Royal School of Information Technology (RSIT)

Learning Outcomes based Curriculum Framework (LOCF)

2021-2022

SYLLABUS
&
COURSE STRUCTURE

B. Sc. IT

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1. Introduction

UGC has come up with the Learning Outcomes- based Curriculum Framework (LOCF) for undergraduate students to provide an outcome-based syllabus at the undergraduate level with the primary goal to structure 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 Under-Graduate Programmes will prepare the students for both, academia and employability. Each programme vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programmes also state the attributes that it offers to
inculcate at the graduation level. The graduate attributes encompass values related to well-being emotional stability, critical thinking, social justice and also skills for employability. In short, each programme prepares students for sustainability and life-long learning. The new curriculum of B.Sc. (IT) aims to inculcate in students the ability to apply the knowledge and skills they have acquired to the solution of specific practical problems in Information Technology. The programme provides the students with the knowledge and skill base that would enable them to undertake further studies in Information Technology and related areas or in multidisciplinary areas that involve Information Technology and help develop a range of generic skills that are relevant to wage employment, self-employment and entrepreneurship. The course aims to produce skilled graduates with a creative mind-set who can recognize a computational problem either in IT industry or society, and develop effective solutions. Understanding the needs of industry related to AI and Information security and also expertise in programming skills using contemporary programming languages used by software industry. It covers core Information Technology topics like data structures, computer networks, operating systems, algorithms, software engineering, database management, theory of computation, artificial intelligence, information security etc. The mode of learning shall be based on theoretical, practical , projects etc to develop critical thinking.

2. Learning Outcomes based approach to Curriculum Planning

The Bachelor's Degree in B.Sc. (IT) is framed for the students to attain sufficient knowledge during the course. The course learning outcomes of Information Technology are aimed at fascinating the learners to acquire knowledge, skills understanding, values, attributes and academic standards. A student is awarded by B.Sc. in Information Technology on the basis of the attainment of these outcomes at the end of the programme.

2.1 Learning Outcome-based Curriculum Framework for B.Sc. (IT) programme

The learning outcomes-based curriculum framework for a B.Sc degree in Information Technology is intended to provide a broad framework within which an Information Technology programme that respond to the needs of students and to the evolving nature of IT as a subject could be developed. The framework is expected to assist in the maintenance of the standard of Information Technology degrees/programmes across the country and periodic programme review within a broad framework of agreed expected graduate attributes, programme learning outcomes and course-level learning outcomes.

2.2 Aims of Bachelor's Degree Programme in B.Sc. (IT)

1. Develop practical knowledge in Information Technology.
2. Enable prospective students, parents, employers and others to understand the nature and level of learning outcomes (knowledge, skills, attitudes and values) or attributes a graduate of a programme should be capable of demonstrating on successful completion of the programme of study
3. Develop expertise in programming skills using high level programming languages.
4. Develop skills to design, implement and document the solutions for computational problems.
5. Help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes that are expected to be demonstrated by the holder of a qualification
6. Develop the ability to use state of the art technologies
7. Maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility.

3. Graduate Attributes in B.Sc. (IT)

Disciplinary knowledge

Ability to build (either independently or by joining higher academic program) the core Information Technology concepts learnt in the course. Ability to apply the core computer science concepts to solve the problems in the IT industry.

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

Problem solving
Graduates are equipped with skills to solve the computational problems at their workplace and for the society.

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.

Communication Skills
Graduates demonstrate effective communication and presentation skills while interacting with Professional peers and in the society.

Self-directed learning
Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

Scientific reasoning
Given a problem, the graduates will be able to analyze it, suggest solutions, and critically evaluate the solutions proposed by others.

Professional Ethics
Graduates follow ethical principles and commitment to professional ethics, accountability and responsibilities.

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 ones 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.

4. Qualification descriptors for a Bachelor's Degree programme in Information Technology

i. Demonstrate coherent knowledge and understanding of the logical organization of a digital   computer, its components and working. Understanding of the time and space complexities of algorithms designed to solve computational problems.
ii. Demonstrate programming skills in high level language and an ability to learn a new programming language without substantial effort.
iii. Apply knowledge of logical skills to identify and analyse problems and issues, and seek solutions to real-life problems. For example, creating mobile applications, database applications, and educative computer games.
iv. Enhanced communication and leadership abilities and ability to work and learn in team environment.
v. Understand the needs of society and sensitivity to societal obligations.

5. Programme Learning Outcomes for B.Sc. (IT)

Programme learning outcomes will include subject-specific skills and generic skills, including transferable global skills and competencies, the achievement of which the students of a specific programme of study should be able to demonstrate for

the award of the certificate/Degree qualification. The programme learning outcomes would also focus on knowledge and skills that prepare students for further study, employment, and citizenship. They help ensure comparability of learning levels and academic standards across colleges/universities and provide a broad picture of the level of competence of graduates of a given programme of study. A programme of study may be monodisciplinary, multi-disciplinary or inter-disciplinary.

6. Program Structure of B.Sc. (IT)

The B.Sc. (Hons.) Information Technology programme is a three-year, six-semesters course. A student is required to complete 148 credits for completion of the course.

6.1   CREDIT DISTRIBUTION FOR B. Sc. IT COURSE

	SEMESTER	CREDITS
FIRST YEAR	I	24
	II	24
SECOND YEAR	III	27
	IV	25
THIRD YEAR	V	23
	VI	25

Total Credits=148

6.2 Semester wise Details of B. Sc. IT Course & Credit Scheme

B. Sc. IT
COURSE STRUCTURE

1st SEMESTER							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Courses (CC)							
1	INT052C101	Fundamentals of Computer Science	3	1	0	4	4
2	INT052C102	Introduction to C Programming	3	1	0	4	4
3	INT052C103	Digital Logic and Computer Design	3	1	0	4	4
4	INT052C112	Introduction to C Programming Lab	0	0	4	2	4
5	INT052C114	Office Automation Lab	0	0	4	2	4
Generic Elective (GE)							
6	INT052G10X	GE-I	3	0	0	3	3
7	INT052G10X	GE-II	3	0	0	3	3
Ability Enhancement Compulsory Courses (AECC)							
8	BHS982A104	Concepts of Behavioural Science	1	0	0	1	1
9	CEN982A101	Developing Oral Communication and Listening Skills	1	0	0	1	1
		TOTAL	**17**	**3**	**8**	**24**	**28**
2nd SEMESTER							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Courses (CC)							
1	INT052C201	Computer Organization and Architecture	3	1	0	4	4
2	INT052C202	Introduction to Data Structures	3	1	0	4	4
3	INT052C203	Object Oriented Programming using C++	3	1	0	4	4
4	INT052C212	Introduction to Data Structures Lab	0	0	4	2	4
5	INT052C213	Object Oriented Programming using C++ Lab	0	0	4	2	4
Generic Elective (GE)							
6	INT052G20X	GE-III	3	0	0	3	3
7	INT052G20X	GE-IV	3	0	0	3	3
Ability Enhancement Compulsory Courses (AECC)							
8	BHS982A204	Understanding Self and Others	1	0	0	1	1
9	CEN982A201	Conversation and Public Speaking	1	0	0	1	1
		TOTAL	**17**	**3**	**8**	**24**	**28**
3rd SEMESTER							

Sl. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Core Courses							
1	INT052C301	JAVA Programming	3	1	0	4	4
2	INT052C302	Introduction to Database Management Systems	3	1	0	4	4
3	INT052C303	Graph Theory	3	1	0	4	4
4	INT052C311	JAVA Programming Lab	0	0	4	2	4
5	INT052C312	Introduction to Database Management Systems Lab	0	0	4	2	4
Generic Elective (GE)							
6	INT052G30X	GE-V	3	0	0	3	3
7	INT052G30X	GE-VI	3	0	0	3	3
Ability Enhancement Elective Courses (AEEC)							
7	INT052S30X	AECC-I	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
8	EVS982A303	Environmental Sciences	2	0	0	2	2
9	CEN102A301	Career Oriented Communication	1	0	0	1	1
		TOTAL	**20**	**3**	**8**	**27**	**31**
4th SEMESTER							
S. No.	Subject Code	Names of subjects	L	T	P	C	TCP
Core Courses							
1	INT052C401	Operating Systems	3	1	0	4	4
2	INT052C402	Data Communication and Networks	3	1	0	4	4
3	INT052C403	Design and Analysis of Algorithms	3	1	0	4	4
4	INT052C411	Operating Systems Lab	0	0	4	2	4
5	INT052C413	Data Communication and Networks Lab	0	0	4	2	4
Generic Elective (GE)							
6	INT052G40X	GE-VII	3	0	0	3	3
7	INT052G40X	GE-VIII	3	0	0	3	3
Ability Enhancement Elective Courses (AEEC)							
8	INT052S40X	AECC-II	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
9	CEN982A401	Communication and Presentation Skills	1	0	0	1	1
		TOTAL	**18**	**3**	**8**	**25**	**29**
5th SEMESTER							
S No.	Subject Code	Names of subjects	L	T	P	C	TCP
Core Courses (CC)							
1	INT052C501	Introduction to Probability and Statistics	4	0	0	4	4
2	INT052C502	Web Technology	4	0	0	4	4

3	CAP052C512	Web Technology Lab	0	0	4	2	4
Discipline Specific Elective (DSE)							
4	CAP052D50X	DSE-I	4	0	0	4	4
5	CAP052D50X	DSE-II	4	0	0	4	4
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A501	Ethics and Business Communication	1	0	0	1	1
Project Dissertation							
7	INT052C523	Mini Project	0	0	8	4	8
		TOTAL	**15**	**2**	**12**	**23**	**29**
6th SEMESTER							
S No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Courses (CC)							
1	INT052C601	Artificial Intelligence	4	0	0	4	4
2	INT052C602	System Analysis and Design	4	0	0	4	4
3	INT052C612	System Analysis and Design Lab	0	0	4	2	4
Discipline Specific Elective (DSE)							
4	INT052D60X	DSE-III	4	0	0	4	4
5	INT052D60X	DSE-IVIV	4	0	0	4	4
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A601	Effective Workplace Communication	1	0	0	1	1
Project Dissertation							
7	INT052C623	Major Project	0	0	12	6	12
		TOTAL	**15**	**2**	**16**	**25**	**33**
TOTAL CREDIT: 25							

Legend: L: Lecture Class; T: Tutorial Class; P: Practical Class: C: Total Credits

LIST OF DEPARTMENT SPECIFIC ELECTIVES			
Elective No	**Sl. No**	**Subject Code**	**Name of the Elective**
I	1	INT052D501	Introduction to Data Mining
	2	INT052D502	System Administration
II	1	INT052D503	Introduction to Cloud Computing
	2	INT052D504	Social Networking
III	1	INT052D601	Introduction to Big Data Analytics
	2	INT052D602	Mobile Application Development
IV	1	INT052D603	E-Commerce
	2	INT052D604	Introduction to Embedded System

LIST OF SUBJECTS OFFERED UNDER AEEC

AEEC No	Sl. No	Subject Code	Name of the Subject
I	1	INT052S301	Office Automation
II	1	INT052S401	Problem Solving using C++
	2	INT052S402	Logical Ability and Reasoning

LIST OF SUBJECTS OFFERED UNDER GENERIC ELECTIVES

Elective No	Semester	Subject Code	Name of the Elective
GE-I	1	INT052G101	Computer Fundamentals
GE-II		INT052G102	Introduction to Computing
GE-III	2	INT052G202	Fundamentals of Web Design
GE-IV		INT052G203	Python Programming
GE-V	3	INT052G301	Windows Programming using C#
GE-VI		INT052G306	Introduction to Computing
GE-VII	4	INT052G401	Intellectual Property Rights and Cyber Law
GE-VIII		INT052G402	Python Programming

6.3 Scheme of Evaluation

Theory Papers (T):
- **Continuous Evaluation: 15%**
  (Assignment, Class Test, Viva, Seminar, Quiz: Any Three)
- **Mid-term examination:** 10%
- **Attendance: 5%**
- **End Term Examination: 70%**

Practical Papers (P):
- **Continuous Evaluation: 25%**
  (Skill Test, lab copy, viva, lab involvement: Any Three)
- **Attendance: 5%**
- **End term examination**: 70 %

Combined Theory & Practical Papers (TP):
- **Continuous Evaluation: 15%**
  (Assignment. Class Test, Lab Experiment, Lab Copy, Viva: Any Three)
- **Mid-term examination:** 10%
- **Attendance: 5%**
- **End term examination:** 70 %

8. **Detailed Syllabus of Core Courses**

SYLLABUS (1ST SEMESTER)

Paper I/Subject Name: Fundamentals of Computer Science		Subject Code: INT052C101
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Course Objective:

The objectives of the course are:

- To explain the basic idea about Computer Systems.
- To teach about the various components of a computer system.
- To give the students idea about issues related to data processing with computers.
- To explain about computer software and computer programming.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction to Computer Systems**	Computer system characterization & capabilities; Speed, Accuracy, Reliability, Memory Capability, Repeatability. Block Diagram of a Computer. Types of Computers- Analog Digital & Hybrid; General and Special Purpose Computers. Characteristics of Computer Generations, Computer Systems Micros, Minis & Mainframes. Personal Computing- The IBM Personal Computer, Type of PC systems, Pentium PCS, Limitations of Microcomputer.	12
II	**Components of a Computer**	Input Devices, Categorizing Input Hardware, Keyboard, Direct Entry-card Reader, Scanners, Output Devices- O.M.R. Character Scanner, Character Readers, MICR, Smart Cards, Voice Input Devices, Pointing Devices-Mouse, Light Pen, impact printers, non-impact printer's plotters, computer output microfilm/microfiche system, softcopy output devices, CRT and flat screen technologies. Computer Storage Fundamentals, Central Proceeding Unit, ALU, register, Primary and Secondary Storage, Data Storage and Retrieval Methods-Sequential, Direct & Indexed & Sequential, Tape Storage and Retrieval Methods Tape Storage Devices, Direct Access Storage for Microcomputers- Hard Disks, Disk Cartridge, Direct Access Storage Devices for Large Computer Systems, Retrieval Methods-Sequential, Direct & Indexed & Sequential, Tape Storage and Retrieval Methods Tape Storage Devices,	12
III	**Data Processing with Computers and Network Fundamentals**	Interconnecting the units of a computer: buses, Data, data processing, data processing methods, data transmission modes, data transmission media: twisted pair, coaxial cable, optical fiber, radio transmission, microwave transmission, satellite transmission, Network topology: bus, star, ring, mesh, hybrid, types of network: LAN, WAN, MAN, PAN, Networking devices: hub, repeater, switch, bridge, router, gateway.	12
IV	**Computer**	Computer software: system software and application	12

	Software and Programming	software, Types of System Software, Types of Operating System, Computer Programming Languages, Types of Programming Languages, Generations of programming Languages Development, Low Level Versus High Level Language, Machine Language, Assembly Language. Advantages of High Level Languages, problem Oriented Languages. Procedure Oriented Languages, Object Oriented Programming languages. Fourth Generation Languages, Device driver, BIOS, Utility Programs, File Maintenance, Language processors: Assembler, Compiler & Interpreter, Applications Software, Types of Application Software, Difference Between program and packages. System Software Versus Application Software,	
Total			**48**

Text Books:

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

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the basic idea about Computer Systems and the various components of a computer system.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn data processing with computers, computer software and computer programming.		
III	Learn about Data Processing. Understand the concepts of Computers Network Fundamentals		
IV	Learn the concepts of Object oriented programming and also know about application software and system software.		

