VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

B. Sc. Computer Science

(B.Sc.CS)

Curriculum

(AY 2020-2021 Admitted Students)

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INDEX

VISION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

- Transforming life through excellence in education and research.

MISSION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

- **World class Education**: Excellence in education, grounded in ethics and critical thinking, for improvement of life.
- **Cutting edge Research**: An innovation ecosystem to extend knowledge andsolve critical problems.
- **Impactful People**: Happy, accountable, caring and effective workforce andstudents.
- **Rewarding Co-creations**: Active collaboration with national & international industries & universities for productivity and economic development.
- **Service to Society**: Service to the region and world through knowledge andcompassion.

VISION STATEMENT OF THE SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

- To be a center of excellence in education and research in Information and Technology, producing global leaders for improvement of the society

MISSION STATEMENT OF THE SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

- To provide sound fundamentals, and advances in Information Technology, Software Engineering, Digital Communications and Computer Applications by offering world class curricula.
- To create ethically strong leaders and trend setters for next generation IT.
- To nurture the desire among faculty and students from across the globe to perform outstanding and impactful research for the benefit of humanity and, to achieve meritorious and significant growth.

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B. Sc. Computer Science

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. To equip the students with the skills and knowledge to get employment in the software industry as well as government departments by imparting the requisite technical skills.

2. To build the capability to work harmoniously as team members be able to become entrepreneur**,** leadership positions in the industry, with ethical responsibility.

3. To motivate them to pursue higher education in renowned universities across the globe.

B. Sc. Computer Science

PROGRAMME OUTCOMES (POs)

PO_01: Having a clear understanding of the subject related concepts and of contemporary issues

PO_02: Having problem solving ability- solving social issues and computer domain specific problems

PO_03: Having adaptive thinking and adaptability

PO_04: Having a clear understanding of professional and ethical responsibility

PO_05: Having cross cultural competency exhibited by working in teams

PO_06: Having a good working knowledge of communicating in English

PO_07: Having interest in lifelong learning

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B. Sc. Computer Science

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of B. Sc. (Computer Science) programme , graduates will beable to

1. PSO1: Ability to understand the programming concepts and methodologies in the field of computer science and apply the algorithmic, mathematical and scientific reasoning to solve wide range of computational problems

2. PSO2: Ability to use the emerging software development techniques and tools of computer science to provide real time solutions for latest applications.

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B. Sc. Computer Science

CREDIT STRUCTURE

Category-wise Credit distribution

Category	Credits
University Core (UC)	**35**
Programme Core (PC)	**57**
Programme Elective (PE)	**36**
University Elective (UE)	**06**
Non-Credit Course	**-**
Total credits	**134**

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B. Sc. Computer Science

University Core

S. No.	Course Code	Course Title	L	T	P	J	C
1.	CHY1003	Environmental Studies	2	0	0	4	3
2.	CSC3098	Comprehensive Examination	0	0	0	0	2
3.	CSC3099	Capstone Project	0	0	0	0	12
4.	ENG1911	General English – I	1	0	2	0	2
5.	ENG1912	General English – II	1	0	2	0	2
6.	ENG1913	Effective Communication Skills	1	0	2	0	2
7.	EXC4097	Co-Extra Curricular Basket	0	0	0	0	2
8.	HUM1032	Ethics and Values	1	0	0	4	2
9.	MAT1012	Statistical Applications	2	0	2	0	3
10.	STS1011	Introduction to Soft Skills	3	0	0	0	1
11.	STS2011	Reasoning Skill Enhancement	3	0	0	0	1
12.	STS2012	Introduction to Etiquette	3	0	0	0	1
13.	STS3003	Soft Skill for Professional Development	3	0	0	0	1
14.	STS3011	Preparedness for External Opportunities	3	0	0	0	1

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B. Sc. Computer Science

Programme Core

S. No.	Course Code	Course Title	L	T	P	J	C
1.	CSC1001	Computational Thinking	2	1	0	0	3
2.	CSC1002	Digital Logic and Design	3	0	2	0	4
3.	CSC1003	Programming Fundamentals	3	0	2	0	4
4.	CSC1004	Operating Systems	3	1	0	0	4
5.	CSC1005	E-Commerce	3	0	0	4	4
6.	CSC2001	Data Structures	3	0	2	0	4
7.	CSC2002	Object Oriented Programming	3	0	2	4	5
8.	CSC2003	Database Management Systems	3	0	2	4	5
9.	CSC3001	Java Programming	3	0	2	0	4
10.	CSC3002	Computer Networks	3	0	2	0	4
11.	CSC3003	Software Engineering	3	0	2	0	4
12.	CSC4001	Software Quality Assurance/Testing	3	0	0	0	3
13.	CSC4002	Web Development	3	0	2	4	5
14.	MAT1013	Discrete Mathematics for Computer Science	3	2	0	0	4

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Programme Elective

S. No.	Course Code	Course Title	L	T	P	J	C
1.	CSC1006	Open Source Programming	2	0	2	4	4
2.	CSC1007	Mobile Application Development	2	0	2	4	4
3.	CSC1008	2D Animation	2	0	2	4	4
4.	CSC1009	Video Production	2	0	2	4	4
5.	CSC1010	Principles of Computer Graphics	3	1	0	0	4
6.	CSC1011	Object Oriented Analysis and Design	3	1	0	0	4
7.	CSC1012	Data Warehousing	3	1	0	0	4
8.	CSC1013	System Software	3	1	0	0	4
9.	CSC1014	Cloud Computing	3	0	0	4	4
10.	CSC1015	Cryptography	3	1	0	0	4
11.	CSC1016	Multimedia Systems	3	0	2	0	4
12.	CSC2004	Computer Architecture	3	1	0	0	4
13.	CSC3004	Visual Programming	3	0	2	0	4
14.	CSC3005	Fundamentals of Data Analytics	3	0	0	4	4
15.	CSC3006	Data Mining	3	1	0	0	4
16.	CSC3007	Design of Algorithms	3	0	0	4	4
17.	CSC4003	System Administration	3	0	0	0	4
18.	CSC4004	Data Communication and Networking	3	1	0	0	4
19.	CSC4005	Artificial Intelligence	3	1	0	0	4

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Non-Credit Course

S. No.	Course Code	Course Title	L	T	P	J	C
1.	ENG3000	English for beginners	1	0	2	0	0
2.	GER1003	Basic German	2	0	0	0	2

CHY1003	Environmental Studies	L	T	P	J	C
		3	0	0	0	3
Pre-requisite	**None**	**Syllabus version**				
		1.1				

Course Objectives:

- To make students understand and appreciate the unity of life in all its forms and the implications of life style on the environment.
- To broaden the understanding of global climate changes and the importance of renewable sources of energy.
- To give students a basic understanding of the major causes of environmental degradation on the planet, with specific reference to Indian situation
- To inspire students to find ways in which they can contribute personally and professionally to prevent and rectify environmental problems.

Expected Course Outcome:

Upon Completion of the course, the students will be able to

1. Students will recognize the environmental issues in a problem oriented interdisciplinary perspectives.
2. Students will understand the key environmental issues, the science behind those problems and potential solutions.
3. Students will demonstrate the significance of biodiversity and its preservation.
4. Students will identify various environmental hazards.
5. Students will design various methods for the conservation of resources.
6. Students will formulate action plans for sustainable alternatives that incorporate science, humanity, and social aspects.
7. Students will have foundational knowledge enabling them to make sound life decisions as well as enter a career in an environmental profession or higher education.

Module:1	**Environment and Natural Resources**	**7 hours**

Definition, scope, importance; need for public awareness on natural resources Forest resources – use, exploitation, causes and consequences of deforestation. Water resources – use of surface and subsurface water; dams - effect of drought, water conflicts. Land resources - Land degradation, soil erosion and desertification. Indian Case studies. Food resources – Definition, world food problems, Traditional and modern agriculture and its impacts and remedies.

Module:2	**Energy Resources**	**7 hours**

Definition for renewable and non-renewable energy resources. Non-renewable energy resources - oil, Natural gas, Coal, Nuclear energy. Renewable energy - Solar energy, Hydroelectric power, Ocean thermal energy, Wind and geothermal energy. Biomass energy and Bio Gas.

Module:3	**Ecosystem and Biodiversity**	**5 hours**

Concept of ecosystem, Structure and functions of an ecosystem, Food chains, food webs. Energy flow in an ecosystem, ecological pyramids and ecological succession. Case studies: Bio magnification of DDT. Biodiversity-Bio-geographical classification of India, hotspots, values of biodiversity. Threats to biodiversity - Case study. Conservation of bio-diversity. GM Crops

.

