ROYAL GLOBAL UNIVERSITY
GUWAHATI

Royal School of Information Technology(RSIT)

Learning Outcome-based Curriculum Framework (LOCF) for

Undergraduate Programme in B. Sc. (IT)

W.E.F 2022-23

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1. Preamble

The Assam Royal Global University is upgrading its undergraduate programmes to cater its student's needs in higher education. 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 and this curriculum upgrades 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.

2. Introduction

The objective of the B.Sc.(IT)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 B.Sc. (IT) 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 B.Sc.(IT) is designed to aspire young mind with computational thinking, analytical, and problem-solving skills, encouraging the building of a creative mind-set in the students. The programme offers certificate, diploma, degree, and honours that builds a base for entry level jobs in information technology and prepares the students for higher studies and research around 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 CurriculumPlanning

The Bachelor of Science in Information Technology (B.Sc.(IT)) course is framed for the students to develop and enhance their analytical & computational thinking, and problem-solving skills. The students are tested based on applicability of the theoretical concepts and implementation of practical knowledge. A student is awarded based on the attainment of these outcomes at the end of the programme.

3.1 Nature and extent of the B.Sc. (IT)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 B.Sc.(IT) 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 BSc IT programme shall be awarded a bachelor degree in Computer Application on completion of 6th Semester after securing 148 Credits.

3.2 Aims of Bachelor of Science in Information TechnologyProgramme

The overall aims of the B.Sc.(IT)Programme are to:

i. Develop theoretical foundations in computer science.

ii. Teach, enhance and develop programming skills using high level programming languages across various platforms relevant to current industry standards.

iii. Encourage to develop skills to design, implement and document solutions for computational problems.

iv. Develop soft skills for effective team work

v. Develop the ability to use state of the art technologies.

vi. 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.

vii. To acquaint to the latest and upcoming technologies and proper and effective implementation of the theoretical concepts.

4. Graduate Attributes in Bachelor of Science in Information Technology

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 workplace through knowledge/skill development/reskilling

5. Qualification Descriptors for B.SC.(IT)Programme

The course structure of B.SC.(IT) 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 for B.SC.(IT) 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 abilities to do team work so as to cope up in different working environments.

6. Programme Learning Outcomes for B.SC.(IT)

6.1 Programme Outcomes (POs)

- **PO1-Computational Knowledge:** Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.
- **PO2- Problem Analysis:** Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.
- **PO3- Design / Development of Solutions:** Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.
- **PO4- Conduct Investigations of Complex Computing Problems:** Ability to devise and conduct experiments, interpret data and provide well informed conclusions.
- **PO5- Modern Tool Usage:** Ability to select modern computing tools, skills and techniques necessary for innovative software solutions
- **PO6- Professional Ethics:** Ability to apply and commit professional ethics and cyber regulations in a global economic environment.
- **PO7- 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.

- **PO8- Project Management:** Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.
- **PO9- Communication Efficacy:** Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
- **PO10- 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.
- **PO11- Individual & Teamwork:** Ability to work as a member or leader in diverse teams in multidisciplinary environment.
- **PO12- Life-long Learning:** Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

6.2 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 B.Sc.(IT)

B.Sc. (IT) Course Structure

1st SEMESTER							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Discipline Specific Core (DSC)							
1	INT052C104	Mathematical Foundations	3	1	0	4	4
2	INT052C102	Introduction to C Programming	3	0	2	4	5
3	INT052C103	Digital Logic and Computer Design	3	0	2	4	5
Generic Elective (GE)							
4	INT052G103	GE-I -Web Development with JavaScript	3	0	0	3	3
5	INT052G104	GE-II-Multimedia Tools and Applications	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	INT052S111	SEC-I: Image Editing and Animation	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992V117	VAC-I:Office Automation	0	0	4	2	4
		TOTAL				**24**	
2nd Semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Discipline Specific Core (DSC)							
1	INT052C201	Computer Organisation and Architecture	3	1	0	4	4
2	INT052C203	Object Oriented Programming using C++	3	0	2	4	5
3	INT052C204	Data Structures and Algorithms	3	0	2	4	5
Generic Elective (GE)							
4	INT052G204	GE-III-Server-Side Programming	3	0	0	3	3
5	INT052G205	GE-IV-Introduction to Cyber Space	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	INT052S211	SEC-II: Windows Programming using C#	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992A217	VAC-II: Computer Hardware and Networking	0	0	4	2	4
		TOTAL				**24**	
3rd SEMESTER							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Discipline Specific Core (DSC)							