Paper II/Subject Name: Introduction to C Programming		Subject Code: INT052C102
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:

- To provide an introduction to the Computers and Computing environments.
- To give the students exposure to computer programming.
- To teach C programming language and basic and advanced concepts of C programming.
- To make the students capable of using C programming to solve basic as well as advanced computing problems.

Prerequisites: None

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. Yashawant Kanetkar, *Let us C,* 15th Edition, 2017, BPB Publication.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand basic idea of Computer Algorithms and Flow Charts and know the problem solving approach through programming. .Also learn the operators used in C.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Understand about the various constructs of programming.		
III	Learn how to solve problems using C programming. Learn to write C programs		
IV	Learn the concepts of functions and pointers used in C programming.		

Paper III/Subject Name: Digital Logic and Computer Design	Subject Code: INT052C103
L-T-P-C – 4-0-0-4 Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:

- To give the students the basic idea about Fundamental concepts of Digital Logic used in Computer Systems.
- To provide an understanding of Simplification of Boolean expression and how to implement with various gates.
- To explain the concepts on Combinational Circuits design.
- To give the students the concepts of Sequential Circuit design.

Prerequisites: None

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 Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, 3rd Edition, 2017, McGraw Hill.
4. Sanjay Sharma, *Digital Electronics: Digital Logic Design*, 1st Edition, 2013, S K Kataria & Sons.
5. Pratima Manhas and Shaveta Thakral, *Digital Logic & Design*, 1st Edition, 2013, S K Kataria & Sons.
6. A Potton, *An Introduction to Digital Logic*, Imort Edition, 2013, Palgrave.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand basic idea of number system and logic gates.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Understand the truth table, logic function and their realization, simplification of logic function using K-map		
III	Learn about Encoders, Decoders, Multiplexers, Demultiplexers		
IV	Learn the concepts Flip flops: truth table and state table SR, JK etc		

Paper IV/Subject Name: Introduction to C Programming Lab		Subject Code: INT052C112
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 student learn about problem solving techniques through C programming language.
- To teach the student to write good programs in C.
- To enhance the analyzing and problem solving skills.

Prerequisites: None

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. Yashawant Kanetkar, *Let us C,* 15th Edition, 2017, BPB Publication.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks

I	Understand examples programs based on character set, Tokens, Keywords and Identifiers	(i) Each topic to be expounded with examples.
		(ii) Students to be motivated to take part in discussions and ask questions.
		(iii) Students to be given homework/assignments.
		(iv) Discuss and solve the theoretical problems in the class.
		(v) Students to be encouraged to give short presentations
			(a)Participation in class discussions
			(b)Continuous Evaluation(30Marks)
			(i)15 marks on
			  • Assignments
			  • Class tests.
			  • viva-voce or presentation
			(ii) Mid-term examinations :10 marks
			(iii) Class attendance -5 marks
			(c) End-term examinations.-70 marks.

II	Learn to write C programs based on decision making, loop control statements etc.		
III	Learn about creation and use of one & two dimensional arrays, Dynamic arrays etc.		
IV	Learn the concepts of functions and pointers using C program examples.		

Paper V/Subject Name: Office Automation Lab   **Subject Code: INT052C114**

L-T-P-C – 0-0-4-2   **Credit Units: 02** **Scheme of Evaluation: T**

Objective:

The objectives of the course are:

- To give the students fundamentals of Office Automation using Computers.
- To provide concepts of Document creation and management using software available under Office Suites.
- To explain concepts of Spreadsheet management using software available under Office Suites.
- To teach concepts of Presentation management using software available under Office Suites.

Prerequisites: None

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.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks

I	Understand documentation using examples of MS Word.	(i) Each topic to be expounded with examples.
		(ii) Students to be motivated to take part in discussions and ask questions.
		(iii) Students to be given homework/assignments.
		(iv) Discuss and solve the theoretical problems in the class.
		(v) Students to be encouraged to give short presentations
			(a)Participation in class discussions
			(b)Continuous Evaluation(30Marks)
			(i)15 marks on
			  • Assignments
			  • Class tests.
			  • viva-voce or presentation
			(ii) Mid-term examinations :10 marks
			(iii) Class attendance -5 marks
			(c) End-term examinations.-70 marks.

II	Learn to make presentations using MS Powerpoint.		
III	Learn about creation of MS Excel		
IV	Learn the concepts of database operations through MS Access.		

Paper VIII/Subject Name: Concepts of Behavioural Science	Subject Code: BHS982A104
L-T-P-C – 1-0-0-1 Credit Units: 01	Scheme of Evaluation: T

Objective:

The objectives of the course are:

- To build understanding of the various elements of behavioral science, the way it is conducted and applied in different research.

Prerequisites: None

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the dynamics of development in the Behavioural and Social Sciences	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn social science disciplines like Psychology, Sociology, Anthropology,		
III	Learn about Statistical control		
IV	Learn the concepts of behavioural science research		

Paper IX/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: None

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
2. *Communicative Functional English 1,* Kumar, Varinder, 2012, Kalyani Publishers. New Delhi.

Reference Books:

1. Koneru, Aruna. *Professional Communication,* 1st Edition 2014, Tata McGraw Hill, India
2. Dan Ohair, *Pocket guide to public speaking,* 5th Edition, 2003, Mac Higher.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the Non-Verbal Communication-Introduction, Body Language, Personal Appearance etc.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on - Assignments - Class tests. - viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn the types of Listening-Superficial, Appreciative, Focused etc.		
III	Learn about Group Communication		
IV	Learn the concepts of Technical Writing		

Paper I/Subject Name: Computer Organization and Architecture		Subject Code: INT052C201
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To make the students understand the machine instructions and basic computer organization
- To give an idea of representation of information in computers
- T explain about memory hierarchy and various memory mapping techniques
- To teach I/O subsystems and pipelining processing.

Prerequisites: Basics of Digital Logic and Computer Design

Detailed Syllabus:

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

Text Book:

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

Reference Books:

1. V. C. Hamacher, Z. G. Vranesic and S. G. Zaky, *Computer Organization*, 5th Edition, 2002 McGraw Hill.

2. J. L. Hennessy and D. A. Patterson, *Computer Architecture: A Quantitative Approach,* 4/e, 2006, Morgan Kaufmann.
3. D. V. Hall, *Microprocessors and Interfacing,* 2nd Edition, 2006, McGraw Hall.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the various components in a computer, like CPU, Buses, Peripherals and Memory.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance - 5 marks (c) End-term examinations.-70 marks.
II	Learn the Assembly language Programming		
III	Learn about Binary arithmetic etc.		
IV	Learn the concepts of Buses, Peripherals and Memory		

Paper II/Subject Name:Introduction to Data Structures		Subject Code: INT052C202
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:

- To give students an introduction to the basic concepts of Data Structures and Algorithms.
- To give an exposure to the concepts of Linked Lists and their applications.
- To impart detailed concepts on various kinds of Trees, Graphs, Searching and Sorting.

Prerequisites: Basics of C Programming

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Data Structure Basics**	Introduction, Terminologies, Data Structures Classification, Operations on Data Structures, Abstract Data Types. Algorithms Efficiency, Time and Space Complexity, Time and Space Tradeoff, Asymptotic Notations	05
II	**Linear Data Structures**	Arrays- Introduction, Memory Representation of One Dimensional and Two Dimensional Arrays, Various operations on array, Sparse Matrices. Linked Lists- Introduction, Memory Representation, Various Types of Linked Lists, Operations and Applications of Linked Lists. Stacks- Introduction, Array and Linked Representation of Stacks, Operations on Stacks, Applications of Stacks. Queues- Introduction, Array and Linked Representation of Queues, Operations on various types of Queues, Types of Queues, Applications of Queues.	20
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	15
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	08
Total			**48**

Text Book:

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

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the various components in a computer, like CPU, Buses, Peripherals and Memory.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn the Assembly language Programming		
III	Learn about Binary arithmetic etc.		
IV	Learn the concepts of Buses, Peripherals and Memory		

Paper III/Subject Name: Object Oriented Programming using C++		Subject Code: INT052C203
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To explain the basic object-oriented concepts and the issues involved in effective class design.
- To teach how to write C++ programs that use: object-oriented concepts such as information hiding, constructors, destructors, inheritance.

Prerequisites: Basics of C programming

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. *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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the various Features and applications of OOP	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn the concept of classes and objects with examples		
III	Learn about Inheritance , Polymorphism , overloading etc		
IV	Learn the concepts of Templates, Exception and File Handling		

Paper IV/Subject Name:Introduction to Data Structures Lab		Subject Code: INT052C212
L-T-P-C – 0-0-4-2	Credit Units: 02	Scheme of Evaluation: P

Objective:

The objectives of the course are:
- To develop skills to design and analyze simple linear and non-linear data structures.
- To strengthen the ability to identify and apply appropriate data structure for real world problem.
- To give practical knowledge on the practical applications of data structures.

Prerequisites: Basics of C Programming

Detailed Syllabus:
Minimum 20 Laboratory experiments based on the following-
1. Some common programs of C as revision.
2. Programs on Arrays- Traversal, Insertion, Deletion, Polynomial Representation, etc.
3. Programs on Linked List- Creation Insertion, Deletion, Polynomial Representation, etc.
4. Programs on Stacks-Creation, Push Pop, Infix to Postfix Conversion, Evaluation.
5. Programs on Queues-Creation, Insertion, Deletion, etc.
6. Programs on Trees- Binary Tree Creation, Tree Traversal, BST
7. Programs on Searching- Linear Search, Binary Search
8. Programs on Sorting- Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort.

Text Book:

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

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the variouslinear and non-linear data structures using examples		(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on
II	Learn about Time and Space Complexity, Asymptotic Notations		• Assignments • Class tests. • viva-voce or presentation
III	Array and Linked Representation of Stacks examples		(ii) Mid-term examinations :10 marks

IV	Learn the concepts of Trees , Graphs , searching , sorting etc	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(iii) Class attendance -5 marks (c) End-term examinations.-70 marks.

Paper V/Subject Name: Object Oriented Programming using C++ Lab	Subject Code: INT052C213	
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 student learn C++ programming language.
- To teach the student the implementation of object oriented programming features.
- To teach the student to write programs in C++ to solve the problems

Prerequisites: Basics of C Programming

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the OOP with C++ programs	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn the concept of classes and objects with example programs		
III	Learn about Inheritance , Polymorphism , overloading etc		
IV	Learn the concepts of Templates, Exception and File Handling using C++ example programs.		

Paper VIII/Subject Name: Understanding Self and Others		Subject Code: BH982A204
L-T-P-C – 1-0-0-1	**Credit Units: 01**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:

- To provide students insight into the various aspects of self and how one perceives and comprehends other's behavior in the light of their present appearance.

Prerequisites: None

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 Quarter life crisis- a new concept of understanding young people's difficulties in transitioning to adulthood	3
III	**Social Perception**	Making sense and categorizing information from environment Person schemas and group stereotypes	3
IV	**Attribution**	Attribution theory Dispositional versus situational attributions Inferring dispositions from acts Co-variation model of attribution Attributions for success and failure Bias and error in attribution Over-attribution to dispositions Focus of attention bias Actor observer difference Motivational biases Cultural basis of attributions	3
Total			**12**

Text Books:

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

Reference Books:

1. Leary, M.R. & Tangney, J. P., Handbook of Self and Identity, 2012, New York: The Guilford Press.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand self-efficacy Personal and social identity	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on • Assignments • Class tests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn the Continuity and differentiation Identity crisis		
III	Learn about Social Perception		
IV	Learn the concepts of Attribution theory		

Paper IX/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.

Detailed Syllabus:

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

IV	Business Presentation and Public Speaking	Business Presentation and Speeches–Difference, Elements of a Good Speech-Planning, Occasion, Audience, Purpose, Thesis, Material, Organising and Outlining a Speech Outline, Types of 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.* PHILearning Pvt. Ltd. Page 136-153
2. Mehra Payal, *Business Communication for Managers,* Pearson, Page 75–83

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the Speaking Styles, Speaking Process, Importance of Oral Communication etc.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on - Assignments - Class tests. - viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn the Conversation-Types of Communication		
III	Learn about Human Personality, Analysis Transactions-Complementary Transactions,		
IV	Learn about the Speech Outline, Types of Delivery, Public speaking etc.		

Paper I/Subject Name: JAVA Programming		Subject Code: INT052C301
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:

- To learn the basic concept and techniques which form the object oriented programming paradigm which is a new way of thinking about problem using models organizes around real world concept.
- To implement the concepts of object oriented programming using JAVA.