Module:4	**Environmental changes and Remediation**	**6 hours**
Air, water, soil, Thermal Pollution: Causes, effects and control measures; Nuclear hazard. Solid waste Management- Causes, Effects and control measures. Floods, earthquakes, cyclones, tsunami and landslides, Case studies.		
Module:5	**Global Climatic Change and Mitigation**	**5 hours**
Global climate change and greenhouse effect – Kyoto Protocol, Carbon sequestration, Acid rain, Ozone depletion problem – Montreal Protocol.		
Module:6	**Social Issues and the Environment**	**6 hours**
Urban problems related to energy and sustainable development, Water conservation, Rain water harvesting, Wasteland Reclamation. Environment Protection Act - Prevention and control of Pollution of Air and Water. Wildlife protection and Forest Conservation Acts.		
Module:7	**Human Population and the Environment**	**7 hours**
Population growth, variation among nations, population explosion, Family Welfare Programme, Environment, Women and Child Welfare, Human rights, HIV/AIDS, Role of information technology on environment and human health. Discussion on current environmental issues / topics by an Industrial expert or faculty		
Module:8	**Contemporary issues**	**2 hours**
Lecture by Industry Experts		
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	Anubha Kaushik and C.P. Kaushik, Environmental Science and Engineering, 2016, 5th Edition, ISBN: 978-81-224-4013-3, New Age International.
2.	G. Tyler Miller Jrand Scott E. Spoolman, Living in the Environment, 2012. 17th Edition, ISBN-13: 978-0-538-73534-6, Brooks / Cole.

Reference Books

1.	Environmental Science and Engineering by Anjali Bagad, 2014, 1st Edition, ISBN-10: 9350997088, Technical Publications.
2.	Introduction to Environmental Engineering by Masters, 2015, 3rd Edition, ISBN-10: 9332549761, Pearson Education India.
3.	Basic Environmental Sciences For Undergraduates by Dr.Tanu Allen, Dr.Richa K. TyagiDr.Sohini Singh, 2014, 1st Edition, ISBN-10: 938375827, Vayu Education of India.

Mode of Evaluation: Internal Assessment (CAT, Quizzes, Digital Assignments) & FAT

Recommended by Board of Studies	12-8-2017		
Approved by Academic Council	No.47	Date	24-08-2017

CSC3098	Comprehensive Examination	L	T	P	J	C
		0	0	0	0	2
Pre-requisite	**Nil**	**Syllabus version 1.0**				

Course Objectives:

1. To re-iterate and explore the basic concepts emphasized in core computing courses
2. To provide a holistic view about the core and advanced computing principles
3. To explore the application avenues for the core computational concepts.

Expected Course Outcomes:

1. Demonstrate knowledge of the fundamental requirement of number systems including binary logic system.
2. Develop applications on various data structures using C language
3. Explore the Database Design constructs using Entity-Relation model
4. Apply the functionalities of an Operating System as a resource manager, process synchronizer and methods used to implement the different parts of OS
5. Mastering the concepts of protocols, network interfaces and design/performance issues in local area networks and wide area networks.

Module:1	**Digital Logic**

Conversion from one number system to another, Complements, Binary Codes, Logic gates, Simplification of Boolean Functions, RS, JK, D and T Flip-flops, Adders ,Subtractors ,Decoders ,Encoders ,Multiplexer ,Demultiplexer, Design of Status Register.

Module:2	**Data Structures**

Structures - array of structures – array to a structure- passing structure to a function – self-referential structures ; stack –implementation – infix, prefix, postfix conversions and its evaluation; queue –implementation – job scheduling; list – static and dynamic list - singly and doubly linked list; sorting ; searching; trees.

Module:3	**Programming in C & Object Oriented Programming**

Data types, Symbolic Constants, Operators, array, Functions, inline functions, Function overloading, Objects, Member functions, Encapsulation, Static data member and functions, Static objects, Constructors, Destructors, Friend functions, Friend classes, constant member function, Operator overloading, Single Inheritance, Multiple Inheritance, Hierarchical Inheritance and Hybrid Inheritance.

Module:4	**Database Management Systems**

Introduction to Databases, Data Models, Schema and Instances, Three schema Architecture, Database Languages, Entity, Attributes and Keys, Structural Constraints, ER Diagrams, Relational Model, Design Guidelines, Inference Rules, Normal forms, Second, Third and Boyce–Codd Normal Form, Transaction Processing and Properties, Concurrency Control, Two Phase Locking, Recovery Concepts, Security Issues.

Module:5	**Operating Systems**

Introduction to OS; OS operations-User Mode and Kernel Mode; Caching; OS structures-OS

Services; User And OS Interfaces; System Calls; OS Structure-Simple, Layered Approach, Interrupts; Process Management And Process Synchronization - Inter-Process Communication-Message Passing And Shared Memory; Thread Management; Semaphores; Deadlock Handling Mechanisms; CPU Scheduling - CPU Scheduler; Scheduling Criteria; Memory Management-Segmentation ; Paging; Page Replacement; Storage Management -Disk Structure; Disk Scheduling Algorithms
Mode of Evaluation : Online examination

CSC3099	Capstone Project	L	T	P	J	C
		0	0	0	0	12
Pre-requisite		**Syllabus version**				
		v. **1.0**				

Course Objectives:

To provide sufficient hands-on learning experience related to the design, development and analysis of suitable product / process so as to enhance the technical skill sets in the chosen field.

Expected Course Outcome:

On completion of course, the students will be able to

1. Formulate specific problem statements with reasonable assumptions and constraints based on the chosen domain.
2. Perform extensive literature search to explore the state-of-the-art development occurred in the recent past
3. Design novel solutions by conducting experiments in an iterative manner and document the results,
4. Perform error analysis on the basis of the result obtained and benchmarking of results.
5. Synthesize the results and arrive at scientific conclusions and solution.
6. Document the results in the form of technical report followed by presentation.

Contents

1. Capstone Project may be a theoretical analysis, modeling& simulation, experimentation & analysis, prototype design, fabrication of new equipment, correlation and analysis of data, software development, applied research and any other related activities.
2. Project can be for 5 months duration based on the completion of required number of credits as per the academic regulations.
3. Should be team work.
4. Carried out inside or outside the university, in any relevant industry.
5. Publications in the reputed journals / International Conferences will be an added advantage

Mode of Evaluation: Periodic reviews, Presentation, Final oral viva, Poster submission

Recommended by Board of Studies	10.06.2016		
Approved by Academic Council	41stAC	Date	17.06.2016

Course code	Course title	L	T	P	J	C
ENG1911	General English-I	1	0	2	0	2
Pre-requisite	Cleared EPT/English for Beginners				Syllabus version	
						1

Course Objectives:

1. To synthesize information, analyze simple arguments, generate and express their own opinions on a limited range of technical as well as general-interest topics inside as well as outside the classroom.
2. To develop competencies in all the areas of LSRW skills
3. To speak and write in grammatically error-free English with the aid of active vocabulary.

Expected Course Outcome:

On completion of course, the students will be able to

1. Develop communicative competence to express himself/herself in English in all challenging situations
2. Apply knowledge, ideas and concepts in the technicalities of proper pronunciation, Grammatical structure
3. Have better grasp over appropriate use and style of the English Language as well as the application areas of English communication
4. Write all types of official Letters/Emails used in the corporate world
5. Interpret text, diagram etc. which helps them in their academic as well as professional career.

THEORY

Module:1	Grammar and Vocabulary	4 Hours

Grammatical & structural aspects covering -Types of sentences, Active & Passive Voice, Tenses, WH- Question Tags, Gerund, Auxiliaries & Modal Verbs, Preposition

Vocabulary: Synonyms, Antonyms, Homonyms, Homophones

Activity: Solving Worksheets of Grammar; Enhancing the knowledge of vocabulary through written interpretation and reading English newspapers/magazines

Module:2	Text-based Analysis	6 Hours

Two short-stories-i) *A Tiger in the House* by Ruskin Bond; ii) *Real Time* by Amit Chaudhury

Activity: Understanding sentence structures and enriching vocabulary by analyzing a text

Module:3	Job-related Communication	3 Hours

Writing resumes, Job-application & Thank-you letters.

Activity: An in-depth discussion on the different types of resumes, Job- application and Thank-you letters.

Module-4	Reading Skills	2 Hours

Skimming, scanning, guessing unfamiliar words from context, understanding text

organization, recognizing argument and counter-argument; distinguishing between main information and supporting detail, fact and opinion, hypothesis versus evidence; summarizing and note-taking

Activity: Reading of Newspapers & Articles in the class

PRACTICE SESSIONS

Activity-1	**Listening Comprehensions**	**4 hours**

Listening & Note Making: Short speeches/ news clips from Indian TV channels in English with interpretive questions

Session: Summarizing/ note-making and drawing inferences

Activity-2	**Introduction to Phonetics**	**4 hours**

Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker

Session: Learning varied types of speech sounds

Activity-3	**Public Speaking: Two Models**	**6 hours**

i) The interactional model of public speaking which includes encoding, decoding and feedback.

ii) The transactional model of public speaking takes on a more mutual communication effort between the sender and receiver wherein both seek to find mutual meaning in the message.