1	INT052C301	JAVA Programming	3	0	1	4	5
2	INT052C302	Introduction to Database Management Systems	3	0	1	4	5
Discipline Specific Elective (DSE)							
3	INT052D30X	DSE-I	3	1	0	4	4
Generic Elective (GE)							
4	INT052G302	GE-V:Front-End Development with React & TypeScript	3	0	0	3	3
5	INT052G303	GE-VI :IPR and Cyber Laws	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	INT052C338	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	INT052C401	Operating Systems	3	0	1	4	5
2	INT054C402	Data Communication and Networks	3	0	1	4	5
Discipline Specific Elective (DSE)							
3	INT052D40X	DSE-II	3	1	0	4	4
Generic Elective (GE)							
4	INT052G402	GE-VII: Web Integration and Application	3	0	0	3	3
5	INT052G403	GE-VIII: Game Development	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	INT052S411	SEC-III:System Administration	0	0	4	2	4
Value Addition Courses (VAC)							
9	VAC992V409	VAC-III:Disaster Management	2	0	0	2	2
		TOTAL				**24**	

9. Detailed Syllabus of Core Courses

SYLLABUS (1st SEMESTER)

Paper I/Subject Name: Mathematical Foundations		Subject Code: INT052C104
L-T-P-C – 3-1-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are to review Set theory, Relation & Functions, Matrices andprovide student with basics of Analytical Geometry which will help them view things in vector prospective

Prerequisites: Fundamental Concepts of basic Mathematics

Course Outcomes

On successful completion of the course the students will be able to:		
Sl No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define**and **Explain**Sets,Complex numbers, Relations & Functions	**BT 1 &BT2**
CO 2	**Compare** different Mathematical relations and their use in computer science	**BT 2**
CO 3	**Apply** concepts of shape and objects in space for computer graphics	**BT 3**
CO 4	**Analyse** computational problems with the help of mathematical concepts	**BT 4**

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Set theory and Real & Complex Number**	Concept, Notation and Specification of Sets, Types of Sets, Operations on Sets (Union, Intersection, Difference, Complement) and their Venn Diagrams, Laws of Algebra of Sets(without proof), Cardinal number of Set and Problems Related to Sets. Real Number System, Intervals, Absolute Value of Real Number, Introduction of Complex Number, Geographical Representation of Complex Number, Simple Algebraic Properties of Complex Numbers (Addition, Multiplication, Inverse, Absolute Value)	**12**
II	**Relation, Functions**	Ordered pairs, Cartesian product, Relation, Domain and Range of a relation, Inverse of a relation; Types of relations: reflective, symmetric, transitive, and equivalence relations. Definition of function, Domain and Range of a function, Inverse function, Special functions (Identity, Constant), Algebraic (linear, Quadratic, Cubic), Trigonometric and their graphs. Definition of exponential and logarithmic functions, Composite function. (Mathematical)	**12**
III	**Matrices and Determinants**	Introduction of Matrices, Types of Matrices, Equality of Matrices, Algebra of Matrices, Determinant, Transpose, Minors and Cofactors of Matrix, Properties of determinants (without proof),	**12**