Prerequisites: Basics of Procedural or Object Oriented Programming

Detailed Syllabus:

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

III	Packages, Interfaces, Exception Handling	Defining a package, accessing a package and using a package, Interfaces: multiple inheritance, Defining interfaces, implementing interfaces and extending interfaces. Exception handling fundamentals, Exception type: using try...catch, Multiple catch clauses, Throw and Throws 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. *Java Generics and Collections*; Maurice N. et al; 1st Edition; 2006; O'REILLY Publication.
2. *The Unified Modeling Language User Guide*; Booch G., Rumbaugh J.,Jacobson I.;2nd Edition;2005;Pearson Education.
3. *The Complete Reference Java*; Schildt H.; 7th Edition; 2007;Tata McGraw-Hill, New Delhi

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	To study the comparison between procedure-oriented programming, Object-oriented paradigm, the Basic concepts of object-oriented programming (OOP)., introduction to JAVA, constructing java programs, Introduction of JVM and an introduction to the control statements and looping constructs in Java.	Written tests, assignments, quizzes, program execution tests, presentations as announced by the instructor in the class.	(a) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Study and implement the concepts of Class and Object and learn the programming concepts of Method overloading and overriding, Static vs. Dynamic binding, Inheritance, Final, Abstract classes, Constructors. This module also spans the concepts of One-dimensional and multi-dimensional arrays and Strings.		

III	Learn about defining, accessing and using Java Packages and Interfaces. This module also covers the concepts of Exception handling fundamentals along with a detail study of the exception type: using try…catch, Multiple catch clauses, Throw and Throws.
IV	To Introduce the concepts of local and remote applets along with its implementation. It also outlines the I/O basics, concept of streams, Stream classes: byte stream classes, character stream classes, I/O exceptions, Creation of files and Random access files.

Paper II/Subject Name: Introduction to Database Management Systems	**Subject Code: INT052C302**
L-T-P-C – 4-0-0-4 **Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:

- To provide fundamental knowledge on database concepts.
- To study the concepts of relational data model.
- To gain practical to experience designing and constructing data models and using SQL to interface to both multi-user DBMS packages and to desktop DBMS packages.

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

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction**	Introduction to Data System, Drawbacks of Conventional File System, Purpose of database systems, DBMS Components, Architecture, Data Independence, Data modeling, Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modeling using the Entity Relationship Model.	12
II	**Relational Databases**	Relational databases, relational algebra, relational calculus. Data definition with SQL, insert, delete and update statements in SQL, views, data manipulation with SQL, triggers and assertions, cursors	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. *An Introduction to Database Systems;* Date C.J.*;* 8th Edition; 2003; Pearson Education Asia
2. *An Introduction to Database Systems*; Desai B.C.;Revised Edition; 2012; Galgotia Publications

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Studies about data modelling, the Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modelling using the Entity Relationship Model.	Written tests, assignments, quizzes, program execution tests, presentations as announced by the instructor in the class.	(b)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
II	Studies about the Relational databases with a detailed implementation of the concepts of SQL by constructing queries using it.		• Assignments • classtests. • viva-voce or presentation (iv)Mid-term examinations :10 marks
III	Learns to design databases efficiently by implementing the concepts of functional dependencies and normalization.		(v) Class attendance -5 marks (c) End-term examinations.-70 marks.
IV	Learns in details about database transactions.		

Paper III/Subject Name:Graph Theory		**Subject Code: INT052C303**	
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**	

Objective:

The objectives of the course are:
- To explain the fundamental concepts in graph theory
- To define how graph theory can be used as tools in solving practical problems
- To improve the proof writing skills and know its applications

Prerequisites: Concepts of Data Structures

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;	14

		detection of planarity; Thickness and crossings.	
		Incidence; Adjacency; Circuit, Cut-Set, Path matrices and their properties	
IV	**Graph Coloring, Directed Graphs and Enumeration of Graphs**	Chromatic number; Chromatic Partitioning, Chromatic polynomial, Coverings, minimization of Switching Functions. Four Color theorem, five color theorems	15
		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.	
Total			**48**

Text Book:

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

Reference Books:

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

Facilitating The Achievement Of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learn about the concept of graph. Study about the different types of graph.	Written tests, assignments, quizzes, program execution tests, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 marks on ● Assignments ● class tests. ● viva-voce or presentation (ii) Mid-term examinations :10 marks (iii) Class attendance -5
II	Understand the concept of trees. fundamental circuits , Spanning trees etc.		
III	Learns about Cut Sets and Vertices, Plannar Graph and different concepts of graph.		

IV	Learn in details about Graph Coloring, Directed Graphs different types of digraphs etc.		marks (c) End-term examinations.-70 marks.

Paper IV/Subject Name: JAVA Programming Lab		Subject Code: INT052C311
L-T-P-C – 0-0-4-2	**Credit Units: 02**	**Scheme of Evaluation: P**

Objective:

The objectives of the course are:
- To learn the basic concept and techniques which form the object oriented programming paradigm which is a new way of thinking about problem using models organizes around real world concept.
- To implement the concepts of object oriented programming using JAVA.

Prerequisites: Basics of Procedural or Object Oriented Programming

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

Facilitating The Achievement Of Course Learning Outcomes

COURSE LEARNING OUTCOMES	TEACHING AND LEARNING ACTIVITY	ASSESSMENT TASK
Show competence in the use of JAVA language in the development different programs. Understand the basic principles of the object-oriented programming. Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (vi) Mid-term examinations :10 marks (vii) Class attendance -5 marks (c) End-term examinations.-70 marks.

Paper V/Subject Name: Introduction to Database Management Systems Lab		Subject Code: INT052C312
L-T-P-C – 0-0-4-2	Credit Units: 02	Scheme of Evaluation: P

Objective:

The objectives of the course are:
- To provide fundamental knowledge on database concepts.
- To study the concepts of relational data model.
- To teach the student database design and query and PL/SQL.

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

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.
1. *Introduction to Database Management System*; Kahate A.; 1st Edition; 2004; Pearson Educations
2. *DataBase Management System*; Paneerselvam; 2nd Edition; 2011; PHI Learning

Reference Books:

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

Facilitating The Achievement Of Course Learning Outcomes

Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
Learn the basic concepts and applications of database systems. Learn the basic constructs of SQL and construct queries using it. Understand the basic concepts of transaction processing and concurrency control.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (viii) Mid-term examinations :10 marks (ix) Class attendance -5 marks (c) End-term examinations.-70 marks.

Objective:

The objectives of the course are:
- To create awareness about the importance of environment
- To learn the effect of technology on the environment and ecological balance

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Concepts Of Environmental Science	Environment, Levels of organizations in environment, Structure and functions in an ecosystem Biosphere its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals	6
II	Natural Resources and Biodiversity	Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative) Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation	6
III	Environmental Pollution	Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution– Rural /Urban/Industrial waste management[with case study of any one type, e.g., power	6

		(thermal/nuclear), fertilizer, tannin, leather, chemical, sugar), Solid/Liquid waste management, disaster management	
IV	**Social Issues and Environment**	Problems relating to urban environment- Population pressure, water scarcity, industrialization, remedial measures Climate Change – reasons, effects, (global warming, ozone layer depletion, acid rain) with one case study; Legal issues – Environmental legislation (Acts & issues involved), Environmental Ethics; Environmental monitoring, covering, Monitoring – Identification of Environment	6
Total			**24**

Text Book:

1. *Perspectives in Environmental Studies,* Kaushik, A., Kaushik, C.P.;4th Edition;2014; New Age International (P) Ltd. Publishers, New Delhi – 110 002.

Reference Books:

1. *Environmental Science*; Sinha, J.;1st Edition; 2011; Galgotia Publication Pvt Ltd, Darya Ganj, Delhi 110002.
2. *Environment & Ecology*; Agarwal, R.K.; 1st Edition; 2008; Krishna Prakashan Media (P) Ltd, Meerut, India.
3. *Environmental Science;* Miller T.G.; Spoolman, S.;15th Edition; 2014; Cengage Learning, 20 Channel Street, Boston, MA 02210, USA

Facilitating The Achievement Of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learns about the environment, the levels of organizations in environment and about the ecosystem and biosphere.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(c) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments
II	Learns about theRenewable and Non-renewable Resources, about Biodiversity at global, national and local levels; India as a mega-diversity nation, about the threats to biodiversity and conservation strategies.		• classtests. • viva-voce or presentation (x) Mid-term examinations :10 marks
III	Studies about environmental pollution, pollution prevention and management strategies.		(xi) Class attendance -5 marks (c) End-term examinations.-70 marks.
IV	Is made aware about the problems relating to urban environment, about the reasons and effects of Climate Change, about Environmental legislation and on the strategies to monitor the environment.		

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

Objective:

The objectives of the course are:
- To adopt different communication strategies to meet different objectives of communication inside the organisation.
- To develop a robust communication strategy such that the student gets prepared for employment by considering relevant information relating to job requirements

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Communication in Organization**	Types of organisation Different purposes of communication in organisations Modes of communication in organisation Levels of communication in organisation Direction of flow of communication in organisation Networks Channels of communication Crisis communication in organisation	3
II	**Communication Strategies for Managers**	Introduction Different communication strategies for managers Communicating different types of messages- positive, negative, persuasive Team communication Cross-cultural communication Communicating for negotiation Corporate communication Leadership communication Business Etiquettes and Professionalism, Applying Ethics	3
III	**Written Communication**	Principles of effective writing Different forms of written communication used in organisations Business Letters- parts of business letters, office order, circular, notice, agenda, minutes.	3

		Order, acceptance & cancellation, complaint & adjustment letters. Writing across cultures	
IV	**Communication for Employment**	Preparing Resumes and Application Messages Planning Targeted Resume Preparing resume Supplementing a Resume Composing Application Messages	3
Total			**12**

Text Book:

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

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Studies about the different purposes of communication in organisations and the variosus modes of communication in organisation	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(d)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (xii) Mid- term examinations :10 marks (xiii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Introduces to different communication strategies for managers, team communication and Cross-cultural communication, Business Etiquettes and Professionalism and the Application of Ethics.		
III	Highlights the principles of effective writing, writing business letters and writing across cultures to develop a robust communication strategy helpful for employment.		
IV	This module eduacates on preparing targeted resumes, readying the student for effective communication for employment.		

Paper I/Subject Name: Operating Systems		Subject Code: INT052C401
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To learn the fundamentals of Operating System and the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management.

Prerequisites: Concepts of Computer Organization and Architecture, Data Structures, Computer Programming

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction to OS, Process and Threads**	Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel. Operating system structure (simple, layered, virtual machine), O/S services, and system calls. Concept of processes, process scheduling, operations on processes, co-operating processes, inter-process communication. Overview of threads, benefits of threads, user and kernel threads.	12

		Scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, and priority), algorithm evaluation, multi-level queue scheduling and multilevel feedback queue scheduling	
II	**Process Synchronization and Deadlocks**	Data Access and control synchronization, critical section problem, critical region, Race conditions in process synchronization , classical problems of synchronization, semaphores, Inter-process communication through message passing mechanism System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.	**12**
III	**Memory and File Management**	Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging Virtual Memory background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing. File concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance	**12**
IV	**I/O, Disk Management, Protection and Security**	I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and non-blocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance. Disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks. Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.	**12**
Total			**48**

Text Book:

1. *Operating System: Concept & Design*; Milenkovie M.; 2nd Edition; 2001; McGraw Hill.
2. *Operating System Design & Implementation*;Tanenbaum A.S.; 3rd Edition; 2006; Practice Hall NJ.
3. *Operating System Concepts*; Silbersehatz A. , Peterson J. L.; 8th Edition; 2008;Wiley.
4. *Operating System;*Dhamdhere; 3rd Edition; 2017;TMH.

Reference Books:

1. *Operating Systems* ;Stalling, W.;1992; Maxwell McMillan International Editions
2. *An Introduction to Operating Systems*; Dietel H. N.; 2nd Edition; 2002; Addison Wesley.
3. *The Design of the UNIX Operating System;*M. J. Bach;1994; Prentice Hall of India.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task

I	This module gives an introduction to operating systems, process concepts and the different scheduling techniques.	Written tests, assignments, quizzes, program execution tests, presentations as announced by the instructor in the class.	(e) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation
II	Learns about theoretical concept behind the different synchronization techniques of processes and about deadlocks, deadlock prevention and avoidance.		(xiv) Mid-term examinations :10 marks (xv) Class attendance -5 marks
III	Analyse the various device and resource management techniques for timesharing and distributed systems; learns about the various memory management techniques including paging and segmentation and the concepts of virtual memory.		(c) End-term examinations.-70 marks.
IV	Interpret the mechanisms adopted for file sharing in distributed Applications and highlight the I/O handling mechanisms of the OS including I/O hardware, polling, interrupts and different protection and security issues.		

Paper II/Subject Name:Data Communication and Networks		**Subject Code: INT052C402**
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To educate concepts, vocabulary and techniques currently used in the area of computer networks.
- To master the terminology and concepts of the OSI model and the TCP/IP model.
- To be familiar with wireless networking concepts and contemporary issues in networking technologies.

Prerequisites: Concepts of Data Communication

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction and Data Link Layer**	Goals and Applications of Networks, Network structure and architecture, The OSI reference and TCP/IP model services, Network Topology Design - Delay Analysis, Back Bone Design, Overview of Physical Layer, ISDN, Terminal Handling, FDDI, X.25, Frame Relay Flow Control and ARQ techniques, Data link Protocols, Sliding Window protocols, Error Handling, HDLC, DLL in Internet.	12
II	**Network Layer and Protocols**	Network Layer - Point to Point Networks, Routing, Congestion control, Internetworking -TCP / IP, IP packet, IP addressing: classless, class full addressing, IPv4, IPv6, IPv4 vs. IPv6. ICMP, RARP, BOOTP, Internet Multicasting – IGMP, Exterior Routing Protocols – BGP	12

III	Transport, Session and Presentation Layer	Transport Layer - Design issues, Connection management, Transport Layer – TCP & UDP., Session Layer-Design issues, Presentation Layer-Design issues, Data compression techniques, cryptography.	12
IV	Application Layer	Application layer –DNS, File Transfer, Access and Management, Electronic mail, MIME, SNMP, Virtual Terminals, Bluetooth,World wide Web	12
Total			48

Text Book:

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

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	To understand the underlying concepts behind the data link layer and apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.	Written tests, assignments, quizzes, program execution tests, presentations as announced by the instructor in the class.	(f) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation
II	To determine proper usage of the IP address, subnet masks and default gateway in a routed network.		(xvi) Mid-term examinations :10 marks (xvii) Class attendance -5 marks
III	To learn about the various transport layer protocols and about the basic concepts of data compression and cryptography.		(c) End-term examinations.-70 marks.
IV	To understand internals of main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP of the application layer.		