Session: The learners watch different videos on Public speaking and accordingly engage themselves in planning and preparing speeches that inform, persuade, or fulfil the needs of a special occasion.

Activity-4	**Skit on Social issues / Debate**

To highlight the use of functional English which helps the students to learn the usage of language in different occasions

Session: Under the supervision of the Instructor and the audio-visual materials, the students will enact small skit on social issues and learn different expressions used for various situations like getting to know someone, introducing someone etc.; they will also hone their oratory power and argumentative skills by taking part in debates

Activity-5	**Reading E-books through Intonation**

Intonation refers to the way the reader varies the voice in tone, pitch, and volume to reflect the meaning of the text--sometimes called "expression."

Session: Students learn to read E-books properly with the appropriate use of intonation

Activity-6	**Information Transfer**

Information transfer, or presenting verbal account of facts and processes in pictorial form and, conversely, changing Web-based graphic representations to writing, involves learning how to restate a given body of material in different ways.

Session: The learners will be interpreting the information in different forms like tree diagrams,

bar charts, pie charts

Textbook/ Workbook

1. Wren & Martin, (Re-Printed 2018), *High School English Grammar & Composition* (Revised by Dr. N.D.V. Prasada Rao); New Delhi, S. Chand & Company Ltd.,

Reference Books

1. ParulPopat (2015) *Communication Skills*, Noida, Pearson Education.
2. ArunaKoneru, (2015) *Professional Speaking Skills*, New Delhi, OUP.

Mode of Evaluation: Quizzes, Presentations, Discussions, Role Play, Assignments and FAT.

List of Challenging Experiments (Indicative)

1	Vocabulary building through reading a newspaper article	5 hours
2	Reading the prescribed text and writing a summary	10 hours
3	Writing a resume	5 hours
4	Listening to speeches/news clips and making inferences	5 hours
5	Public speaking	10 hours
6	Debates on current issues	10 hours
	Total Laboratory Hours	**45 Hours**

Mode of Evaluation: Quizzes, Presentations, Discussions, Role Play, Assignments and FAT.

Recommended by Board of Studies

Approved by Academic Council

Course code	Course title	L	T	P	J	C
ENG1912	General English-II	1	0	2	0	2
Pre-requisite	General English-I	Syllabus version				
		1				

Course Objectives:

1. To provide resources for the students to learn pronunciation of the English sounds through the knowledge of syllable-break-up and stress; and to know the advance level English grammar and vocabulary
2. To learn to appear for personal interview and to participate in Group Discussions
3. To develop the students' reading skills to enable them to skim an adapted text for main idea, to scan the text for specific information, to interpret and for inferences

Course Outcome:

1. Communicate effectively in medium level interview and group-discussions;
2. Develop the listening skills so as to understand and apply specific information from the source;
3. Use English appropriately in their professional and academic environment
4. Improve the Grammar writing skills to enable the students to respond to input provided through training so as to stimulate, to select and to summarize information in Technical Reports and apply acquired information to a specified task like Transcoding, writing letters etc.
5. Develop the overall personality and to hone the leadership qualities of the learners

THEORY

Module:1	Advanced-level Grammar	5 hours

Simple, Compound and Complex Sentences, Phrases-Adjective Phrases, Adverb Phrases, Noun Phrases, Direct and Indirect Speech, Conditionals, Concord, Punctuation
Vocabulary building: Idioms
Activity: Grammar Worksheet

Module:2	Professional Dialogues	2 hours

Formal Conversations – at the office with the CEO/ with the Registrar of a University/ Introducing oneself at an interview panel
Activity: Role play [students practice short formal conversations in pairs/groups of 5-6]

Module:3	Drafting	4 hours

Notice, Circular, Resolution & Minutes, Business letter writing- Offer letter, quotation, status enquiry, Confirmation, Execution, Refusal and cancellation of order, recommendation, credit collection, claim, bank loan
Activity: Worksheets

Module:4	Text-based Analysis	4 hours

You Can Win by Shiv Khera
Activity: Skimming, scanning, guessing unfamiliar words from context; summarizing/note making & drawing inferences from the Text

PRACTICE SESSIONS:		
Activity-1	**Listening Comprehension for General Details**	**2 hours**
Listening Comprehension Tests; Testing Exercises Session: Students will reflect back what they hear from the videos, which help them to be understood.		
Activity-2	**Syllable structure; Word stress**	**4 hours**
Structure of Syllables – Word Stress– Weak Forms and Strong Forms –Tone & Rhythm Session: Practicing basic rules of word accent - Stress shift - Weak forms and Strong forms- Sentence Stress		
Activity-3	**Verbal & Non-Verbal Communication**	**6 hours**
Exposure to videos of structured talks delivered by leaders across all domain - Presentation Skills- Non-verbal Communication Session: Students will make short speeches by watching relevant TED-Talk videos –PPT presentations by students communicating non-verbally in a pair/group		
Activity-4	**Features of Good Conversation**	**4 hours**
Strategies for effective Communication and the use of polite language through the aid of audio-visual materials. Session: Making requests and seeking permissions, Telephone etiquette, Participating in Case-study based Group Discussions		
Activity-5	**Report Writing & Transcoding**	**8 hours**
Report writing format; Essential qualities of technical writing; Data interpretation & Transcoding; logical and analytical reasoning questions Session: Students write a Report; they interpret graphs of medium level difficulty		
Activity-6	**Leadership Development**	**6 hours**
The focus will be on individual, group and organization factors associated with leadership. Session: Students will be acquainted with the development of the conception of leadership and in the process would hone their vocabulary and conversational power, by watching videos of leaders delivering Lectures; Seminars conducted by Administrative Heads of various Schools/ Departments within the University.		
	Total Practical hours:	**45 hours**

Text Book/ Work Book

1	Wren & Martin, (Re-Printed 2018) *High School English Grammar & Composition* (Revised by Dr. N.D.V. Prasada Rao); New Delhi, S. Chand & Company Ltd.,

Reference Books	
1.	Maclean Joan and Lynch Tony (2013) *Study Speaking*, CUP.
2.	Thill John and L. Bove Courtland (2016) *Excellence in Business Communication*, Pearson Publications
3	Khera Shiv 2013 (Reprint 2019) *You Can Win:* New Delhi, Bloomsbury India, New Delhi
Mode of Evaluation: Quizzes, Presentation, Discussion, Role play, Assignments and FAT	

	List of Challenging Experiments (Indicative)	
1	Error detection in paragraph	**6 hours**
2	Role plays on professional situations	**10 hours**
3	Discussing a Case on communication skills	**7 hours**
4	Academic listening and note taking	**7 hours**
5	Report Writing	**10 hours**
6	Guessing unfamiliar words from the prescribed text	**5 hours**
	Total Laboratory Hours	**45 hours**
Mode of Evaluation: Quizzes, Presentation, Discussion, Role Play, Assignments & FAT		

Recommended by Board of Studies	08-06-2019		
Approved by Academic Council	No. 55	Date	13-06-2019

Course code	Course title	L	T	P	J	C
ENG1913	Effective Communication Skills	1	0	2	0	2
Pre-requisite	General English-II	Syllabus version				
		v.1				

Course Objectives:

1. To be an independent/ a competent speaker in all areas of written and spoken communication for successful business/ professional interactions.
2. To organize, compare and contrast, categorize and describe complex content.
3. To speak and write with fluency and confidence, with minor grammatical errors and with a fairly wide active vocabulary.

Course Outcome:

1. Acquire an effective command over the language, though with minor inaccuracies
2. Understand complex theories of varied subjects and understand detailed logic & reasoning
3. Perform well in middle to upper-end placement interviews/ competitive exams/ general social situations
4. Participate actively and independently in seminars/discussions
5. Understand the requisite proficiency for difficult/ varied levels of communications in BBC/UK & CNN/US accents

THEORY

Module:1	**Verbal-Logic & Reasoning**	**4 hours**
Verbal reasoning tests assess the learner's understanding and comprehension skills. Activity: Interpreting short texts.		
Module:2	**The Art of Paraphrasing**	**2 hours**
A restatement of the meaning of a text or passage using other words. Activity: Paraphrasing different articles & Research papers		
Module:3	**Text-based Analysis**	**6 hours**
The Thousand Faces of Night by GithaHariharan Activity: Summarizing/ note making & drawing inferences from the text		
Module:4	**Research Paper Writing**	**3 hours**
Structure of a Research paper; Plagiarism Activity: Practice on Research Paper writing.		