		Singular and non-singular matrix, adjoin and inverse of matrices. Linear transformations, orthogonal transformations; rank of matrices. (Matlab)	
IV	**Analytical Geometry**	Conic Sections: Definitions (Circle, Parabola, Ellipse, Hyperbola and Related Terms), Examples to Explain The Defined Terms, Equations and Graphs of The Conic Sections Defined Above, Classifying The Defined Conic Sections by Eccentricity and Related Problems, Polar Equations of Lines, Circles, Ellipse, Parabolas, and Hyperbolas.(Matlab) Vectors in Space: Vectors in Space, Algebra of Vectors in Space, Length, Distance Between Two Points, Unit Vector, Null Vector, Scalar Product of Two and Three Vectors and Their Geometrical Interpretations and Related Examples.(Matlab)	**12**
Total			**48**

Text Book:

1. *Discrete Mathematics and its Applications,* Kenneth H. Rosen, 7th Edition, 2008, McGraw Hill Education.
2. *Discrete Mathematical Structure with Applications to Computer Science,* J. P. Tremblay & R. Manohar, 1st Edition, 53rd Reprint, 2018, McGraw Hill Education.

Reference Books:

1. Seymour Lipschutz and M. Lipson; *Discrete Mathematics*, Revised 3rd Edition, 2013, Tata McGraw Hill.
2. Kolman and Busby Ross,*Discrete Mathematical Structures*, 6th Edition, 2015,Prentice Hall International.

Paper II/Subject Name:Introduction to C Programming Subject Code: INT052C102		
L-T-P-C – 3-0-1-4	**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 & Lopping**	Importance of decision making, decision making with *if* statement, *if-else* statement, nested *if-else* statements, *switch-case* statement, *goto* statement, the?*:* operator, examples. Importance of loping, the *while* statement, *do-while* statement, *for* 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. YashawantKanetkar, *Let us C,* 15th Edition, 2017, BPB Publication.

Introduction to C Programming Lab

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	**Relate** and **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 loping, 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. YashawantKanetkar, *Let us C,* 15th Edition, 2017, BPB Publication.

Paper III/Subject Name: Digital Logic and Computer Design		Subject Code: INT052C103
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 subs tractors. 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 ZvonkoVranesic, *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*,Imort 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** combinatorial 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 Elective-I**

Paper IV/Subject Name: Web Development with Java Script		**SubjectCode: 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: Basics of Office Automation

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 basic characteristics and concepts of web development.	**BT 1& 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"	**12**
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	**12**

		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,	
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 return a value from a function, Passing a function as an argument , introduction toFirebase.	**12**
IV	**Advanced Techniques of Javascript**	Iterating over Arrays: Iterating over an array using the for Eeach 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.	**12**
Total			**48**

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, 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	**Define** and **understand** basic of multimedia concepts	**BT1 & 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 to Multimedia and Multimedia Authoring**	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 project and documentation**	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 and methods for multimedia information**	Compression and encoding techniques for a. Image b. Animation c. Audio d. Video Information format: Presentation of digital images, Presentation of digital audio, Presentation of digital video	**09**
Total			**36**

Text Book:

1. Digital Multimedia, Chapman, Nigel and Chapman, Jeny, 1st Edition New York: While 2000. ISBN: 0-471-98386-1
2. Multimedia and Interactive Technologies, Nuno Ribeiro, 5th Edition. FCA -ISBN: 978-972-722-744-0

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 (AECC-I)**

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	**Define** the elements of a communication	**BT 1**
CO 2	**Understand** the basics of written and oral communication.	**BT 2**
CO 3	**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 research.

Prerequisites: None

Course Outcomes

On successful completion of the course the students will be able to:		
Sl 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	**Understand** and**demonstrate** the basic idea behind image enhancement, modelling, and animation	**BT1 &BT 2**
CO 2	**Experiment** with image enhancement with the concepts learnt.	**BT 3**
CO3	**Analyse** any given image for its quality along with the 2D/3D modelling of various architectures.	**BT 4**
CO 4	**Assess**3D models for uses in the areas of Interior Designing, Civil Engineering, Gaming etc	**BT 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 Modelling 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**

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	**Define** different element presents in office automation	**BT 1**
CO 2	**Understand** the working of the applications under the MS Office Suite.	**BT 2**
CO 3	**Practice**working withsheets, presentations, word documents	**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 I/Subject Name:Computer Organisation and ArchitectureSubject Code: INT052C201