Paper III/Subject Name:Design and Analysis of Algorithms		Subject Code: INT052C403	
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**	

Objective:

The objectives of the course are:

- To teach the fundamental algorithms
- To explain how to analyse the performance of algorithms
- To provide the fundamental algorithmic design strategies

Prerequisites: Concepts of Data Structures and Basic Mathematics

Detailed Syllabus:

Module s	Topics	Course content	Periods
I	Introduction	Fundamental characteristics of an algorithm. Basic algorithm analysis – Asymptotic analysis of complexity bounds – best, average and worst-case behaviour, standard notations for expressing algorithmic complexity. Empirical measurements of performance, time and space trade-offs in algorithms. Using recurrence relations to analyse recursive algorithms – illustrations using recursive algorithms.	12
II	Fundamental Algorithm Strategies	Brute Force: String Matching, Closest-Pair and Convex-Hull Problems ,Exhaustive Search, Travelling Salesman Problem, Knapsack Problem, Job Assignment problem. Divide and Conquer Methodology :Binary Search, Merge sort , Quick sort ,Heap Sort, Multiplication of Large Integers ,Closest-Pair and Convex . Dynamic Programming: Computing a Binomial Coefficient, Wars hall's and Floyd' algorithm, Optimal Binary Search Trees, Knapsack Problem and Memory	12

		functions. Greedy Technique: Prim's algorithm- Kruskal's Algorithm - Dijkstra's Algorithm-Huffman Trees.	
III	**Iterative Improvement**	The Simplex Method – The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem	**12**
IV	**Tractable and Intractable Problems**	Limitation of algorithms,. The Halting problem. Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem. Standard NP complete problems Reduction techniques. Approximation algorithms, Randomized algorithms, Class of problems beyond NP – PSPACE.	**12**
Total			**48**

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*, Addison- Wesley
2. Horowitz & Sahani, *Fundamentals of Algorithms,* 2nd Edition, 2009, Galgotia Publications

Facilitating the Achievement of Course Learning Outcomes

Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks

On completion of this course the students will be expected to:
• Be able to analyze algorithms and improve the efficiency of algorithms.
• Apply different designing methods for development of algorithms to realistic problems, such as divide and conquer, greedy and etc.
• Understand and estimate the performance of algorithm.
	• Each topic to be explained with examples.
	• Students to be motivated to discover the relevant concepts to take part in discussions and ask questions.
	• Students to be given homework/assignments to make their concept clear.
	• Discuss and solve the theoretical problems in the class
		• Participation in class discussions
		• Continuous Evaluation: 30 Marks
		  • 15 marks on
		    o Assignments
		    o class tests
		    o viva-voce or presentation
		  • Mid-term examinations :10 marks
		  • Class attendance: 5 marks
		• End-term examinations: 70 marks

Paper IV/Subject Name: Operating Systems Lab		Subject Code: INT052C411
L-T-P-C – 0-0-4-4	Credit Units: 02	Scheme of Evaluation: P

Objective:

The objectives of the course are:

- To learn the fundamentals of Operating System
- To learn the UNIX commands.
- To learn the shell scripting
- To learn about process, CPU scheduling etc.

Prerequisites: Concepts of Computer Programming and Data Structures

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-
1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users.
10. Write a shell script to display the multiplication table any number,

11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
14. Write a shell script to find the LCD (least common divisor) of two numbers.
15. Write a shell script to perform the tasks of basic calculator.
16. Write a shell script to find the power of a given number.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Program to show the pyramid of special character "*".
21. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
22. Implement all file allocation strategies
23. Implement Semaphores

Text Book:

1. *Operating System: Concept & Design*; Milenkovie M.; 2nd Edition; 2001; McGraw Hill.
2. *Operating System Design & Implementation*; Tanenbaum A.S.; 3rd Edition; 2006; Practice Hall NJ.
3. *Operating System Concepts*; Silbersehatz A. , Peterson J. L.; 8th Edition; 2008;Wiley.
4. *Operating System;* Dhamdhere; 3rd Edition; 2017;TMH.

Reference Books:

1. *Operating Systems* ;Stalling, W. ; 1992; Maxwell McMillan International Editions
2. *An Introduction to Operating Systems*; Dietel H. N.; 2nd Edition; 2002; Addison Wesley.
3. *The Design of the UNIX Operating System;*M. J. Bach; 1994; Prentice Hall of India.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Analyse the structure, basic architectural components involved in OS design. Able to learn the shell scripting method. Able to learn the basics Unix commands	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(g)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (xviii) Mid-term examinations :10 marks (xix) Class attendance -5 marks (c) End-term examinations.-70 marks.
II			
III			
IV			

Paper V/Subject Name:Data Communication and NetworksLab Subject Code: INT052C412

L-T-P-C – 0-0-4-4	Credit Units: 02	Scheme of Evaluation: P

The objectives of the course are:
- To educate concepts, vocabulary and techniques currently used in the area of computer networks.
- To master the terminology and concepts of the OSI model and the TCP/IP model.
- To make the students familiar with wireless networking concepts and contemporary issues in networking technologies.

Prerequisites: Concepts of Computer Programming

Detailed Syllabus:
Minimum 20 Laboratory experiments based on the following-
- Study of different network cables and devices.
- Study of college LAN with references to network IP and design a LAN for it.
- Study of basic network command and network configuration command.
- Study of LAN transmission media's, topologies, interconnection devices & LAN standards.
- Write a program in 'C' for PC to PC communication using RS-232 port.
- Implement Dijkstra's algorithm to compute the Shortest path in a graph.
- Study of Different network simulators for simulations.
- Token bus and token ring protocol tyo create scenario and study the performance of token bus and token ring protocols through simulation.
- Implement Transfer of files from PC to PC using Windows / Unix socket programming.
- Case study of client/server scenario. Observing the difference between UDP and TCP servers.
- To observe the working of TCP three-way-hand-shaking procedure. Locating different packets like, SYN, SYN-ACK and ACK. Comparing different fields of these packets.
- Write a program for Hamming Code generation for error detection and correction Using TCP/IP sockets.

- Write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.
- Study & Simulation of Routing Protocols using Standard Network Simulator

Text Book:

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, 5th Edition, 2014, Pearson Education.

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
After completion of the course the students are expected to ● To understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks. ● To apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission. ● To determine proper usage of the IP address, subnet masks and default gateway in a routed network. ● To understand internals of main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(h)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (xx) Mid-term examinations :10 marks (xxi) Class attendance -5 marks (c) End-term examinations.-70 marks.

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

Objective:

The objectives of the course are:

- To develop report writing skills after detailed inquiry and investigation, tailored to the context of given situation and audience.
- To create, develop and deliver an effective presentation.
- To understand the increasing importance of group communication.
- To learn the different forms of technology-enabled communication in the 21st century businesses.

Prerequisites: None

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 Manager;* Verma, S; 2nd Edition; 2015;Vikas Publishing House Pvt Ltd; pp 267-298, 243-259.

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Helps to develop report writing skills after detailed inquiry and investigation, tailored to the context of given situation and audience.	Written tests, assignments, quizzes,presentations as announced by the instructor in the class.	(i) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
II	Educates on how to create, develop and deliver an effective presentation.		• Assignments • classtests. • viva-voce or presentation (xxii) Mid-term examinations :10 marks
III	Develops and helps to Understand the increasing importance of group communication.		(xxiii) Class attendance -5 marks (c) End-term examinations.-70 marks.
IV	Learn the different forms of technology-enabled communication in the 21st century businesses		

Paper I/Subject Name: Introduction to Probability and Statistics		Subject Code: INT052C501
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To teach the basic rules of probability and to use them in modelling uncertainty in obtaining and recording data.
- To explain the utilization of graphical and numerical summaries of data in understanding data generating processes.
- To explain the logic of statistical inference to apply to common inferential procedures.

Prerequisites: Basic concepts of Mathematics

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Univariate Data and Probability**	Types of data, Mean and Median, Standard Deviation and Variance, Range, IQR and Finding Outliers, Graphs and Describing Distributions, Counting Techniques, Combinations and Permutations, Sets and Venn Diagrams, Basic Probability Models, General Probability Rules	12
II	**Discrete and**	Probability Distributions: Random Variable, Discrete random	12

	Continuous Distributions	variable, Mean and Standard deviation of discrete random variable, Discrete Probability Distributions: Binomial, Poisson and Hypergeometric probability distribution, Continuous Probability distribution: Normal distribution, Density Curves, The Normal Distribution, Standard Normal Calculations, Sampling Distribution of x and p^	
III	Sampling	Sampling Distribution: sampling plans and experimental designs, Sampling distribution of a statistic, Central Limit theorem, Sampling distribution of the Sample mean and Proportion. Large Sample Estimation: Point estimation, Interval estimation, Confidence interval of population mean, Population proportion, difference between two population means, difference between two population proportions.	12
IV	Variance and Linear Regression	Analysis of Variance: One-way classification, Two-way classification. Linear regression and Correlation: Method of least squares, Analysis of variance for linear regression, Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line. Carl Pearson's coefficient of Correlation, Test of hypothesis concerning the Correlation coefficient.	12
	Total		48

Text Book:

1. *Probability and Statistics*, William Mendenhall, Robert J. Beaver, Barbara M. Beaver, 14th Edition, CENGAGE Learning.
2. *Probability and Statistics*, E. Rukmangadachari, 1st Edition, 2012, Pearson Education.

Reference Books:

1. Vijay K. Rohatgi, *An Introduction to Probability and Statistics*, 2nd Edition, 2008, Wiley

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learn about the types of data, Mean and Median, Standard Deviation and Variance, Range, IQR and Finding Outliersetc.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation xxiv) Mid-term examinations
II	Understand Probability Distributions: Random Variable, Discrete random variable, Mean and Standard deviation of discrete random variable etc.		

			:10 marks
III	Understand the Sampling Distribution, Central Limit theorem, Sampling distribution of the Sample mean and Proportion. Large Sample Estimation, Point estimation etc.		(xv) Class attendance -5 marks (c) End-term examinations.-70 marks.
IV	Learn about analysis of Variance, Linear regression and Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line etc.		

Paper II/Subject Name: Web Technology   Subject Code: INT052C502
L-T-P-C – 4-0-0-4   Credit Units: 04 Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To teach the basic web concepts and Internet protocols.
- To make the students familiar with Scripting Languages.
- To explain DHTML, XML, SERVELETS AND JSP.

Prerequisites: Basics of computer programming

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction, to Web Technology**	World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and FTP. Introduction to Browser and search engines, Working of the search engines, Miscellaneous Web Browser details, Introduction to Web Servers: Features of web servers, caching, case study-IIS, Apache, Configuring web servers. Internet Principles – Basic Web Concepts – Client/Server model – retrieving data from Internet – HTM and Scripting Languages – Standard Generalized Mark –up languages – Next Generation –	12

		Internet –Protocols and Applications.	
II	HTML,CSS, Java Script	Web Pages - types and issues, tiers; comparisons of Microsoft and java technologies, WWW-Basic concepts, web client and web server, http protocol (frame format), universal resource locator (url), HTML different Tags, sections, image & pictures, listings, tables, frame, frameset, form. The need of dynamic web pages; an overview of DHTML, cascading style sheet (css), comparative studies of different technologies of dynamic page creation. Java Script : Data types, variables, operators, conditional statements, array object, date object, string object, Dynamic Positioning and front end validation, creating rollovers, building smarter forms, Event Handling, working with cookies, DOM, node and objects, creating sliding menu, pop-up menu, slideshow with caption	12
III	XML and AJAX	XML – Server side includes – communication – DTD – Vocabularies – DOM methods – Introduction of XML, Validation of XML documents, DTD, Ways to use XML, XML for data files, HTML Vs XML, Embedding XML into HTML documents, Converting XML to HTML for Display, Rewriting HTML as XML, Firewalls– Proxy Servers. AJAX technologies, Action, XML Http Request database operations, security, issues	12
IV	J2SE, J2EE, Severlet and JSP	Data Types, Arrays, Type Casting, Classes and Objects, Inheritance, Interfaces, Exception Handling, Multithreading,J2EE as a framework, Client Server Traditional model, Comparison amongst 2-tier, 3-tier and N-tier Architectures, Thin and Thick Clients. J2EE Servlet 2.x Specification, Writing small Servlet Programs, Deployment Descriptor, Inter Servlet Collaboration, Session: Definition, State on web, Different ways to track sessions, JSP Technology Introduction-JSP and Servlets- Running JSP Applications Basic JSP- JavaBeans Classes - Support for the Model- View- Controller Paradigm- Case Study- Related Technologies.	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.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Understand about TCP/IP ,WAP, DNS, Email, Introduction to Browser and search engines, Web Servers, Client/Server model etc.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
II	Learn HTML Tags, **CSS and Java Script and creation of dynamic webpages.**		• Assignments • classtests. • viva-voce or presentation (xvi) Mid-term examinations :10 marks
III	Understand XML, DTD, DOM , AJAX etc.		(xvii) Class attendance -5 marks
IV	Learn J2EE Servlet 2.x Specification, JSP Technology etc.		(c) End-term examinations.-70 marks.

Paper III/Subject Name: Web Technology Lab	Subject Code: INT052C512
L-T-P-C – 0-0-4-4	Credit Units: 02 Scheme of Evaluation: P

Objective:

The objectives of the course are:

- To teach the basic web concepts and Internet protocols.
- To make the students familiar with Scripting Languages.
- To explain DHTML, XML, SERVELETS AND JSP.