PRACTICE-SESSIONS

Activity-1	**Vocalics**	**4 hours**
The learners will undergo training in vocalics which are rate, or speed at which the person speaks, pitch, inflection and variety in the voice, volume, being loud or soft, and articulation and pronunciation, or how correctly and clearly the person speaks. Session: Type the learners will undergo training in vocalics		
Activity-2	**Travel blogs / E-Travel Diary**	**6 hours**
Briefing on the art of writing travel blogs. Session: The learners will engage in writing relevant blogs		
Activity-3	**Video-conference and Interview**	**8 hours**
Preparing the students for Interviews. Session: Students will participate in mock-Interviews and real-time video-conference		
Activity-4	**Language Sensitivity & Cross Cultural Communication**	**4 hours**

Meaning & importance of Cross Cultural Communication; Understanding Inter and Cross-Cultural Communication Nuances through relevant videos & case-studies Session: Students will attempt a case study on cross-cultural communication		
Activity-5	**Mass-Media Communication**	**2 hours**
Briefing on the constituents of mass media such as newspapers, magazines, films/documentaries, radio, television, the mechanism of conveying information to a mass-audience and an academic investigation of the different methods of mass correspondence Activity:An advanced understanding of news media and their role in the society and relevant media education through the mode of note-making & interpretive exercises		
Activity-6	**Writing Abstract/Summary/Articles**	**6 hours**
Equip participants with skills in writing and presenting effective and successful Abstract/ Summary. The participants will also acquire skills in writing quality Articles which can engage the audience. Session: Each individual student will submit an Article under the guidance of the course-Instructor		
	Total Lecture hours:	**45 hours**

Text Book/Work Book	
1	Krizan, Merrier, Logan, Williams (Eight Edition) 2012 *Business Communication*, New Delhi, Cengage Learning
Reference Books	
1.	GithaHariharan (2013) *The Thousand Faces of Night*, Royal New Zealand Foundation of the Blind
2.	O' Brien, Terry, (2011) *Effective English Skills*, Nd: Rupa
3.	Kumar, Sanjay &Puspalata, (2015-2nd Ed) *Communication Skills*,Nd: OUP

Mode of Evaluation: Quizzes, Presentation, Discussion, Role play, Assignments & FAT

	List of Challenging Experiments (Indicative)	
1	Interpreting short texts and writing a paragraph	**8 hours**
2	Writing an abstracts	**10 hours**
3	Mock Interviews through video conferencing	**12 hours**
4	Analysing and discussing a case on cross cultural communication	**6 hours**
5	Listening and paraphrasing	**4 hours**
6	Reading aloud travel blogs or E-travel diary with focus on vocalics	**5 hours**
	Total Laboratory Hours	**45 hours**

Mode of Evaluation: Quizzes, Presentation, Discussion, Role play, Assignments & FAT

Recommended by Board of Studies	08.06.2019		
Approved by Academic Council	No.55	Date	13-06-2019

HUM1032	Ethics and Values	L	T	P	J	C
		2	0	0	0	2
Pre-requisite	**Nil**	**Syllabus version**				

Course Objectives:

1. To understand and appreciate ethical issues facing an individual, profession, society and polity.
2. To understand the negative health impacts of certain unhealthy behaviors.
3. To appreciate the need and importance of Physical, Emotional Health and Social Health
4. Exposes to non-traditional violent and nonviolent crimes that have significant physical, fiscal, and social costs.

Expected Course Outcome:

On completion of course, the students will be able to

1. Make better lifestyle choices to increase your health and wellness for life.
2. Ability to follow sound morals and ethical values scrupulously to prove as good citizens
3. Understand how a habit becomes an addiction; its effects and prevention.
4. Understand the negative health impacts of certain unhealthy behaviours.
5. Identify and portray ethical behaviours and values consistent with the health.
6. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
7. Identify the main typologies, characteristics, activities, actors and forms of cybercrime.

Module:1	**Being good and responsible**	**5 hours**

Gandhian values such as truth and non-violence – comparative analysis on leaders of past and present – society's interests versus self-interests

Personal Social Responsibility: Helping the needy, charity and serving the society.

Module:2	**Social Issues 1**	**4 hours**

Harassment – types - Prevention of harassment, violence and terrorism

Module:3	**Social Issues 2**	**4 hours**

Corruption: ethical values, causes, impact, laws, prevention – electoral malpractices

white collar crimes - tax evasions – unfair trade practices

Module:4	**Addiction and Health**	**3 hours**

Peer pressure - Alcoholism: ethical values, causes, impact, laws, prevention – Ill effects of smoking - Prevention of Suicides

Sexual Health: Prevention and impact of pre-marital pregnancy and Sexually Transmitted Diseases

Module:5	**Drug Abuse**	**4 hours**

Abuse of different types of legal and illegal drugs: ethical values, causes, impact, laws and prevention

Module:6	**Personal and Professional Ethics**	**3 hours**
Dishonesty - Stealing - Malpractices in Examinations – Plagiarism		
Module:7	**Abuse of technologies**	**4 hours**
Hacking and other cyberc rimes, addiction to mobile phone usage, video games and social networking websites		
Module:8	**Invited Talk:** Contemporary Issues	**3 hours**
	Total Lecture hours:	**30 hours**

Reference Books

1. Dhaliwal, K.K (2016), "Gandhian Philosophy of Ethics: A Study of Relationship between his Presupposition and Precepts, Writers Choice, New Delhi, India
2. Vittal, N (2012), "Ending Corruption? - How to Clean up India?", Penguin Publishers, UK
3. Birch, S (2011), "Electoral Malpractice", Oxford University Press, UK
4. Pagliaro, L.A. and Pagliaro, A.M (2012), "Handbook of Child and Adolescent Drug and Substance Abuse: Pharmacological , Developmental and Clinical Considerations", Wiley Publishers, U.S.A
5. Pandey, P. K (2012), "Sexual Harassment and Law in India", Lambert Publishers, Germany

Mode of Evaluation: Quizzes, CAT, Digital assignments, poster/collage making and projects

Recommended by Board of Studies	26-07-2017		
Approved by Academic Council	No. 46	Date	24-8-2017

MAT1012	Statistical Applications	L	T	P	J	C
		2	0	2	0	3
Pre-requisite	**None**	**Syllabus Version**				
		1.0				

Course Objectives:

1. This paper provides the meaning and scope of Statistical Applications.
2. This enables the students to understand and use the applications of statistics in the real-time problems.
3. This course seeks the comprehensive knowledge about the data collection, presentation of data, pictorial representation, and measures of central tendency, measures of dispersion, control charts, correlation, regression, time series, probability, estimation and inference.

Expected Course Outcome:

On completion of course, the students will be able to

1. Organize, present and interpret statistical data, both numerically and graphically.
2. Perform regression analysis, and compute and interpret the coefficient of correlation.
3. Use various methods to compute the probabilities of events.
4. Analyse and interpret data using appropriate statistical hypothesis and parametric testing techniques.
5. Apply statistical quality control techniques.
6. Implement SPSS code for statistical data.

Module:1	**Introduction to Statistics and Data Collection:**	**5 hours**

Importance of statistics, concepts of statistical population and a sample - Methods of Random and Non -Random Sampling - quantitative and qualitative data - Measurement scales - nominal, ordinal, interval and ratio - Primary and secondary data- Classification and tabulation of data. Diagrammatic and graphical representation of data-Histograms and Frequency Polygons.

Module:2	**Describing Business Data:**	**5 hours**

Measures of Central tendency- Mean, median and mode- Measures of Dispersion, Range, Quartile deviation, Mean Deviation, Standard Deviation-The coefficient of Variation.

Module:3	**Correlation and Regression Analysis:**	**4 hours**

The Scatter Plot- Correlation-Types-Karl Pearson's Coefficient of Correlation-Spearman's Rank Correlation –Regression lines and coefficients- the coefficient of Determination- Residuals-the standard error of Estimate.

Module:4	**Probability:**	**4 hours**

Probability, Random experiments, trial, sample space, events. Approaches to probability - classical, empirical, subjective and axiomatic. Theorems on probabilities of events. Addition rule

of probability. Conditional probability,independence of events and multiplication rule of probability. Bayes theorem and its applications.		
Module:5	**Statistical Control Charts:**	**5 hours**
Statistical Control Charts- Introduction - Types of Control Charts – Setting up a Control Procedure – X bar (Mean) Chart and R Chart–c Chart–p Chart–Advantages and Limitation of Control Charts.		
Module:6	**Testing of Hypothesis:**	**5 hours**
Testing of Hypothesis – Z- test, Student's t- test, F-test, Chi-square test.		
Module:7	**Contemporary Issues**	**2 hours**
Industry Expert Lecture		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	David. M. Levin, David. F. Stephen, and Cathryn. A. Szadat , (2013) , Statistics for managers using MS-Excel , 7Th Edition, Pearson Education (India) .
Reference Books	
1.	S. P. Gupta, 2014, Business Statistics and Statistical Methods, S. Chand Publication, New Delhi.
2.	L. Mayes & Keying, (2005) , Probability Statistics for Engineers and Scientists, Pearson Education.
3.	Levin Richard and Rubin David, ((2008) , 2011-reprint), Statistics For Management, 7th Edition, Pearson Education, Dorling Kindersley.
4.	Andy Field, (2013) , Discovering Statistics Using IBM SPSS Statistics, 4th Edition, Sage Publication.
Mode of Evaluation	
Digital Assignments, Continuous Assessments, Final Assessment Test	

