a report Using different visual representations for writing a report Developing an outline for a business proposal Developing an outline for business plan	3
II	Designing and Developing Business Presentations	Planning an effective Business Presentation, Organising the content Designing compelling presentation visuals Refining your delivery Special presentation situations	3

III	Focusing on Group Communication	Increasing focus on groups Characteristics of Effective Groups Group Conflicts Meeting Management	3
IV	Technology Enabled Communication	Role of Technology-enabled communication in the 21st century businesses Different forms of technology-enabled communication tools used in organisations Telephone, Teleconferencing, Fax, Email, Instant messaging , Blog, podcast, Videos, videoconferencing, social media	3
Total			12

Text Book:

1. *Business Communication: Essential Strategies for twenty-first century Managers*, Verma, Salini. 2nd Edition, 2015, Vikas Publishing House Pvt Ltd. pp 267-298, 243-259.

Reference Books:

1. Lehman, Dufrene, Sinha, *BCOM: An Innovative Approach to learning and teaching Business Communication*, 2011, Cengage Learning Pvt. Ltd. pp. 50-63, 302-322.

Paper VII/Subject Name: Behavioral Science-IV	Subject Code: BHS982A404
L-T-P-C - 1-0-0-1	Credit Units: 01
	Scheme of Evaluation: TP

Objective:

The objectives of the course are:

- **Detailed Syllabus of Skill Enhancement Courses (SEC-III)**

Paper VIII/Subject Name: System Administration	Subject Code: CAP052S411
L-T-P-C - 0-0-4-2	Credit Units: 02 Scheme of Evaluation: P

Objective:

The objectives of the course are to make the students familiar with python and to explain the process of connecting a Unix/Linux server to the network and share resources on the network.

Prerequisites: Basics of Operating Systems

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Understand and analyse the basic system administration tools.	BT 2
CO 2	Apply the concepts learnt to administer Unix/Linux machines as standalone workstations or in a network environment.	BT 3
CO 3	Identify different commands of Linux system	BT 4

Detailed Syllabus:

Practical based on following topics

Microsoft's Windows:

How to use Windows 10 and Server 2016 , use Local users and groups, Basics of Servers and Clients., Routers, Switches configuration Public and Private Ip Addresses. What are Public DNS zones and Private DNS zones, use Active Directory users and groups. How to enable Sharing and NTFS rights. use Group Policy.

Linux

Run levels, Processes and daemons, Configure start-up scripts. User Management: Add user, User groups, User and system security, Collapse User environment, Shell start-up scripts, Networking: File sharing with FTP, NFS, NIS, Services and inetd. Setting up DHCP, DNS etc Backup strategy, Selecting the backup devices and software, Automating the backup procedure, Third party product overview, Auto-mounter Requirements and Mechanism. Monitor processes: truss/strace, ps top.\, Monitor network: lsof, netstat, working with files: strings, awk, od, du, df, find, Misc: which, whereis, dmesg, Logfiles Kernel reconfig, Get the kernel source code, add new adapter and update drivers, Kernel upgrade.

Text Book:

1. *Essential System Administration: Tools and Techniques for Linux and Unix Administration*, Aeleen Frisch, 3rd Edition, 2013, O'Reilly Media

Reference Books:

1. Evi Nemeth, Synder, Hein, Whaley, MAckin, *UNIX and Linux System Administration Handbook*, 5th Edition, 2017, Addison Welsley

- **Detailed Syllabus of Value Addition Course (VAC-III)**

Paper IX/Subject Name: Disaster Management	Subject Code: VAC052V409
L-T-P-C – 2-0-0-2	Credit Units: 02
	Scheme of Evaluation: T

Objective:

The objectives of the course are to impart a critical understanding for disaster, risks, etc and their reduction and humanitarian response

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	Course Outcome	Blooms Taxonomy Level
CO 1	Define and interpret disasters and hazards and the various types of associated risks.	BT 1 & 2
CO 2	Examine the economic repercussions of disasters.	BT 3
CO3	Analyse and assess risks.	BT 4 & 5

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	06

II	Repercussions of Disasters and Hazards	Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	06
III	Disaster Prone Areas and Disaster Preparedness and Management	Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts. Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	06
IV	Risk Management and Disaster Mitigation	Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival. Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	06
Total			24

Text Books:

1. *Disaster Management in India: Perspectives, issues and strategies*, R. Nishith, Singh AK, 1st Edition, 2007, New Royal book Company.

Reference Books:

1. Sahni, Pardeep Et.Al. (Eds.), *Disaster Mitigation Experiences And Reflections;* 1st Edition, 2018, Prentice Hall Of India, New Delhi.