Prerequisites: Computer Programming Concepts

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-
1. Basic use of html tag, linking image table, frame, form design.
2. DHTML- inline styles, creating style sheets with the style element, linking external style sheet,positioning elements, user style sheet.
3. Creating event handler that respond to mouse and keyboard event: Onload, onmouseover,onmouseout, onfocus, onblur, onsubmit, onresult, onclick, onchange.
4. Structuring data with xml, xml parser, extensible style language (xsl); customising mark uplanguage.
5. Configuring apache-tomcat server.

6. Building simple jsp: Declaring variables and methods in jsp, inserting java expression in jsp, processing request from user, generating dynamic response for the user. Accessing database fromjsp, inserting applet into jsp.

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.

Facilitating the Achievement of Course Learning Outcomes

Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
i) Web design ii) Learn HTML Tags, **CSS and Java Script and creation of dynamic webpages.** iii) Creation of XML files, DTD, DOM , AJAX etc. iv)Learn web application using J2EE Servlet, JSP Technology etc.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (xviii)Mid-term examinations :10 marks (xix) Class attendance -5 marks (c) End-term examinations.-70 marks.

Paper VI/Subject Name: Ethics and Business Communication		Subject Code: CEN982A501
L-T-P-C – 1-0-0-1	Credit Units: 01	Scheme of Evaluation: TP

Objective:

The objectives of the course are:
• To introduce students to truthfulness, accuracy, honesty, and reason as essential to the integrity of communication.
• Ethics will enable a student to use specific capacities and skills to make moral decisions.
• Students should develop, demonstrate and act out their ethical abilities.

Prerequisites: Previous knowledge of communication

Detailed Syllabus:

Modules	Topics	Course Contents	Hours

I	Why ethics in organizational communication?	Characteristics of Ethical Communication, ethical code in communication, Ethical Perspectives)values, religious, economic, legal, utilitarian, humanistic, dialogic, situational, universalistic), Ethical issues involved in Business communication (honesty, respect, sensitivity to cultural differences)	3
II	What does a professional communicator do?	Practices and behaviours of a professional communicator, ethical dilemmas (secrecy, whistle blowing, leaks, rumours and gossips, Lying, ambiguity), Strategic approaches to corporate ethics, Ethical communication on the intern	3
III	Areas of Concern	Ethical communication on the internet, freedom of expression, ethical implication of privacy of electronic mail, Ethics in advertising, Advertising and social responsibility, plagiarism, Social Media and responsible handling.	3
IV	Corporate image, PR, CSR and Advertising	Employee relations and employee communication – key tasks and communicative objectives, forms of employee involvement and tools of communication, PR and corporate mission, Advertising, PR and Publicity, Corporate social responsibility, financial communication, customer relations,	3
		TOTAL	**12**

Text Books:

1. *Business Communication*, Raman, Meenakshi and Singh, Prakash. 2nd Edition, 2012, Oxford University Press, pp. 546-585.
2. *Lean, Ethical Business Communication*, Sundararajan, Binod and Macdonald, Linda, 2017, Oxford University Press, pp 212 – 220.

Reference Books:

1. Sengupta. Sengupta, *Business and Managerial Communication*, 2nd Edition, 2011, Vikas Publishing House Pvt Ltd, pp. 529 – 603.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Understand about Ethical Perspectives, Business communication etc.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	h) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation
II	Learn about corporate ethics, Practices and behaviours of a professional communicator.		(xx) Mid-term examinations

III	Understand about advertising and social responsibility, ethical communication on the internet etc.		:10 marks xxxi) Class attendance -5 marks
IV	Learn about PR and corporate mission, Advertising, Publicity, Corporate social responsibility		(c) End-term examinations.-70 marks.

SYLLABUS (6th SEMESTER)	
Paper I/Subject Name:Artificial Intelligence	**Subject Code: INT052C601**
L-T-P-C – 4-0-0-4 **Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
● To make the students learn the concepts of Artificial Intelligence.
● To teach the methods of solving problems using Artificial Intelligence.
● To introduce the concepts of Expert Systems and machine learning.

Prerequisites: Concepts of Mathematics, Programming Languages, Data Analytic Techniques
Detailed Syllabus

Modules	Topics	Course Contents	Hours
I	**Introduction and Production Systems**	Introduction to AI-Problem formulation, Problem Definition - Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.	9
II	**Knowledge Representation and Inference**	Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.	9
III	**Planning and Machine Learning**	Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning	13
IV	**Expert Systems**	Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.	5
		TOTAL	36

Text Book:

1. *AI: A Modern Approach,* Stuart Russel and Peter Norvig, 2nd Edition, 2007, Pearson Education
2. *Artificial Intelligence,* Kevin Night, Elaine Rich, Nair B., 3rd Edition, 2008, Mc Graw Hill
3. *Introduction to AI and ES*, Dan W. Patterson, 3rd Edition, 2007, Pearson Education.

Reference Books:

1. Peter Jackson, *Introduction to Expert Systems*, 3rd Edition, 2007, Pearson Education
2. Deepak Khemani, *Artificial Intelligence*, 2013, Tata Mc Graw Hill Education.

Facilitating the Achievement of Course Learning Outcomes

Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks

On completion of this course the students will be expected to:
● Identify problems that are amenable to solution by AI methods.
● Identify appropriate AI
	● Each topic to be explained with examples.
	● Students to be motivated to discover
		● Participation in class discussions
		● Continuous Evaluation: 30 Marks
		  ● 15 marks on
		    ○ Assignments

methods to solve a given problem. ● Formalise a given problem in the language/framework of different AI methods. ● Implement basic AI algorithms. ● Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.	the relevant concepts to take part in discussions and ask questions. ● Students to be given homework/assignments to make their concept clear. ● Discuss and solve the theoretical problems in the class	○ class tests ○ viva-voce or presentation ● Mid-term examinations :10 marks ● Class attendance: 5 marks ● End-term examinations: 70 marks

Paper II/Subject Name:System Analysis and Design		Subject Code: INT052C602
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To explain how to determine specific needs of system.
- To discuss approaches and tasks of system.
- To teach evaluation tools and techniques.
- To explain the use of appropriate methods and techniques to design software.

Prerequisites: Fundamentals of Computer Science and Management Information System

Detailed Syllabus:

Modules	Topics	Course content	Periods

I	Introduction to System	Systems Development Approaches Function, Oriented, Object Oriented Development Process, Methodologies, Tools ,Modelling Methods, Processing Types and Systems, Batch Processing, Real Time Processing, Management Process, Management, System Analysis, Programmers, Computer Operators, End Users, System Structure, People Processes and Data, Databases, Personal Systems, Centralized Systems, Data Warehousing, Data Mining, Distributed Systems, Evolution of Distributed Processing, Client Server Systems, Agent Oriented Systems.	12
II	System Development	System Development Life Cycle, Linear or Waterfall Cycle, Linear Cycle Phase, Problem Definition, System Specification, System Design, System Development, Testing, Maintenance Problem with Linear Life Cycle, Iterative Cycles, Spiral Model Requirements Analysis, Importance of Communication, Identifying Requirements, Data and Fact Gathering Techniques, Feasibility Studies, Introduction to Prototyping, Rapid Prototyping Tools, Benefits of Prototyping	12
III	Data & Process modelling	Interface Design Tools, User Interface Evaluations, Introduction to Process Modelling, Introduction to Data Modelling. System Design Techniques, Document Flow Diagrams, Documents, Physical Movement of Documents, Usefulness of Document Flow Diagram, Data Flow Diagrams, DFD Notation, Context Diagram DFD Levelling, Process Descriptions Structured English, Decision Trees and Decision Tables, Entity Relationship Diagrams, Entities, Attributes, Relationship, Degree, Optionality, Resolving Many to Many Relationship, Exclusive Relationship, Structure Charts, Modules, Parameter Passing, Execution Sequence, Structured Design, Conversion from Data Flow Diagrams to Structure Charts.	12
IV	System Maintenance	System Implementation, Maintenance and Documentation, Testing, Evaluation, Maintenance Activities, Documentation, Document Configuration Maintaining a Configuration.	12
Total			**48**

Text Books:

1. *System Analysis and Design,* Elias m. Awad, 2nd Edition, 2010, Galgotia Publications Pvt. Ltd.
2. *System Analysis & design,* Perry Edwards, 2nd Edition, Tata McGraw-Hill Education.

Reference Books:

1. S. Skidmore, *Introduction to system Analysis*, 2nd Edition, 2000, Macmillan Education.
2. S. Skidmore, *system Design*, 2nd Edition, 2000, Macmillan Education.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Understand about Systems Development Approaches ,Object Oriented Development Process, Data Warehousing, Data Mining, Distributed Systems.	Written tests, assignments, quizzes, presentations as announced by the	)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson

II	Learn about System Development Life Cycle , Testing, Maintenance Identifying Requirements.	instructor in the class.	• Assignments • classtests. • viva-voce or presentation (xxii) Mid-term examinations :10 marks (xxiii) Class attendance -5 marks
III	Understand about Interface Design Tools, Document Flow Diagrams, Decision Trees ,Entity Relationship Diagrams.		
IV	Learn about System Implementation, Maintenance and Documentation, Testing, etc.		(c) End-term examinations.-70 marks.

Paper III/Subject Name:System Analysis and Design Lab	Subject Code: INT052C612
L-T-P-C – 0-0-4-4 Credit Units: 02	Scheme of Evaluation: P

Objective:

The objectives of the course are:
- To explain how to determine specific needs of system.
- To discuss approaches and tasks of system.
- To teach evaluation tools and techniques.
- To explain the use of appropriate methods and techniques to design software.

Prerequisites: Fundamentals of Computer Science and Management Information System

Detailed Syllabus:

Minimum 20 Laboratory experiments based on the following-

1. Choose a hypothetical system of significant complexity and write an SRS for the same.
2. Draw one or more Use Case diagrams for capturing and representing requirements of the system.
3. Draw Use case diagrams that include template showing description and steps of the Use Case for various scenarios.
4. Draw basic class diagrams to identify and describe key concepts like classes, types in your system and their relationships.
5. Draw sequence diagrams OR communication diagrams with advanced notation for your system to show objects and their message exchanges.
6. Draw activity diagrams to display either business flows or like flow charts.
7. Draw component diagrams assuming that you will build your system using existing components along with a few new ones.
8. Draw deployment diagrams to model the runtime architecture of your system

Text Books:

1. *System Analysis and Design,* Elias m. Awad, 2nd Edition, 2010, Galgotia Publications Pvt. Ltd.
2. *System Analysis & design,* Perry Edwards, 2nd Edition, Tata McGraw-Hill Education.

Reference Books:

1. S. Skidmore, *Introduction to system Analysis*, 2nd Edition, 2000, Macmillan Education.
2. S. Skidmore, *System Design*, 2nd Edition, 2000, Macmillan Education.

Facilitating the Achievement of Course Learning Outcomes

Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
i) Write an SRS ii) Draw Use case diagrams iii)Draw class diagrams, activity diagrams etc iv)Draw deployment diagrams	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation xxiv)Mid-term examinations :10 marks xxv) Class attendance -5 marks (c) End-term examinations.-70 marks.

Paper VI/Subject Name: Effective Workplace Communication   Subject Code: CEN982A601
L-T-P-C – 1-0-0-1   Credit Units: 01   Scheme of Evaluation: TP

Objective:

The objectives of the course are:
• To introduce students to areas of concern in the workplace environment like culture, business etiquettes, decision making, and workplace interpersonal relationships

Prerequisites: Basic knowledge of interpersonal communication and organizational communication paradigms.

Detailed Syllabus:

Modules	Topics	Course Contents	Hours
I	**Communicating Across Cultures in a Diverse Work Environment**	What is Culture, Workplace culture, Communicating across different cultures, Culture and writing skills, Culture and non-verbal communication, Managing Global Teams. Cross cultural communication (view of authority – Egalitarian versus Hierarchy and status; view of society – individualist or collectivist society teamwork versus individualism; view of time – linear and flexible punctuality, technology; cultural contexts, international communication, high and low context culture, intercultural communication and the workplace, cultural conflicts, resolving conflicts.	3
II	**Business Etiquette**	What is etiquette, Constituents of etiquette (First Impression, Dressing and Grooming etiquette, Conduct at the workplace, Body Language, Introducing yourself and others, Business Cards, Dining and Gifts, Meeting Customers and Clients, Travelling, Gender issues, Small talks etiquette, General business meeting etiquettes, Offline Networking etiquette) Business Etiquette and modern technology (emails, Instant Messaging, Text messages and Mobile Phones, Social Networking sites, , Using Software and Hardware, Audio/Videoconferencing)	3
III	**Managing Relationship at Work**	Peer-to-peer relationship, peer-to-superior relationship, peer-to subordinate relationship, Communicating Effectively within your team, Gateways to effective interpersonal communication, conflicts in a team. Theories of Interpersonal and Organizational Communication. Classical Rhetoric, Contagion Theory, Enactment theory, Groupthink, Network theory, Media richness and media naturalness theory, Reduced social cues approach, Sense making, Uncertainty reduction theory.	3
IV	**Corporate Communication**	Organizational Decision Making tools – Brainstorming, Nominal Group Technique, Delphi Technique Why corporate communication, Focus areas of Corporate communication (Internal – employees, departments; External – reputation, corporate social responsible, government, financial communication, media, crisis communication)	3
		TOTAL	**36**

Text Books:

1. *Business Communication: Essential Strategies for Twenty-first Century Managers,* Verma, Shalini, 2nd Edition, Vikas Publishing House Pvt. Ltd, pp. 30-47, 100-116, 140-147, 155-159, 415-443.

Reference Books:
1. Mukherjee, Hory Sankar,*Business Communication: Connecting At Work*, 1st Edition, 2013, Oxford University Press, pp. 530 – 543, 501-528

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Understand about Workplace culture, Cross cultural communication international communication.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
II	Learn about Dressing and Grooming etiquette, Gender issues, Social Networking sites.		• Assignments • classtests. • viva-voce or presentation xxvi)Mid-term examinations :10 marks
III	Understand about Peer-to-peer relationship, Interpersonal and Organizational Communication. Sense making, Uncertainty reduction theory.		xxvii)Class attendance -5 marks (c) End-term examinations.-70 marks.
IV	Learn about organizational Decision Making ,Corporate communication etc.		