List of Challenging Experiments (Indicative)		
1.	Tabulation and Pictorial representations of Various data types using Excel or SPSS.	2 hours
2.	Calculation of Mean, Median, Mode, location measures, Variance and Box-Plot representations calculation using Excel or SPSS.	2 hours
3.	Plotting scatter plot, Measuring correlation	2 hours
4	Fitting of linear regression	2 hours
5	Fitting of Multiple linear regression	2 hours
6.	Plotting Mean and Range Charts, C chart, using Excel or SPSS.	2 hours
7	Plotting P chart ,np chart and C chart using Excel or SPSS.	2 hours
8	Z-test for means and Proportions-One sample and Two sample tests	2 hours
9	t-test for single mean, difference of means and Proportions	2 hours
10	Test for variance and Contingency (Chi-Square -Cross Tab) Test Excel or	2 hours

	SPSS.	
	Total Laboratory Hours	20 hours

Mode of Evaluation

Weekly Assessments, Final Assessment Test			
Recommended by Board of Studies	25-02-2017		
Approved by Academic Council	No. 45	Date	16-03-2017

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

STS1011	Introduction to Soft skills	L	T	P	J	C
		3	0	0	0	1
Pre-requisite	None	Syllabus version				
		2				

Course Objectives:

1. To Identify and develop personal skills to become a more effective team member/leader.
2. To Examine, clarify and apply positive values and ethical principles.
3. To develop habits which promote good physical and mental health.

Expected Course Outcome:

1. Enabling students to know themselves and interact better with self and environment

Module:1	Lessons on excellence	10 hours

Ethics and integrity
Importance of ethics in life, Intuitionism vs Consequentialism, Non-consequentialism, Virtue ethics vs situation ethics, Integrity - listen to conscience, Stand up for what is right
Change management
Who moved my cheese?, Tolerance of change and uncertainty, Joining the bandwagon, Adapting change for growth - overcoming inhibition
How to pick up skills faster?
Knowledge vs skill, Skill introspection, Skill acquisition, "10,000 hours rule" and the converse
Habit formation
Know your habits, How habits work? - The scientific approach, How habits work? - The psychological approach, Habits and professional success, "The Habit Loop", Domino effect, Unlearning a bad habit
Analytic and research skills.
Focused and targeted information seeking, How to make Google work for you, Data assimilation

Module:2	Team skills	11 hours

Goal setting

SMART goals, Action plans, Obstacles -Failure management

Motivation

Rewards and other motivational factors, Maslow's hierarchy of needs, Internal and external motivation

Facilitation

Planning and sequencing, Challenge by choice, Full Value Contract (FVC), Experiential learning cycle, Facilitating the Debrief

Introspection

Identify your USP, Recognize your strengths and weakness, Nurture strengths, Fixing weakness, Overcoming your complex, Confidence building

Trust and collaboration

Virtual Team building, Flexibility, Delegating, Shouldering responsibilities

Module:3	**Emotional Intelligence**	**12 hours**

Transactional Analysis

Introduction**,** Contracting, Ego states**,** Life positions

Brain storming

Individual Brainstorming, Group Brainstorming, Stepladder Technique, Brain writing, Crawford's Slip writing approach, Reverse brainstorming, Star bursting, Charlette procedure, Round robin brainstorming

Psychometric Analysis

Skill Test, Personality Test

Rebus Puzzles/Problem Solving

More than one answer, Unique ways

Module:4	**Adaptability**	**12 hours**

Theatrix
Motion Picture, Drama, Role Play, Different kinds of expressions
Creative expression
Writing, Graphic Arts, Music, Art and Dance
Flexibility of thought
The 5'P' framework (Profiling, prioritizing, problem analysis, problem solving, planning)
Adapt to changes(tolerance of change and uncertainty)
Adaptability Curve , Survivor syndrome

Total Lecture hours		**45 hours**	
Text Book(s)			
1.	Chip Heath, How to Change Things When Change Is Hard (Hardcover), 2010, First Edition,Crown Business.		
2.	Karen Kindrachuk, Introspection, 2010, 1st Edition.		
3.	Karen Hough, The Improvisation Edge: Secrets to Building Trust and Radical Collaboration at Work, 2011, Berrett-Koehler Publishers		
Reference Books			
1.	Gideon Mellenbergh, A Conceptual Introduction to Psychometrics: Development, Analysis and Application of Psychological and Educational Tests, 2011, Boom Eleven International.		
2.	Phil Lapworth, An Introduction to Transactional Analysis, 2011, Sage Publications (CA)		
Mode of Evaluation: FAT, Assignments, Projects, Case studies, Role plays,3 Assessments with Term End FAT (Computer Based Test)			
Recommended by Board of Studies	09-06-2017		
Approved by Academic Council	No. 45	Date	15-06-2017

STS1012	Introduction to Business Communication	L	T	P	J	C
		3	0	0	0	1

Pre-requisite	None	Syllabus version
		2

Course Objectives:

- To provide an overview of Prerequisites to Business Communication.
- To enhance the problem solving skills and improve the basic mathematical skills.
- To organize the thoughts and develop effective writing skills.

Expected Course Outcome:

1. Enabling students enhance knowledge of relevant topics and evaluate the information

Module:1	Study skills	10 hours

Memory techniques
Relation between memory and brain, Story line technique, Learning by mistake, Image-name association, Sharing knowledge, Visualization
Concept map
Mind Map, Algorithm Mapping, Top down and Bottom Up Approach

Module:2	Emotional Intelligence (Self Esteem)	6 hours

Empathy
Affective Empathy and Cognitive Empathy
Sympathy
Level of sympathy (Spatial proximity, Social Proximity, Compassion fatigue)

Module:3	Business Etiquette	9 hours

Social and Cultural Etiquette
Value, Manners, Customs, Language, Tradition
Internal Communications
Open and objective Communication, Two way dialogue, Understanding the audience
Planning
Identifying, Gathering Information, Analysis, Determining, Selecting plan, Progress check, Types of planning
Writing press release and meeting notes
Write a short, catchy headline, Get to the Point –summarize your subject in the first paragraph,

Body – Make it relevant to your audience		
Module:4	**Quantitative Ability**	**4 hours**
Numeracy concepts Fractions, Decimals, Bodmas, Simplifications, HCF, LCM, Tests of divisibility **Beginning to Think without Ink** Problems solving using techniques such as: Percentage, Proportionality, Support of answer choices, Substitution of convenient values, Bottom-up approach etc. **Math Magic** Puzzles and brain teasers involving mathematical concepts **Speed Calculations** Square roots, Cube roots, Squaring numbers, Vedic maths techniques		
Module:5	**Reasoning Ability**	**3 hours**
Interpreting Diagramming and sequencing information Picture analogy, Odd picture, Picture sequence, Picture formation, Mirror image and water image **Logical Links** Logic based questions-based on numbers and alphabets		
Module:6	**Verbal Ability**	**3 hours**
S**trengthening Grammar Fundamentals** Parts of speech, Tenses, Verbs(Gerunds and infinitives) **Reinforcements of Grammar concepts** Subject Verb Agreement, Active and Passive Voice, Reported Speech		
Module:7	**Communication and Attitude**	**10 hours**
Writing Writing formal & informal letters, How to write a blog & knowing the format, Effective ways of writing a blog, How to write an articles & knowing the format, Effective ways of writing an articles, Designing a brochures **Speaking skills** How to present a JAM, Public speaking **Self managing** Concepts of self management and self motivation, Greet and Know, Choice of words, Giving feedback, Taking criticism		
Total Lecture hours	**45 hours**	

Text Book(s)	
1.	FACE, Aptipedia, Aptitude Encyclopedia, 2016, First Edition, Wiley Publications, Delhi.
2.	ETHNUS, Aptimithra, 2013, First Edition, McGraw-Hill Education Pvt. Ltd.
Reference Books	
1.	Alan Bond and Nancy Schuman, 300+ Successful Business Letters for All Occasions, 2010, Third Edition, Barron's Educational Series, New York.
2.	Josh Kaufman, The First 20 Hours: How to Learn Anything ... Fast , 2014, First Edition, Penguin Books, USA.
Mode of Evaluation: FAT, Assignments, Projects, Case studies, Role plays, 3 Assessments with Term End FAT (Computer Based Test)	

Recommended by Board of Studies	09-06-2017		
Approved by Academic Council	No. 45	Date	15-06-2017

STS2011	Reasoning Skill Enhancement	L	T	P	J	C
		3	0	0	0	1
Pre-requisite	None	**Syllabus version**				
		2				

Course Objectives:

1. To Strength the social network by the effective use of social media and social interactions.
2. To Identify own true potential and build a very good personal branding.
3. To Enhance the Analytical and reasoning skills