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	**Understand** the various components in a computer, like CPU, Buses, Peripherals and Memory	**BT 1**
CO 2	**Demonstrate** computer architecture concepts related to design of modern processors, memories and I/O	**BT 2**
CO 3	**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	**12**

		complement representation, One's complement representation, Floating point numbers- Representation, Normalization, Floating point arithmetic, Multiplication and division.	
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:INT052C202
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: INT052C204
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	**Define** and **understand** the basic concepts of OOP and basic constructs of data structure, implementation, and application.	**BT1 &BT 2**
CO 2	**Construct C++** programs and find errors in it.	**BT 3**
CO 3	**Analyse** a problem and construct suitable data structure with C++	**BT 4**
CO 4	**Asses** suitable algorithms in real life problem	**BT 5**

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,	**12**

		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.	
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**

Textbook:

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.

Data Structures using C++ Lab

Objectives

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:		
Sl No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Understand and define** the application of elementary data structures such as stacks, queues, linked lists, trees and graphs	**BT 1 & BT 2**
CO 2	**Utilize** appropriate data structures to solve various problems.	**BT 3**
CO 3	**Analyse** 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 Educat

- **Detailed Syllabus of Generic Elective-III**

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 2**
CO 2	**Build** dynamic web applications.	**BT 3**
CO 3	**Assess and evaluate** server side of web applications.	**BT 4**

Detailed Syllabus:

Modules	**Topics**	**Course content**	**Periods**
I	**Introduction**	In this module students start using GitHub and are introduced to collaboration on code with others using the git tool. an introduction to Ruby for students. They start by learning how to set up a developer environment and VSCode for Ruby and use irb. Students then learn the basics of Ruby programming language, the use of Ruby hashes and how to write recursive methods. They also learn more about the 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 in this module develop their Rails application and connect it to the PostgreSQL database	**09**
III	**HTML, CSS & ERB Pipeline**	basics of the CRUD pattern by building some additional features to the application. 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 Authentication**	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 password storage and play around with browser cookies, sessions, user authentication	**09**
Total			**36**

Text Book:

1. Learn Rails 6: Accelerated Web Development with Ruby on Rails, Adam Notodikromo ,1st edition 25 October 2020,

Reference Books:

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

- **Detailed Syllabus of Generic Elective-IV**

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 ofComputer 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-crimestargeting 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 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.	**09**
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,* SumitBelapure 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:		
Sl 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	**3**

		Effective Oral Communication, Three aspects of Oral Communication- Conversing, Listening and Body Language, Intercultural Oral Communication	
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 Delivery, Guidelines for Delivery–Verbal Elements, Non-Verbal Elements, Vocal Elements, Visual Elements, Controlling Nervousness and Stage Fright	**3**
		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.*PHILearningPvt. 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:

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**

Textbooks:

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 Pre

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

Paper VIII/Subject Name:Windows Programming using C#		**Subject Code: INT052S211**
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 frame work:** 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. PoulKlausen, *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 – 0-0-4-2	**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**

Detailed Syllabus:

Modules	**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	**12**

		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	
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, ComputechPublicaations

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: INT052C301**
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:		
Sl 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.	**12**

		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.	
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 Creating threads, Extending the thread class, Stopping and blocking a thread, Life cycle of thread, Threads methods, Thread exceptions	**12**
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**he 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: INT052C302
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,	**12**

		Architecture, Data Independence, Data modeling, Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modeling using the Entity Relationship Model.	
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: INT052D301**
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

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	**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, Plannar Graph and Matrix Representation of Graph**	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. 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	**14**
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, NarosaPublising 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, ShivrajPundir and Sandeep Kumar, *Discrete Mathematics*, 7th Edition, 2010, Pragati Publication

Paper III/Subject Name: Computer Graphics and Multimedia		Subject Code: INT052D402
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	**Analyze** 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 Transformations. The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-View Port Coordinate Transformation, Clipping- Point, Line(Cohan-0Sutherland Line Clipping and Liang –Barsky Line Clipping and Nicholl-Lee-Nicholl Line Clipping) and Polygon Clipping(Sutherland- Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping).	**12**
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*, KoegelBuferd 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.