8. Detailed Syllabus of Department Specific Electives

ELECTIVE-I

Paper IV/Subject Name:Introduction to Data Mining	**Subject Code: INT052D501**
L-T-P-C – 4-0-0-4 **Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To give students an introduction to the basic concepts of Data and Data Mining.

- To provide an exposure to Classification and Clustering of Data Mining.
- To explain the idea of Association and correlation analysis.
- To give students an exposure to Data Mining applications.

Prerequisites: Concepts of Database Management Systems.

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Introduction and basics of Data**	Basic concepts of data mining, including motivation and definition; different types of data repositories; data mining functionalities; concept of interesting patterns; data tasks; current trends, major issues and ethics in data mining. Types of data and data quality; Data Preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept hierarchy generation; Exploring Data: summary statistics, visualization, multidimensional data analysis.	15
II	**Classification and Clustering**	Binary Classification - Basic concepts, Bayes theorem and Naive Bayes classifier, Association based classification, Rule based classifiers, Nearest neighbour classifiers, Decision Trees. Concept of clustering, measures of similarity, Clustering algorithms: Partitioning methods, Hierarchical methods, Density based methods. Other methods.	12
III	**Association and Correlation Analysis**	Basic concepts: frequent patterns, association rules - support and confidence; Frequent item set generation - Apriori algorithm, FP-Growth algorithm; Rule generation, Applications of Association rules; Correlation analysis.	12
IV	**Data Mining Applications**	Text mining, Web Mining, Business Data Analytics, Overview of Big Data Analytics.	9
Total			48

Text Book:
1. *Introduction to Data Mining,Pang*-Ning Tan, Michael Steinbach and Vipin Kumar, 1st Edition, 2016, Pearson Education India.
2. *Data Mining: Concepts and Techniques,* Jiawei Han and MichelineKamber,3rd Edition, 2011, Morgan Kaufmann.

Reference Books:

1. Ian H. Witten and Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques,* 3rd Edition, 2011, Morgan Kaufmann.
2. K. P. Soman, ShyamDiwakar and V. Ajay, *Insight into Data Mining: Theory and Practice,* New Edition, 2006, Prentice Hall India.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Learn the basic applications, concepts, and techniques of data mining.	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical and practical	a) Participation in class presentations b) Continuous Evaluation (30 Marks) i) 15 marks on • Assignments • class tests. • viva-voce or presentation
II	Learn the different algorithms of Classification and Clusterings		
III	Understand the basic concepts of Association rules		
IV	Familiarize with text mining, web mining and Big data		

analytics	problems in the class. (v) Students to be encouraged to give short presentations	ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks

Paper V/Subject Name:System Administration		**Subject Code: INT052D502**
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To teach the students how to install and maintain a Unix/Linux server
- To explain how to connect a Unix/Linux server to the network, and share resources on the network.
- To impart the skills and knowledge needed to be qualified system administrators

Prerequisites: Basic Knowledge of Operating Systems

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**The System Administrator and User Management**	Information resources: Books, Internet, Online documents, System administrator duties and tasks Boot and Shut Down: Run levels, Processes and daemons, Configure startup scripts. User Management: Add user, User groups, User and system security, Collapse User environment, Shell startup scripts, What not to do in startup scripts, Other dot files	12
II	**File Management, Networking and Backup**	File system structure: Manage disk storage, Partition, Format, Fix errors on disk, Mount Links: hard, symbolic, Permission Permission bits, Special permission, ACLs, Quotas. Networking: Network concepts overview, History, ISO/OSI., Layers description, Name to address translation, File sharing with NFS, NIS, Services and inetd. Backup strategy, Selecting the backup devices and software, Automating the backup procedure, Third party product overview, Auto-mounter Requirements and Mechanism	12
III	**Backup System Administration Tools**	Monitor processes: truss/strace, ps top.\, Monitor network: lsof, netstat, Working with files: strings, awk, od, du, df, find, Misc: which, whereis, dmesg, Logfiles, Operating System Installation, System installation, Linux/Solaris installation, Patches, Installing and removing packages (RPM), Download compile and install using source code, Kernel reconfig, Get the kernel source code, Add new adapter and update drivers, Kernel upgrade.	12
IV	**The proc File system and System Monitoring**	Map of /proc, Process entries, Hardware information, Kernel information, Kernel settings, Swap space tunings, Detecting physical memory shortage, System resource loads: CPU, I/O, Disk, Raid disks, Setting limits to processes, Measuring network load.	12
		Total	**48**

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Acquire the basic skills and knowledge needed to administer Unix/Linux machines as standalone workstations or in a network environment.	i) Basic preliminary topics to be explained with illustrations. ii) Students to be encouraged to develop their learning	a) Participation in class discussions b) Continuous Evaluation (30 Marks)

II	Learn the detailed concepts of file management and network layers	ability. iii) Students be given homework/assignments. iv) Discuss and solve the theoretical problems and its application in the class. v) Students to be encouraged to apply concepts of vector calculus to develop other mathematical techniques.	i) 15 marks on • Assignments • class tests. • viva-voce or presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks
III	Understand the basic system administration tools		
IV	Familiarize with the kernel, kernel settings and system resource loads		

ELECTIVE-II

Paper V/Subject Name:Introduction to Cloud Computing	Subject Code: INT052D503
L-T-P-C – 4-0-0-4 Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:

- To explain current cloud computing technologies, including technologies for different cloud services.
- To teach large data processing and resource management in the cloud
- To help the students analyze the components of cloud computing showing how business agility in an organization can be created
- To make the students critically analyze case studies to derive the best practice model to apply when developing and deploying cloud based applications.

Prerequisites: Concepts of Database Management Systems, Networking

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Introduction**	The vision of cloud computing, Characteristics and benefits, Challenges ahead, A short history Client – Server Computing, Peer-to-Peer Computing, Distributed Computing, Collaborative Computing, Cloud Computing, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Infrastructure Services, Platform Services, Software Services - Software as service modes- Massively scaled software as a service- Scale of Economy, Management and Administration.	12
II	**Cloud Computing Technology**	Service Level Agreements and Monitoring-Support Services- Accounting Services, Resource Management- IT Security- Performance Management- Provisioning- Service Management, Untangling Software Dependencies. Introduction-Objectives, Clients – Mobile – Thin – Thick, Security - Data Linkage - Offloading Work - Logging - Forensics - Development – Auditing, Network- Basic Public Internet- The Accelerated Internet- Optimised Internet Overlay- Site-to-Site VPN- Cloud Providers- Cloud Consumers - Pipe Size- Redundancy, Services- Identity- Integration- Mapping- Payments- Search	12
III	**Accessing the Cloud**	Introduction-Objectives, Platforms- Web Application Framework- Web Hosting Services- Proprietary Methods, Web Applications- API's in Cloud Computing, Browsers for Cloud Computing- Internet Explorer- Mozilla Firefox- Safari- Chrome.	12
IV	**Data Management and Information Storage**	Introduction- Objectives, Data Security- Data Location- Data Control- Securing data for transport, Scalability and Cloud Services- Large Scale Data Processing- Databases and Data Stores- Data Archival. Introduction- Objectives, Storage as a Service, Storage Providers- Amazon Simple Storage Service- Nirvanix- Google Bigtable Datastore- MobileMe- Live Mesh, Storage Security, Merits and Demerits of Storage.	12
Total			**48**

Text Book:
1. *Mastering Cloud Computing - Foundations and Applications Programming,* Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, 1st Edition, 2013, MK publications
2. *Enterprise Cloud Computing: Technology, Architecture, Applications*, Gautam Shroff, 1st Edition, 2010, Cambridge University Press.

Reference Books:

1. Michael J.Kavis, *Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS),* 1st Edition, 2014, John Wiley & Sons Inc.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the fundamental principles of distributed computing	i) Each topic to be explained with illustrations. (ii) Students to be encouraged to discover the relevant concepts. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical and practical problems in the class. (v) Students to be encouraged to apply concepts to real world problems.	a) Participation in class discussions b) Continuous Evaluation (30 Marks) i) 15 marks on • Assignments • class tests. • viva-voce or presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks
II	Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing		
III	Understand the business models that underlie Cloud Computing		
IV	Understand concepts of IAAS, SASS, PAAS		

Paper IV/Subject Name:Social Networking		Subject Code: INT052D504
L-T-P-C – 4-0-0-4	**Credit Units: 04**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
● To explain the concept of semantic web and related applications.
● To teach knowledge representation using ontology.
● To explain human behaviour in social web and related communities.
● To provide visualization of social networks.

Prerequisites: Basic Knowledge of Computer Programming and Graph Theory

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Introduction**	Introduction to Semantic Web: Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis: Development of Social Network Analysis, Key concepts and measures in network analysis, Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities, Web-based networks, Applications of Social Network Analysis.	12
II	**Modelling, Aggregating and Knowledge Representation**	Ontology and their role in the Semantic Web: Ontology-based knowledge Representation, Ontology languages for the Semantic Web: Resource Description Framework, Web Ontology Language, Modelling and aggregating social network data: State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data, Advanced representations.	12
III	**Extraction and Mining Communities in Web Social Networks**	Monitor processes: truss/strace, ps top.\, Monitor network: lsof, netstat, Working with files: strings, awk, od, du, df, find, Misc: which, whereis, dmesg, Logfiles, Operating System Installation, System installation, Linux/Solaris installation, Patches, Installing and removing packages (RPM), Download compile and install using source code, Kernel reconfig, Get the kernel source code, Add new adapter and update drivers, Kernel upgrade.	12
IV	**Predicting Human Behaviour and Privacy Issues and Applications**	Understanding and predicting human behaviour for social communities, User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, Trust models based on subjective logic, Trust network analysis, Trust transitivity analysis, Combining trust and reputation, Trust derivation based on trust comparisons, Attack spectrum and countermeasures. Graph theory, Centrality, Clustering, Node-Edge Diagrams, Matrix representation, Visualizing online social networks, and Visualizing social networks with matrix-based representations. Matrix and Node-Link Diagrams, Hybrid representations, Applications, Cover networks, Community welfare, Collaboration networks, Co-Citation networks.	12
Total			**48**

Text Book:
1. *Social Networks and the Semantic Web*, Peter Mika, 1st Edition, 2007, Springer.
2. *Handbook of Social Network Technologies and Applications*, Borko Furht, 1st Edition, 2010, Springer.

Reference Books:

1. Dion Goh and Schubert Foo, *Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively,* 2008, IGI Global Snippet.
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Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Understand the key concepts and measures of social network analysis	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	a) Participation in class discussions b) Continuous Evaluation (30 Marks) i) 15 marks on ● Assignments ● class tests. ● viva-voce or presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks
II	Learn the represent knowledge using ontology.		
III	Analyze the monitor processes		
IV	Predict human behaviour in social web and related communities		

ELECTIVE-III

Paper IV/Subject Name:Introduction to Big Data Analytics	Subject Code: INT052D601
L-T-P-C – 4-0-0-4 Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To explain the basic concepts of big data.
- To teach the methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and the business needs

Prerequisites: Concepts of Database Management Systems, Java

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Introduction**	Big Data and its Importance, Challenges of Conventional Systems, Four V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications, Intelligent data analysis, Nature of Data: Analytic Processes and Tools, Analysis Vs. Reporting, Introduction To Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream.	12
II	**Big Data Technologies**	History of Hadoop, The Hadoop Distributed File System, Components of Hadoop, Analyzing the Data with Hadoop, Scaling OutHadoop Streaming, HDFS basics, developing a Map Reduce Application, How Map Reduce Works.	14
III	**Big Data Tools and Techniques**	Applications on Big Data Using Pig, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators in Pig. Introduction of Hive - HiveQL, Querying Data in Hive, User-Defined Functions	14
IV	**Real Time Database using HBase**	HBase Overview, Data Model, Architecture, Downloading, Installing and Configuring HBase, HBase Shell, HBase Java API for CRUD Operations.	8
	Total		48

Text Book:
1. *The Big Data Revolution,* Jason Kolb, Jeremy Kolb, 2013, Jason Kolb Publishers.
2. *Big Data Analytics with R and Hadoop,* Vignesh Prajapati, 2013, Packet Publishing

Reference Books:

1. WAGmob , *Big Data and Hadoop*, 1.5 Edition, 2013, WAGmob Publisher

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Familiar with the Big Data models	(i) Each topic to be explained with illustrations.	a) Participation in class discussions
II	Learn the big data techniques like Hadoop with data	(ii) Students to be encouraged to discover the relevant concepts.	b) Continuous Evaluation (30 Marks)
III	Learn the different applications of big data, user defined functions	(iii) Students to be given homework/assignments.	i) 15 marks on • Assignments • class tests.
IV	Understand real time data with	(iv) Discuss and solve the	• viva-voce or

	HBase	theoretical and practical problems in the class. (v) Students to be encouraged to apply concepts to real world problems.	presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks

Paper IV/Subject Name:Mobile Application Development		Subject Code: INT052D602
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To teach how to install and maintain a Unix/Linux server
- To explain connecting a Unix/Linux server to the network, and share resources on the network.
- To impart the skills and knowledge needed to be qualified system administrators

Prerequisites: Fundamental concepts of Computer Programming using C++/JAVA

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	Introduction	Introduction to Mobile Computing, Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User, More on UIs, VUIs and Mobile Apps, Text-to-Speech Techniques. Designing the Right UI c. Multichannel and Multimodal UIs	12
II	Intent, Services, Data Retrieval and Communication	Android Intents and Services, Characteristics of Mobile Applications, Successful Mobile Development, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider, State Machine, Correct Communications Model, Android Networking and Web	12
III	Telephony, Notifications and Graphics	Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony, Performance, Performance and Memory Management, Android Notifications and Alarms, Performance and Multithreading, Graphics and UI Performance, Android Graphics and Multimedia, Mobile Agents and Peer-to-Peer Architecture, Android Multimedia	12
IV	Location, Security and Additional Issues	Mobility and Location Based Services, Android, Packaging and Deploying, Performance Best Practices, Android Field Service App, Active Transactions, More on Security, Hacking Android, Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing	12
Total			48

Text Book:
1. *Android Programming: The Big Nerd Ranch Guide,* Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, 3rd Edition, 2017, Big Nerd Ranch LLC.
2. *Android SDK 3 for Dummies,* Rajiv Ramnath, Roger Craw, and Paolo Sivilotti, Wiley.