Expected Course Outcome:

1. Understanding the various strategies of conflict resolution among peers and supervisors and respond appropriately

Module:1	Social Interaction and Social Media	6 hours

Effective use of social media
Types of social media, Moderating personal information, Social media for job/profession, Communicating diplomatically
Networking on social media
Maximizing network with social media, How to advertise on social media
Event management
Event management methods, Effective techniques for better event management
Influencing
How to win friends and influence people, Building relationships, Persistence and resilience, Tools for talking when stakes are high
Conflict resolution
Definition and strategies , Styles of conflict resolution

Module:2	Non Verbal Communication	6 hours

Proximecs

Types of proximecs**,** Rapport building

Reports and Data Transcoding

Types of reports

Negotiation Skill

Effective negotiation strategies

Conflict Resolution

Types of conflicts

Module:3	**Interpersonal Skill**	**8 hours**

Social Interaction
Interpersonal Communication,Peer Communication, Bonding,Types of social interaction
Responsibility
Types of responsibilities**,** Moral and personal responsibilities
Networking
Competition, Collaboration, Content sharing
Personal Branding
Image Building, Grooming, Using social media for branding
Delegation and compliance
Assignment and responsibility, Grant of authority, Creation of accountability

Module:4	**Quantitative Ability**	**10 hours**

Number properties
Number of factors, Factorials, Remainder Theorem, Unit digit position, Tens digit position
Averages
Averages, Weighted Average
Progressions
Arithmetic Progression, Geometric Progression, Harmonic Progression
Percentages
Increase & Decrease or successive increase
Ratios
Types of ratios and proportions

Module:5	**Reasoning Ability**	**8 hours**

Analytical Reasoning

Data Arrangement(Linear and circular & Cross Variable Relationship), Blood Relations, Ordering/ranking/grouping, Puzzletest, Selection Decision table

Module:6	**Verbal Ability**	**7 hours**

Vocabulary Building

Synonyms & Antonyms, One word substitutes, Word Pairs, Spellings, Idioms, Sentence completion, Analogies

Total Lecture hours	**45 hours**	

Text Book(s)

1.	FACE, Aptipedia Aptitude Encyclopaedia, 2016, First Edition, Wiley Publications, Delhi.
2.	ETHNUS, Aptimithra, 2013, First Edition, McGraw-Hill Education Pvt.Ltd.
3.	Mark G. Frank, David Matsumoto, Hyi Sung Hwang, Nonverbal Communication: Science and Applications, 2012, 1st Edition, Sage Publications, New York.

Reference Books

1.	Arun Sharma, Quantitative aptitude, 2016, 7th edition, Mcgraw Hill Education Pvt. Ltd.
2.	Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler, Crucial Conversations: Tools for Talking When Stakes are High, 2001,1st edition McGraw Hill Contemporary, Bangalore.
3.	Dale Carnegie, How to Win Friends and Influence People, Latest Edition,2016. Gallery Books, New York.

Mode of evaluation: FAT, Assignments, Projects, Case studies, Role plays,
3 Assessments with Term End FAT (Computer Based Test)

Recommended by Board of Studies	09-06-2017		
Approved by Academic Council	No. 45	Date	15-06-2017

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

STS 2012	Aptitude and Reasoning skills	L	T	P	J	C
		3	0	0	0	1
Pre-requisite	**None**	**Syllabus version**				
		1				

Course Objectives:

1. To enhance the logical reasoning skills of the students and improve the problem-solving abilities
2. To strengthen the ability to solve quantitative aptitude problems
3. To enrich the verbal ability of the students
4. To develop the self-presentation skills

Expected Course Outcome:

1. The students will be able to interact confidently and use decision making models effectively
2. The students will be able to deliver impactful presentations
3. The students will be able to be proficient in solving quantitative aptitude and verbal ability questions effortlessly

Module:1	**Logical Reasoning**	**5 hours**

Logical connectives, Syllogism and Venn diagrams

- Logical Connectives
- Syllogisms
- Venn Diagrams – Interpretation

Venn Diagrams – Solving

Module:2	**Quantitative Aptitude**	**11 hours**

Logarithms, Progressions, Geometry and Quadratic equations

- Logarithm
- Arithmetic Progression
- Geometric Progression
- Geometry
- Mensuration
- Coded inequalities
- Quadratic Equations

Permutation, Combination and Probability

- Fundamental Counting Principle
- Permutation and Combination
- Computation of Permutation
- Circular Permutations

Computation of Combination and Probability

Module:3	**Verbal Ability**	**8 hours**

Critical Reasoning

- Argument – Identifying the Different Parts (Premise, assumption, conclusion)
- Strengthening statement
- Weakening statement
- Mimic the pattern

Vocabulary for placements

- Exposure to solving questions of
- Synonyms
- Antonyms
- Analogy
- Confusing words

Spelling correctness

Module:4	**Recruitment Essentials**	**8 hours**

Mock interviews

Cracking other kinds of interviews

Skype/ Telephonic interviews

Panel interviews

Stress interviews

Case studies/ situational interview

- Scientific strategies to answer case study and situational interview questions
- Best ways to present cases

Practice on presenting cases and answering situational interviews asked in recruitment rounds.

Module:5	**Writing skills for placements**	**6 hours**

Essay writing

- Idea generation for topics
- Best practices
- Practice and feedback

Writing Company Blogs
Building a blog, Developing brand message, FAQs', Assessing Competition
Email writing etiquette

Module: 6	**Adaptability & Time management**	**7 hours**

Theatrix
Motion Picture, Drama, Role Play, Different kinds of expressions
Creative expression
Writing, Graphic Arts, Music, Art and Dance
Flexibility of thought
The 5'P' framework (Profiling, prioritizing, problem analysis, problem solving, planning)
Adapt to changes(tolerance of change and uncertainty)
Adaptability Curve , Survivor syndrome

Time management skills
Prioritization - Time Busters, Procrastination, Scheduling, Multitasking, Monitoring
6. Working under pressure and adhering to deadlines

Total Lecture hours	**45 hours**	

Text Book(s):

1	FACE, Aptipedia Aptitude Encyclopedia, 2016, 1st Edition, Wiley Publications, Delhi.
2	ETHNUS, Aptimithra, 2013, 1st Edition, McGraw-Hill Education Pvt.Ltd.
3	**SMART, PlaceMentor, 2018, 1st Edition, Oxford University Press**.
4	R S Aggarwal, Quantitative Aptitude For Competitive Examinations, 2017, 3rd Edition, S. Chand Publishing, Delhi.

Reference Books:

1.	Arun Sharma, Quantitative Aptitude, 2016, 7th Edition, McGraw Hill Education Pvt. Ltd.

Mode of Evaluation: FAT, Assignments, 3 Assessments with Term End FAT (Computer Based Test)

Recommended by Board of Studies	09-06-2017		
Approved by Academic Council	No. 45	Date	15-06-2017

STS3003	Soft skills for Professional Development	L	T	P	J	C
		3	0	0	0	1
Pre-requisite	None	**Syllabus version**				
		1				

Course Objectives:

1. To enhance the logical reasoning skills of the students and improve the verbal ability of the students.
2. To facilitate the Basic quantitative ability.
3. To enrich the professional requirements in students.

Expected Course Outcome:

1. The Students will be able to perform effectively in social, academic and professional contexts

Module:1	**Numeracy**	**10 hours**

Time, Speed & Distance-Work-Interest calculations- Value of money ,ratio, Proportion-Mixtures & Solution-Progression-Problems on Ages-Numbers- Power cycle- Remainder pattern,-Finding last two unit digits- Pipes and Cisterns- Divisibility rules for unlimited numbers-LCM and HCF-Alligations and MixturesIntroduction to Statistics-Stocks and Shares-discounts-Introduction to Business Mathematics

Module:2	**Logical Reasoning**	**5 hours**

Directions-Analogy-Sequential Input and Output-Syllogisms-PuzzlesComplex arrangements-Clocks, Calendars, Cubes-Abductive Reasoning, Deductive Reasoning, Visual Reasoning-Blood Relations, Spatial reasoning

Module:3	**Verbal Reasoning & Vocabulary**	**5 hours**

Critical Reasoning - Para jumbles, General Vocabulary, Business Vocabulary, Collocations - Strategies for vocabulary enhancement, Idiomatic phrases & Phrasal verbs

Module:4	**Business Communication & Grammar**	**5 hours**
Fundamentals of Business Communication - Written Communication- Direct & Indirect Speech-		
Voice-Tenses: Exceptions to rules in Grammar		
Module:5	**Professional networking**	**5 hours**
Creating a network through multiple Channels- Social MediaDifferent Conversation techniques-		
Capitalizing on one's strengthSuccessful Negotiation - Essential Skills and Strategies-Netiquette		
Module:6	**Interview Facing Skills / Resume Writing**	**5 hours**
Structured and Unstructured Interview, Face-Face InterviewTechniques to face Video Interviews,		
Grooming, Body Language, Dressing Etiquette-Mock Interview- Customizing Resume - Usage of		
Power Verbs, Formatting- One's selling power		
Module:7	**Case Studies**	**5 hours**
Technical/Non-Technical Company specific tests Mock tests		
Module:8	**Organizational Culture**	**5 hours**
Understanding the hierarchy of an Organization- Adapting to the culture of the Work place -		
Meeting the Industry's expectationWorkload Management and prioritizing- Team work		
Total Lecture hours	**45 hours**	
Text Book(s)		
1	FACE, Aptipedia Aptitude Encyclopedia, 2016, 1st Edition, Wiley Publications, Delhi.	