- **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 Sate 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 Apps**	Front-end development including the importance of 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.	**09**
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. Electronic commerce, Electronic contracts.	**9**
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, EnhancingEmployability: 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 – • 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: INT052C401**
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 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	**Define & understand** the basic concepts of Operating systems.	**BT 1 & 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**

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 Overvie**w- 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 Dhamdhere, *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 Dhamdhere, *Operating Systems: A Concept-Based Approach*, 2nd Edition, 2007, Tata McGraw-Hill Education.

Paper II/Subject Name: Data Communication and Networks		**Subject Code: INT052C402**
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 Network security	**12**
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. AnuranjanMisra, *Computer Networks*, 2006, Acme Learning, Morgan Kaufman Publication, New Delhi
3. BhushanTrivedi, *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, routers & bridges used in networks.
- To learn the usage of connecters and cables (cabling standards) used in networks
- To make certain copper and fiber patch cords using different standards.
- 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*, 5thEdition, 2011, Morgan Kaufmann
2. AnuranjanMisra, *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 II/Subject Name: Design and Analysis of Algorithms		**Subject Code: INT052C401**
L-T-P-C – 3-0-1-4	**Credit Units: 04**	**Scheme of Evaluation: TP**

Objectives

The objectives of the course to understand how the choice of data structures and algorithm impacts the performance of programs and to solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.

Prerequisites: Concepts of Data Structures and Basic Mathematics

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define and classify** asymptotic notation, NP-Hard and NP-Complete Problems, types of algorithms.	**BT 2**
CO 2	**Apply** different designing methods for development of algorithms to realistic problems, such as divide and conquer, greedy and etc	**BT 3**
CO 3	**Analyse and evaluate** the performance of algorithm	**BT 4 & 5**

Detailed Syllabus:

Modules	Topics	Course Contents	Hours
I	**Introduction and Divide and Conquer**	Algorithm, Psuedo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis. Master's Theorem	**9**
II	**Searching and Traversal Techniques**	Efficient non - recursive binary tree traversal algorithm, Disjoint set operations, union and find algorithms, Spanning trees, Graph traversals - Breadth first search and Depth first search, AND / OR graphs, game trees, Connected Components, Bi - connected components. Disjoint Sets- disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components.	**9**
III	**Types of Problem-Solving Techniques**	Greedy Method: General method, applications - Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem. Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 Knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design. Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles. Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution	**13**
IV	**NP-Hard and NP-Complete Problems**	NP-completeness – Polynomial time verification – Theory of reducibility – Circuit satisfiability - NP-completeness proofs – NP-complete problems: Vertex cover, Hamiltonian cycle and Traveling Salesman problems – Approximation Algorithms – Approximation algorithms to vertex-cover and traveling salesman problems.	**5**
TOTAL			**36**

Text Book:

1. *Introduction to Algorithms,* T. H. Cormen, C. E. Leiserson, R. L. Rivest, 3rd Edition, 2009, The MIT Press, Cambridge, Massachusetts.

Reference Books:

1. Aho, Hopcroft & Ullman, *The Design and Analysis of Algorithms,*1974,Addison- Wesley
2. Horowitz &Sahani, *Fundamentals of Algorithms,* 2nd Edition, 2009, Galgotia Publications

Paper III/Subject Name: Information Theory and Coding		Subject Code: INT052D402
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 Sy

llabus:

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. A Buchman, 2nd Edition 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	**Differentiate** between popular JS flavours	**BT 4**
CO 4	**Choose** between popular JS flavours and pick one that is suitable for a task.	**BT 5**

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, 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.	**09**
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 21st 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: INT052S411**
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	**Test** 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, LogfilesKernel 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: INT052V409**
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 of a disaster	**BT 4 & 5**

Prerequisites: None

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.