Reference Books:
1. Maximiliano Firtman, *Programming the Mobile Web*, 2nd Edition, 2013, O'Reilly Media, Inc.
2. Brian Fling, *Mobile Design and Development*, 2009, O'Reilly Media, Inc.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Expose to technology and business trends impacting mobile applications	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the	a) Participation in class discussions b) Continuous Evaluation (30 Marks) i) 15 marks on • Assignments • class tests. • viva-voce or
II	Understand the characterization and architecture of mobile applications.		
III	Learn the performance and multi-threading		
IV	Understand the security and		

testing of mobile applications	class. (v) Students to be encouraged to give short presentations	presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks

ELECTIVE-IV

Paper V/Subject Name:E-Commerce	Subject Code: INT052D603
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:
The objectives of the course are:
- To provide basic concepts of E-commerce.
- To explain integrated E-commerce system for order processing, payments and updating information on the web

- To teach various security related issues in the web.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Introduction	Defining Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities; Process of E-Commerce; Types of E-Commerce; Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models.	12
II	The Internet and WWW	Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov;.net etc.),Types of Network, Internet Service Provider(ISP), World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots	12
III	Internet Security	Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus (How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorization and Authentication, Firewall, Digital Signature(How it Works)	12
IV	Electronic Data Exchange	Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash	12
Total			**48**

Text Book:

1. *E-Commerce Concepts, Models, Strategies,* Murthy, G.S.V, 1st Edition, 2011, Himalaya Publishing House.
2. *E-Commerce,* Bajaj, K. Kamlesh and Nag,Debjani, 2nd Edition, 2005, Tata McGraw-Hill Education

Reference Books:

1. Schneider, P. Gray, *Electronic commerce*, 11th Edition, 2015, Cengage Learning.
2. Henry Chan, Raymond lee, Tharam Dillon, Elizabeth Chang, *E-Commerce, Fundamentals and Applications*, 1st Edition, 2001, Wiely, India.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Gain a comprehensive understanding of the E-Commerce landscape, current	(i) Each topic to be expounded with examples. (ii) Students to be motivated	a) Participation in class discussions

	and emerging business models, and the technology and infrastructure underpinnings of the business.	to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the theoretical problems in the class. (v) Students to be encouraged to give short presentations	b) Continuous Evaluation (30 Marks) i) 15 marks on • Assignments • class tests. • viva-voce or presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks
II	Understanding the basics of Internet and WWW		
III	Gain an understanding on the importance of security, privacy, and ethical issues as they relate to E-Commerce.		
IV	Gain an understanding on how innovative use of the E-Commerce can help developing competitive advantage.		

Paper VI/Subject Name:Introduction to Embedded Systems		Subject Code: INT052D604
L-T-P-C – 4-0-0-4	Credit Units: 04	Scheme of Evaluation: T

Objective:

The objectives of the course are:

- To introduce the fundamentals of Embedded System Design using Ardunio Board and Rasberry Pi Pico .

- Introduction to basic C language/MicroPython programs that perform I/O functions and implement simple data structures, manipulate numbers in multiple formats, interfacing of LED, Sensors, etc. and understand how software is used to Program Embedded System (Arduino/Rasberry Pi Pico)

Detailed Syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	BASIC FUNDAMENTALS Fundamental concepts: number system, basic electronics components, digital logic fundamentals, Microprocessor and Computer systems, Introduction to Raspberry Pi Pico, Introduction to Arduino Board	9
II.	EMBEDDED SYSTEM BOARDS AND PROGRAMMING. Introduction to basic Embedded C function, Introduction to IDE Software for programming of Arduino Board. Board, Input/Output Programming, using Libraries.. Introduction to Raspberry Pi Pico Board and its features.	9
III.	INTRODUCTION TO MICROPYTHON AND RASBERRY PI PICO PROGRAMMING Introduction to Python, Micro Python and its features, Advantages of MicroPython in Embedded System programming, basic programming using MicroPython. Physical computing using Raspberry Pi Pico	9
IV	DESIGN PROCESS OF EMBEDDED SYSTEM Design of Embedded System, using ADC, DAC, Interrupts, Switches. Different case studies of Embedded Project Design Using Arduino board and Raspberry Pi Pico	9
	TOTAL	**36**

Text Book:

1. "*Programming Arduino: Getting Started with Sketches*"Simon Monk - Second Edition
2. "*Get started with MicroPython on Raspberry Pi Pico*"by Gareth Halfacree and Ben EverReady- Raspberry Pi Publication

Reference Books:
1. Michael Margolis, Brian Jepson, Nicholas Robert Weldin, *Arduino Cookbook,* 3rdEdition, April 2020, Media, Inc.
2. Pan, Tianhong Zhu, Yi, *Designing embedded systems with Arduino a fundamental technology for makers,* ,Springer Publication.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Know the Fundamentals of Embedded System Design and will be	(i) Each topic to be expounded with examples. (ii) Students to be motivated to take part in discussions and ask questions. (iii) Students to be given homework/assignments. (iv) Discuss and solve the	a) Participation in class discussions b) Continuous Evaluation (30 Marks) i) 15 marks on • Assignments • class tests.
II	Able to design simple Embedded System Design using Arduino and Raspberry Pi Pico for a specific application.		

		theoretical problems in the class. (v) Students to be encouraged to give short presentations	• viva-voce or presentation ii) Mid-term examinations: 10 marks iii) Class attendance: 5 marks c) End-term examinations: 70 marks
.			

9. Detailed Syllabus of Ability Enhancement Elective Courses

Paper VIII/Subject Name: Office Automation		Subject Code: INT052S301
L-T-P-C – 2-0-0-2	Credit Units: 02	Scheme of Evaluation: TP

Objective:

The objectives of the course are:

- To give the students fundamentals of Office Automation using Computers.
- To give the students concepts of Document creation and management using software available under Office Suites.
- To give the students concepts of Spreadsheet management using software available under Office Suites.
- To give the students concepts of Presentation management using software available under Office Suites.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Office Automation Fundamentals**	Overview of Personal Computing Software, Installation of Operating System, Installation of Utility Software and Applications. Use of System Tools for disk management, different file formats, file & directory managers, GUI, partitions, Networking tools and application, Web Browning, use of Web Browsers, Multimedia applications, Printer/Scanner software, Image editing.	6
II	**Document Management**	Creation and management of text documents using MS-Word/Open-Office Writer/Libre-Office Writer. Text formatting, Paragraph formatting, handling colors, page-numbering, tables, layouts, cut-copy-paste, handling graphics and shapes, multiple columns, page settings, mail-Merge, printing, using built-in templates.	6
III	**Spreadsheet Management**	Creation and management of spreadsheets and workbooks using MS-Excel/Open-Office Calc/Libre-Office Calc. Cell formatting, handling colors, layouts, cut-copy-paste, page settings, printing, cell editing commands and functions, using mathematical functions, using logical operators, generating graphs and charts.	6
IV	**Presentation Management**	Creation and management of presentation slides using MS-PowerPoint/Open-Office Impress/Libre-Office Impress. Adding slides, Text formatting, Paragraph formatting, handling colors, slide-numbering, tables, layouts, cut-copy-paste, handling graphics and shapes, slide settings, printing handouts, using built-in design templates, adding animations, controlling shows.	6
Total			**24**

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.
3. Patrick Bultema, *PC Software Essentials: A 4-In-1 Guide to the Most Popular PC Programs*. 1998.

Facilitating the Achievement of Course Learning Outcomes

MODULE	COURSE LEARNING OUTCOMES	TEACHING AND LEARNING ACTIVITY	ASSESSMENT TASK
I	Have adequate idea on Office Automation using Computers.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (c)Mid-term examinations :10 marks (d)Class attendance -5 marks (e) End-term examinations.-70 marks.
II	Have expertise on Document creation and management using software available under Office Suites.		
III	Have expertise on Spreadsheet management using software available under Office Suites.		
IV	Have expertise on Presentation management using software available under Office Suites		

Paper VIII/Subject Name: Problem Solving using C++		**Subject Code: INT052S401**
L-T-P-C – 2-0-0-2	**Credit Units: 02**	**Scheme of Evaluation: TP**

Objective:

The objectives of the course are:
   • Acquire an understanding of basic object-oriented concepts and the issues involved in effective
     class design.

- Write C++ programs that use: object-oriented concepts such as information hiding, constructors, destructors, inheritance

Prerequisites: Basics of Computer Programming

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction**	What is Object Oriented Programming? Why we need Object Oriented Programming? Programming characteristics of OOP. Difference between OOP and procedure-oriented programming; Basic Concepts of OOPs, feature of OOPs, Application of OOPs, and. Review of Data Types (user define and derived data types), Keywords, Tokens, Identifies, Constants, Reference variables, different Operators and Control statements	6
II	**Classes and Objects**	Introduction to Objects and classes, Difference between Class and Structure, Class definition and syntax, Defining member functions, Access control to other functions (Private, Public, Protected). 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	6
III	**Inheritance**	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, Abstract Class.	6
IV	**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,	6
Total			**24**

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
3. P.B. Mahapatra, *Thinking In C-Including Object Oriented Programming With C++*, 1998, Wheeler Publishing

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learns about the various concepts associated with object oriented programming.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
			• Assignments
II	Learns to implement class and object, the concept of member functions, data members, constructors and destructors.		• classtests.
			• viva-voce or presentation (c)Mid-term examinations :10 marks
III	Learns about the concept of inheritance and its types.		(d)Class attendance -5 marks
IV	Learns about polymorphism.		(e) End-term examinations.-70 marks.

Paper VIII/Subject Name: Logical Ability and Reasoning		Subject Code: INT052S402
L-T-P-C – 2-0-0-2	Credit Units: 02	Scheme of Evaluation: T

Objective:

The objectives of the course are:
- To teach the concepts expressed through words by assessing vocabulary, spelling, grammar and reading and understanding capabilities

- To explain non verbal reasoning through picture oriented problems
- To develop students' ability to reason logically.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Verbal Reasoning-I**	Number series, Analogy, Classifications, Blood relations, Coding-decoding, Puzzle test, Machine input, Inequalities, Decision making, Syllogism, Sitting arrangement, Sequential output tracing, Direction sense test, Logical Venn diagram	6
II	**Verbal Reasoning-II**	Alphabet test, Alpha-numerical sequence puzzle, Mathematical operations, Numbers, ranking & time sequence test, Logical sequence test, Arithmetical operations, Inserting the missing characters, Data Sufficiency, Eligibility test, Assertion and reason, Situation reaction test, Verification of truth of the statement	6
III	**Non-Verbal Reasoning**	Series, Analogy, Classification, Analytical reasoning, Mirror-image, Water-image, Spotting out the embedded figures, Completion of incomplete pattern, Figure matrix, Paper folding, Paper cutting, Rule detection, Grouping of identical figures, Cubes and dice, Dot situation, Construction of squares and triangles	6
IV	**Logical Reasoning**	Statements and course of action, Statements and assumption Cause and effect reasoning, Statements and argument, Drawing inference, Statement and Conclusion, Deriving conclusion from passages, Theme detection, Calendars, Clocks, Sequence and series, Puzzles, Seating arrangement, Odd figures or Odd man out	6
Total			24

Text Books:
1. *Quantitative Aptitude*, Dr. R.S. Aggarwal, Old Edition, 2008, S.Chand Publication, New Delhi.
2. *A Modern Approach to Verbal & Non- Verbal Reasoning* , Dr. R.S Agarwal , 2016 Edition, S. Chand Publication, New Delhi.

Reference Books:
1. Abhijit Guha, *Quantitative Aptitude for Competitive Examinations*, 4th Edition, 2014, McGraw Hill Education
2. Arun Sharma, *How to Prepare for Logical Reasoning for the CAT*, 2015, McGraw Hill Education

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task

I	Understand about Number series, Blood relations, Decision making, Syllogism, Logical Venn diagram.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
II	Learn aboutMathematical operations, Numbers, Data Sufficiency, Eligibility test, Assertion and reason.		• Assignments • classtests. • viva-voce or presentation (ii)Mid-term examinations :10 marks
III	Understand about Series, Analogy, Classification, Rule detection, Grouping of identical figures.		(iii)Class attendance -5 marks (c) End-term examinations.-70
IV	Learn about Statements and course of action, Drawing inference, Deriving conclusion from passages, Sequence and series, Odd figures.		marks.