2	ETHNUS, Aptimithra, 2013, 1st Edition, McGraw-Hill Education Pvt.Ltd
3	**SMART, PlaceMentor, 2018, 1st Edition, Oxford University Press.**

Reference Books	
1	Brown, Lola (2007) Resume Writing Made Easy. Canada. Prentice Hall.
2	Swan, Michael (2013) Practical English Usage. Oxford. Oxford Publications
3	Cosentino, Marc. P. (2016) Case in point Burgee Press
4	RS Agarwal, R.S. (2013) Quantitative Aptitude. Mumbai Publishers S. Chand

Mode of Evaluation: 3 Assessments - Assignments, Projects, Case studies, Role plays and FAT (Computer Based Test)			
Recommended by Board of Studies		08-05-2016	
Date of approval by the Academic Council	No. 45	Date	12-12-2016

CSC1001	Computational Thinking	L	T	P	J	C
		2	1	0	0	3
Pre-requisite	**None**	**Syllabus version**				
		1.0				

Course Objectives:

1. Acquainting students with basics on developing algorithms.
2. Introducing them to building logic as algorithmic steps in problem solving.
3. Familiarizing students with the programming languages constructs to understand the structure of a program and develop logic accordingly.

Expected Course Outcome:

On completion of course, the students will be able to

1. Convert real world situations to appropriate problem statements and identify the input, algorithmic approach involved and expected output.
2. Design solutions to mathematical problems following a top-down approach.
3. Argue on the appropriateness of solution developed with respect to complexity by eliminating redundant comparisons and swaps.
4. Apply suitable strategies on loop initials, iterations and terminations while implementing Algorithms.
5. Classify programming language generations, articulate on programming constructs and synthesize all modular codes into a whole application based on Software Development Life Cycle.

Module:1	**Introduction**	**6 hours**

Introduction: The problem solving aspect, Top down design, Implementation of algorithms, Pseudo code, Flowchart.

Module:2	**Fundamental Algorithms**	**7 hours**

Exchange the values of two variables - Counting - Summation of a set of number - factorial computation - Sine Function computation - Generation of the Fibonacci sequence - Reversing the digits of an integer - Base conversion - Character to number conversion. All examples to be discussed with flowchart and pseudocode.

Module:3	**Factoring method**	**7 hours**

:Finding the square root of a number - The smallest divisor of an integer - The greatest common Divisor of two integers - Generating prime numbers - Computing the prime factors of an integer - Generation of Pseudo - random numbers - Raising a number to a large power - Computing the n-th Fibonacci number.

Module:4	**Overview of Programming Languages**	**4 hours**

Computer languages, generation of languages, creating and running programs, system development: system requirement, analysis, design, code, test and maintenance

Module:5	**Constructs of Programming Languages**	**6 hours**

Datatypes, variables, keywords, I/O statements, control structures: Decision making, looping – User defined functions

	Total Lecture hours:		**30 hours**
Text Book(s)			
1.	R.G.Dromey, How to solve it by computer - Pearson, 2011.		
2.	B.A. Forouzan, R.F. Gilberg, Computer Science: A Structured Programming Approach Using C, Cengage Learning, 3rd edition, 2009		
Reference Books			
1.	Kunth -Fundamental Algorithm ,Narosa Publishing House, 2003.		
Mode of Evaluation: Cat, Assignment, Quiz, Fat, Project, Seminar			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1002	Digital Logic and Design	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	**Nil**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To introduce the basic concept of digital and binary systems.
2. To understand Boolean algebra, Combinational and Sequential Circuits.
3. To impart the knowledge of digital logic fundamentals and to design simple computer based system.

Expected Course Outcome:

On completion of course, the students will be able to

1. To comprehend the different kind of number systems and its applications in digital logic design.
2. To solve Boolean expression using minimization methods.
3. Analyze and design the sequential circuit.
4. Design a circuit using logic gates for practical applications.
5. Construct a component using combinational and sequential circuits.
6. Design, simulate and implement the basic combinational and sequential circuits.

Module:1	**Introduction: Number System**	**9 hours**

Conversion from one number system to another–Complements–Binary Codes–Binary Logic–Logic gates – Truth Tables

Module:2	**Boolean Algebra**	**9 hours**

Axioms– Theorems– Simplification of Boolean Function– Map Method (up to 5 Variables) –McClausky tabulation method

Module:3	**Sequential Logic**	**9 hours**

RS, JK, D and T Flip-flops – Registers – Shift Registers–Counters–Ripple Counters–Synchronous Counters–Design of Counters.

Module:4	**Combinational Logic**	**9 hours**

Adders–Subtractors–Decoders–Encoders– Multiplexer–Demultiplexer–Design of circuits using decoders/Multiplexers–ROM–PLA– Designing circuits using ROM/PLA.

Module:5	**Designing Circuits**	**9 hours**

Design of ALU – Design of Status Register – Design of Accumulator – Introduction to Computer Design

Total Lecture hours:	**45 hours**

Text Book(s)

1. M. Morris Mano Digital Logic and Computer Design, Pearson Education India 1st Edition-2016, ISBN: 9789332542525

Reference Books

1.	T.C.Bartee Computer Architecture and Logic Design McGraw Hill 2010.
2.	Thomas L Floyd Digital Fundamentals Pearson Edition -11th Edition-2015- ISBN: 9780132737968.
3.	A.P. Malvino, D.P. Leach and GoutamSaha Digital Principles and Applications (SIE) Tata McGraw Hill 8th Edition 2014, ISBN: 9789339203405.

Mode of Evaluation:Cat1 /Cat2/ Digital Assignment / Quiz / FAT / Seminar

List of Challenging Experiments (Indicative)

1.	Logic gates using discrete Components.	2 hours
2.	Verification of truth table for AND, OR, NOT, NAND, NOR and EXORgates.	1hour
3.	Realization of NOT, AND, OR, EXOR gates with only NAND and NORgates	1hour
4.	Verification of De Morgan'sLaw.	1hour
5.	Implementation of Half-Adder and Half-Subtractor.	2 hours
6.	Implementation of Full-Adder and Full-Subtractor.	1hour
7.	Multiplexer, Demultiplexer	2 hours
8.	Encoder,Decoder	2 hours
9.	Four bit Binary Adder	3 hours
10.	Design a circuit that performs adders and subtractor	2 hours
11.	Four bit binary subtractorusing 1's and 2'sComplement	3 hours
12.	Implementation of Shift registers, Serial Transfer.	4 hours
13.	Ring Counter	3 hours
14.	4-Bit Binary Counter Counters for arbitrary sequence	3 hours
	Total Laboratory Hours	**30 hours**

Mode of evaluation: Individual Exercises, Team Exercises, Online Quizzes, Online Discussion Forums

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1003	Programming Fundamentals	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	**None**	**Syllabus version**				
		v1.0				

Course Objectives:

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Have the ability to write a computer program to solve specified problems.
3. To create a real time application using set of standards established for the course.

Expected Course Outcome:

On completion of course, the students will be able to

1. Comprehend the major concepts of C programming.
2. Choose the appropriate loops and decision-making statements to solve the problem.
3. Understand the concept of function and its prototypes.
4. Discuss the various types of user defined data types.
5. Describe the concepts of pointers and file Operations.
6. Ability to implement the C concepts on a different environment

Module:1	**Introduction:**	**9 hours**

C fundamentals - character set - keywords and identifiers - constants - variables - data types – declaration of variables – Arithmetic express ions – operators, hierarchy of operator s - library functions – type conversion – data types revisited: enumerated data type, typedef.

Module:2	**I/O Functions**	**9 hours**

I/O Functions: Managing input /output operations – Decision making and Branching: If, If…else, switch, goto, Decision making and looping: while, do…while and for

Module:3	**Functions:**	**9 hours**

Functions - defining, accessing functions – function prototypes – passing arguments – scope rule of functions -recursions - storage classes in C

Module:4	**Arrays and Structures:**	**9 hours**

Arrays:Arrays - defining and processing - passing array to functions - multidimensional arrays - arrays and string. **Structures:** declaring a structure – accessing structure elements– array of structures - pas sing structures to functions – self-referential structures – unions

Module:5	**Pointers and Files:**	**9 hours**

Pointers:declaration of pointer variables – accessing a variable through its pointer – pointer expressions – pointers and arrays.files:defining and opening a file, i /o operations on files, random access to files

Total Lecture hours:	**45 hours**

Text Book(s)

1. E. Balaguruswamy, Programming in ANSI C, TMH, 6th edition, 2012.
2. Kanithkar Y, Let us C, BPB Publication- New Delhi -11th Edition, 2008.