10. Detailed Syllabus of Generic Electives

Paper VI/Subject Name: Computer Fundamentals	**Subject Code: INT052G101**
L-T-P-C – 3-0-0-3 **Credit Units: 03**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To give the students the basic idea about Computer Systems.
- To explain about the various components of a computer system.
- To teach issues related to data processing with computers.
- To give the students idea about computer software and computer programming.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Computer Appreciation and Organization**	Overview of Computers, Characteristics, Block Diagram, Types of Computers and features, Applications, Types of Memory, I/O Devices, Number Base Systems, Central Processing Unit - Processor Speed, Cache, Memory, RAM, ROM, Booting, Memory- Secondary Storage Devices: Floppy and Hard Disks, Optical Disks CD-ROM, DVD, Mass Storage Devices: USB thumb drive. Managing disk Partitions, File System Input Devices - Keyboard, Mouse, joystick, Scanner, web cam, Output Devices- Monitors, Printers – Dot matrix, inkjet, laser, Multimedia- What is Multimedia, Text, Graphics, Animation, Audio, Images, Video; Multimedia Application in Education, Entertainment, Marketing. Names of common multimedia file formats, Computer Software- Relationship between Hardware and Software; System Software, Application Software, Compiler, names of some high level languages, free domain software.	9
II	**Operating Systems**	Definition of Operating System Objectives, types, and functions of Operating Systems, Microsoft Windows- An overview of different versions of Windows, Basic Windows elements, File management through Windows. Using essential accessories: System tools – Disk cleanup, Disk defragmenter, Entertainment, Games, Calculator, Imaging – Fax, Notepad, Paint, WordPad. Command Prompt-Directory navigation, path setting, creating and using batch files. Drives, files, directories, directory structure. Application Management: Installing, uninstalling, Running applications. Linux- An overview of Linux, Basic Linux elements: System Features, Software Features, File Structure, File handling in Linux: H/W, S/W requirements, Preliminary steps before installation, specifics on Hard drive repartitioning and booting a Linux system.	9
III	**Computer Software and Virus**	Need, Types of Software's – System Software, Application Software. System Software – Operating System, utility Program, Programming languages, Assemblers, Compilers and Interpreter. Types of software, systems software, GUI, Operating System– Functions, Types-Batch, Single, Multiprogramming, and Multiprocessing. Programming Languages – Machine, Assembly, High level, 4GL their merits and demerits. Application Software – Word Processing, Spread sheet, presentation Graphics, Data Base Management Software, Characteristics, uses and examples and area of application of each of them. Virus working principals, Types of Viruses, Virus detection and Prevention, Virus detection and Prevention	9

IV	Information Technology and Society	Indian IT Act, Intellectual Property Rights – issues. Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, Video games, Telephone exchanges, Mobile phones, Information kiosks, special effects in Movies.	9
Total			**36**

Text Books:

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

Reference Books:

1. S. K. Bansandra*, Computer Today*,1st Edition, 1995, Galgotia publication Pvt. Ltd.
2. E. Balaguruswamy,*Fundamentals of Computers*,1st Edition, 2009, McGraw Hill.
3. P.K. Sinha,*Computer Fundamentals*,6th Edition, 2004, BPB.

Facilitating the Achievement of Course Learning Outcomes

Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
On completion of this course students will be expected to: • Have the basic idea about Computer Systems and the various components of a computer system. • Learn data processing with computers, computer software and computer programming.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (ii)Mid-term examinations :10 marks (iii)Class attendance -5 marks (c) End-term examinations.-70 marks.

Paper VI/Subject Name: Introduction to Computing	**Subject Code: INT052G102/ INT052G306**
L-T-P-C – 3-0-0-3	**Credit Units: 03** **Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To give the students an introduction to the Computers and Computing environments.
- To give the students exposure to computer programming.
- To give the students exposure to the C programming language and basic and advanced concepts of C programming.
- To make the students capable of using C programming to solve basic as well as advanced computing problems.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	Overview of C	Importance of C, sample C program, C program structure, executing C program. Variables, Data Types, Constants: integer constant, real constant, character constant, string constant; Character set, C tokens, keywords and identifiers, variables declaration, Assigning values to variables, Assignment statement, declaring a variable as constant, as volatile. Categories of operator- Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators; arithmetic expressions, precedence and associativity of operators, type conversions, mathematical functions	9
II	Decision Making and Branching Statements	if statement, if…..else statement, nested if…. else statement , switch….case statement, goto statement. Definition of loop, categories of loops, for loop while loop, do-while loop, break statement, continue statement	9
III	Arrays and Functions	Arrays Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.. Functions The form of C functions, Return values and types,return statement, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference , storage classes.	9
IV	Structures, Unions and Pointers	Defining, giving values to members, initialization and comparison of structure variables, array of structure, array within structure, structure within structure, structures and functions, unions. Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.	9
Total			36

Text Book:

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

Reference Books:

1. E Balaguruswamy, *Computing Fundamentals and C Programming*, 1st Edition, 2017, McGraw Hill.

2.   Venugopal and Prasad, *Mastering C*, 2nd Edition, 2017, Tata McGraw Hill.
3.   Yashawant Kanetkar, *Let us C,* 15th Edition, 2017, BPB Publication.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learn about C program, variables, data types, constants, categories of operator, type conversions, mathematical functions.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson
II	Understand about if statement, if.....else statement, nested if, Definition of loop, categories of loops.		• Assignments • classtests. • viva-voce or presentation (ii)Mid-term examinations :10 marks (iii)Class attendance -5 marks (c) End-term examinations.-70 marks.
III	Understand about Array Declaration, multidimensional arrays, functions Nested functions, Recursion, storage classes		
IV	Learn about pointer, pointers and arrays, pointers and functions, pointers and structures.		

Paper VI/Subject Name: Fundamentals of Web Design	**Subject Code: INT052G202**
L-T-P-C – 3-0-0-3 **Credit Units: 03**	**Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To explain the basics of internet and www.
- To teach developing HTML pages.
- To explain designing of web pages using HTML and CSS.
- To impart the knowledge of advanced web development to design professional looking web pages.

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Internet and WWW**	What is Internet? : A Network of Networks, Gateway; History of the Internet: Connecting to the Internet, Internet Service Providers, DNS Servers, Connection Types, Modems, Connecting to the Internet using Dialup Networking; Web Browsers; Using Web Browser; How does the Internet Work?; Routers; What you can do with the Internet; Origins and Development of the Internet; How Internet Standards are Developed; Moving Data across the Internet: Internet Addresses Introduction to world wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Applications, Websites – Home Pages: Web Site Development ; How to Builds Web Sites? , Web Content Authoring, Web Graphics Design, Web Programming, Webserver Administration, Protocols, Search Engines & Search Engines, Plug-ins, FTP Applications	9
II	**HTML**	History of HTML, Introduction to URI: Fragment Identifier & Relative Uniform Resource indicator, Standard Generalized Markup Language, Structure of HTML document, Switching between your Editor and Browser, Structuring Web Page, Paragraph and Line Break Tags, Adding Comments, Formatting your Text; Creating Lists: Ordered List Tags, Unordered List Tag Creating Hyper Text Links, Linking to a File or Data Object. Inserting Images; Creating Image Links; Horizontal Rules: Changing the Height of a Horizontal Rule, Changing between Shaded and Un-shaded Horizontal Rule, Changing the Width of a Horizontal Rule, Setting the Alignment of a Horizontal Rule; Address Tag; Working with text; Using a Background Image; Marquee Tag Tables, Frames, Forms: What is Form?, Form Tag, Method, Action, Input Tag, Type Attribute: Check box, Hidden, Image, Radio, Reset, Submit, Text; Other <INPUT> attributes: Value, SRC, Checked, Size, Max length, Align, Select tag, Text Area, CGI, Get, Post.	9
III	**CSS and XML**	Using the style Attribute, Creating Classes and IDs, Generating External Style Sheets, Typography, Consistency, Types of styles, Specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Text and font attributes: Font Vs CSS, changing fonts, text attributes, Advance CSS properties: Backgrounds, Box properties and Positioning. XML: Need for XML, Structured Data and Formatting,	9

		Advantages of XML, SGML, XML, and HTML, World Wide Web Consortium (W3C) Specifications and Grammars, XML Applications and Tools, Creating and Viewing XML Documents, Transforming XML Documents, XML Document Syntax, Validating XML Documents with DTDs, XML Namespaces	
IV	Javascript	Introduction to JavaScript: Utility of JavaScript, Evolution of the JavaScript Language, JavaScript Versions and Browser Support, Differences Between Client-Side vs. Server-Side JavaScript, Statements and Operators, Variable Declarations, Assignment Operators and Statements, Arithmetic Operators, Logical Operators, Comparison Operators, String Operators, Conditional Operators, Operator Precedence; Implementing Control Constructs: Conditional and Looping Constructs, Implementing Functions: Defining Functions, Calling Functions, Passing Arguments, Local vs. Global Variables, Using the Return Statement, Nested Functions; JavaScript Objects: The JavaScript Object Model and Hierarchy, Form Validation and Testing, Form Validation and Testing	9
Total			36

Text Books:
1. *Web Technologies- A Computer Science Perspective*, Frey C. Jackson, 1st Edition, 2006, Pearson Education

Reference Books:

1. Robert. W. Sebesta, *Programming the World Wide Web*, 4th Edition, 2007, Pearson Education.
2. Deitel, Deitel, Goldberg, *Internet & World Wide Web How to Program*, 3rd Edition, 2006, Pearson Education.
3. Marty Hall and Larry Brown, *Core Web Programming*, 2nd Edition, Volume I and II, 2001, Pearson Education.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learn about Web Browsers, world wide Web, Web Servers, Web Applications, Websites Web Graphics Design, Web Programming, FTP Applications etc.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(a)Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (ii)Mid-term examinations :10 marks (iii)Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Understand about different HTML Tags. Web design examples.		
III	Understand about Form Tag, Method, Action, Input Tag, Type Attribute, Check box, Image, Radio, Reset, Submit, CGI, Get, Post etc.		
IV	Learn about CSS advanced topics and XHTML basics.		

Paper VII/Subject Name: Python Programming   **Subject Code: INT052G203/INT052G402**

L-T-P-C – 3-0-0-3   **Credit Units: 03**   **Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.

Prerequisites: Fundamentals of Computer Programming

Detailed Syllabus:

Modules	Topics	Course content	Hours
I	**Algorithmic Problem Solving**	Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). **Illustrative problems:** find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.	9
II	**Data, Expressions, Statements**	Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; **Illustrative programs:** exchange the values of two variables, circulate the values of n variables, distance between two points.	9
III	**Control Flow, Functions**	Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. **Illustrative programs:** square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.	9
IV	**Lists, Tuples, Dictionaries**	Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; **Illustrative programs:** selection sort, insertion sort, mergesort, histogram.	9
Total			36

Text Books:

1. *An Introduction to Python – Revised and updated for Python 3.2,* Guido van Rossum and Fred L. Drake Jr, 2011, Network Theory Ltd.

Reference Books:

1. Timothy A. Budd, *Exploring Python*, 2015, Mc-Graw Hill Education (India) Private Ltd.
2. Kenneth A. Lambert, *Fundamentals of Python: First Programs*, 2nd Edition, 2012, CENGAGE Learning.
3. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, 1st Edition, 2013, Wiley India Edition.

Paul Gries, Jennifer Campbell and Jason Montojo, *Practical Programming: An Introduction to Computer Science using Python 3*, 2nd edition, 2013, Pragmatic Programmers, LLC.

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Structure simple Python programs for solving problems.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(q) Participation in class discussions (b) Continuous Evaluation(30Marks) (i)15 markson
II	Learn about the various data expressions and statements and the working of the python interpreter.		• Assignments • classtests. • viva-voce or presentation (xxxviii) Mid-term examinations :10 marks
III	Learn about the chained control and looping statements along with the working of local and global variables, scoping rules, arrays, slices, lists and to decompose a python program into functions.		(xxxix) Class attendance -5 marks (c) End-term examinations.-70 marks.
IV	Represent compound data using Python lists, tuples, dictionaries..		

Paper VII/Subject Name:Windows Programming using C#   **Subject Code: INT052G301**

L-T-P-C – 3-0-0-3   **Credit Units: 03**   **Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- Create, compile and run object-oriented C# programs using Visual Studio
- Write and understand C# language constructs, syntax and semantics
- Develop reusable .NET components via interface realization and standard design patterns
- Leverage the major namespaces and classes of the .NET Framework

Prerequisites: None

Detailed Syllabus:

Modules	Topics	Course content	Periods
I	**Introduction to .Net and C#, Literals, Variables and Data Types, Operators and Expressions:**	The C# Environment: .NET Framework – An Overview, 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. Object Oriented Concepts, C# Program – Execution, 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.	9
II	**Branching and Looping Structure, Arrays and Strings, Methods in C#, Structures and Enumerations**	Decision Making Statements, The Switch Statement, The? Operator, Decision Making and Looping, Jumps in Loops, Labelled Jumps. Single Dimensional Arrays, Multidimensional Arrays, Jagged Arrays, System. Array Class, Array List Class, Strings, Regular Expressions. Declaring Methods, Main Method, Invoking Methods, Nesting of Methods, Method Parameters. Structures- 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.	9
III	**Classes and Objects, Inheritance and Polymorphism, Exception Handling**	Constructors & Destructors, Member Initialization, 'this' Reference Variable, Nesting of Classes, Members, Properties. Classical Inheritance, Containment Inheritance, Defining a Subclass, Visibility Control, Subclass Constructor, Method Overriding, Hiding Methods, Abstract Classes, Abstract Methods, Sealed Classes, Sealed Methods, Polymorphism. 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.	9
IV	**Interfaces, Delegates and Events, Managing Console I/O Operations, Windows and Web Application Development:**	Defining Interfaces, Extending Interfaces, Implementing Interfaces, Explicit Interface Implementation, Abstract Classes and Interfaces, Delegates, Multicast Delegates, Events. The Console Class, Console Input and Output, Formatted Output, Custom Numeric Format. Developing Windows Applications, Developing Web Applications.	9
Total			36

Text Book:

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

Reference Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learning basic C# constructs and writing and compiling C# programs using Visual Studio.	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(r) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (xl)Mid-term examinations :10 marks (xli)Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn about looping structures, arrays and structures in C#.		
III	Building C# classes and inheritance hierarchies		
IV	Writing desktop applications with Windows Forms and Web Forms, constructing and deploying custom .NET components, writing multithreaded applications and organizing synchronize access to shared resources and accelerating development with the .NET Framework library		

L-T-P-C – 3-0-0-3 **Credit Units: 03** **Scheme of Evaluation: T**

Objective:

The objectives of the course are:
- To inculcate the significance of Cyber space.
- To enlighten 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.
- To outlines international best practices and the various legal mechanisms to control the various offences in the cyberspace

Prerequisites: None

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 Books:

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

Facilitating the Achievement of Course Learning Outcomes

Module	Course Learning Outcomes	Teaching And Learning Activity	Assessment Task
I	Learn about the laws related to Intellectual Property Rights in India	Written tests, assignments, quizzes, presentations as announced by the instructor in the class.	(s) Participation in class discussions (b)Continuous Evaluation(30Marks) (i)15 markson • Assignments • classtests. • viva-voce or presentation (xlii) Mid-term examinations :10 marks (xliii) Class attendance -5 marks (c) End-term examinations.-70 marks.
II	Learn about various aspects of IPR		
III	An overview of cyber space and cyber law with the context of its implementation in India to inculcate the significance of Cyber space.		
IV	Enlighten 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		