Reference Books

1.	Gottfried B S-Programming with C , II Edition TMH Pub Co Ltd New Delhi -2010
2.	K R Venugopal , S R Prasad - Mastering C, The McGraw-Hill Companies,1st edition 2006

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Challenging Experiments (Indicative)

1	Determining a given number is prime or not .	2 hours
2	Pascal's Triangle.	2 hours
3	String Manipulation.	2 hours
4	Matrix addition, Multiplications.	2 hours
5	Finding Determinant of a Matrix.	2 hours
6	Finding inverse of a Matrix	2 hours
7	Fibonacci numbers using function.	2 hours
8	Euclidean's Algorithms for finding GCD	2 hours
9	Generating Permutations	4 hours
10	Computing Combinations.	3 hours
11	Creating database for telephone number s and r elated operations Use file concepts.	3 hours
12	Creating database for Mailing addresses and related operations Using Structures.	4 hours
	Total Laboratory Hours	30 hours

Mode of evaluation: Individual Exercises, Team Exercises, Online Quizzes, Online Discussion Forums, Project/Activity

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1004	Operating Systems	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	**None**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To understand the mechanisms of OS to handle the processes, thread, communication and the concepts related to deadlock strategies.
2. To gain knowledge in Memory Management Techniques.
3. To enable the student to appreciate the need of protection, isolation and abstraction.

Expected Course Outcome:

On completion of course, the students will be able to

1. Differentiate between the user and kernel mode operations
2. Describe use of semaphores, interrupts, context switching
3. Write a simple concurrent and multi-threaded programs
4. Summarize the principles of various Memory Management Techniques in Operating Systems.
5. Discuss the issues related to security in operating systems.
6. Evaluate the trade-offs in design and implementation concepts used in the development of Operating Systems.

Module:1	**Introduction:**	**9 hours**

Operating Systems – Operating System Services, System calls , Operating system Structure, Virtual machine, Booting – Fi le System – Device Driver – Terminal I/O.

Module:2	**Process Management**	**9 hours**

Process Management – Inter –Process Communication – Peterson‘s Algorithm, Hardware assistance, Semaphores, classical IPC problems. Dead Lock – Dead Lock prerequisites – Deadlock Strategies

Module:3	**Memory Management**	**9 hours**

Single Contiguous – Fixed Partitioned – Variable Partitions – Non-contiguous allocations – Paging – Segmentation – Combined Systems – Virtual Memory Management Systems.

Module:4	**Security Protection**	**9 hours**

Treats – Attacks – Security Violation – Worms – Virus –Design Principles – Authentication – Protection Mechanisms – Encryption

Module:5	**Case Study**	**9 hours**

History & Overview – UNIX file system – Data structures for process/memory management- process states - Unix and Linux a comparison, Android- History, architecture diagram, Memory management.

Total Lecture hours:	**45 hours**

Text Book(s)

1. A.S.Godbole – Operating Systems –Second Edition, TMH – 2009.

Reference Books	
1.	A. Siberschatz and P.B.Galvin - Operating Systems Concept - Addison Wesley Publishing Company, 2009.
2.	H.M. Deitel - Operating Systems - Second Edition - Addison Wesley, 2005
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar	
Tutorials	
	1. Study of UNIX commands 2. shell scripting 3. Display System information like CPU, Memory information 4. Write a program to create processes and threads. 5. Implement the various process scheduling mechanisms such as FCFS, SJF, Priority, round – robin. 6. Implement the solution for Classical IPC problems 7. Implement Banker's algorithm. 8. Implement FIFO, Optimal and LRU page replacement algorithms.
Mode of evaluation: Individual Exercises, Team Exercises, Online Quizzes, Online Discussion Forums	

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1005	Electronic Commerce	L	T	P	J	C
		3	0	0	4	4
Pre-requisite	**Nil**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To understand different types and key components on business models in the new economy.
2. Essential principles of e-Commerce focusing the basic concepts on electronic purchase and various payment schemes with security aspects.
3. Develop an e-Commerce application using internet tools.

Expected Course Outcome:

On completion of course, the students will be able to

1. Empathize the e-Business Architecture, Process and Opportunities.
2. Discover the major electronic payment issues and security issues against security threats.
3. Explore the current scope of various electronic transactions
4. Illustrate the role and function of each technologies in e-Commerce
5. Identify the main forms of search engine marketing, optimization techniques, and their application in online marketing campaigns.
6. Manifest the application and services to the development of e-Commerce applications.

Module:1	**Introduction**	**5 hours**

Electronic Commerce Environment and Opportunities: Background -The Electronic Commerce

Module:2	**Security**	**6 hours**

Modes of Electronic Commerce: Overview - Electronic Data Interchange -Electronic fund transfer -Approaches to safe Electronic Commerce: Overview - Secure Transport Protocols -Secure Transactions - Secure Electronic Payment Protocol (SEPP)- Secure Electronic Transaction (SET) - Certificates for Authentication - Security on Web Servers and Enterprise Networks

Module:3	**Electronic Payments**	**6 hours**

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment and Security Requirements - Payment and Purchase Order Process - On-line Electronic Cash. Internet/Intranet

Module:4	**Security Issues and Solutions**	**6 hours**

The Need for Computer Security - Specific Intruder Approaches. B2CIndividuals Online- B2C E-Commerce - E-Commerce Business Models -how to make money on the Internet

Module:5	**Messaging**	**5 hours**

MasterCard/Visa Secure Electronic Transaction: Introduction - E-mail and Secure E-mail

Module:6 Technologies for Electronic Commerce:	**6 hours**

Introduction - The Means of Distribution - Message handling models- MIME: Multipurpose Internet Mail Extensions - S/MIME: Secure Multipurpose Internet Mail Extensions - MOSS: Message Object Security Services

Moudle:7 Applications:	**5 hours**
Internet and Web Site Establishment: Introduction Technologies for Web Servers - Internet Tools Relevant to Commerce - Internet Applications for Commerce Internet Access and Architecture - Searching the Internet	
Module:8 Internet Resources:	**6 hours**
Creating a Web Site. Creating a Mobile App for Shopping	
Total Lecture hours:	**45 hours**

Text Book(s)

1. Minoli, D., Minoli, E. (2002). Web commerce technology handbook. McGraw-Hill School Education Group.

Reference Books

1. Bajaj, K. K., Nag, D., Bajaj, K. K. (2005). E-commerce. Tata McGraw-Hill Education.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC2001	Data Structures	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	NIL	Syllabus version				

Course Objectives:

1. To acquire knowledge of data structures for implementing various computing system.
2. To impart a thorough understanding of linear and non-linear data structures and their applications.
3. To impart familiarity with various sorting and searching techniques and their performance comparison.

Expected Course Outcome

1. Write C programs using array, structures, unions, dynamic memory allocation functions and command line arguments.
2. Describe and simulate various linear data structures like stacks, queues, linked lists using static and dynamic allocation and use them in solving problems.
3. Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
4. Apply suitable strategies for searching and sorting.
5. Illustrate various hashing techniques.
6. Identify an appropriate data structure for a problem and implement it.
7. Demonstrate graph traversal algorithms.

Module:1	Structures and Pointers	6 hours

Structure definition, multi-dimensional array - Array of structures- Array of pointers- Passing Array of structures, Array of pointers to functions-Self-referential structures

Module:2	Lists	5 hours

Introduction- Static and Linked List based implementation Singly Linked List Introduction to Doubly Linked List

Module:3	Stacks	5 hours

Introduction-Static and Linked List based implementation- Applications - Fix conversion an devaluation-Recursive function call- Parenthesis matching

Module:4	Queue	6 hours

Introduction- Static and Linked List based implementation Priority Queue-Introduction toCircular Queue- Application Job scheduling

Module:5	Sorting and Searching	6 hours

Introduction-Sorting-Bubble, Insertion, Selection, Quick, merge, Searching - Sequential and Binary Search. Add Topics

Module:6	Trees	6 hours

Terminologies-Binary Search Tree-Heap tree and Heap sort

Module:7	**Graphs**		**6 hours**
Terminologies-Representation-Adjacency matrix and adjacency list - BFS, DFS traversals - Shortest Path Algorithm - Dijkstra's algorithm- Minimum Spanning Tree Kruskal algorithm,Prims Algorithm..			
Module:8	**Hashing**		**5 hours**
Introduction - Hash functions- collision and detection linear and quadratic and chaining			
	Total Lecture hours:		**45 hours**
Text Book(s)			
1.	Reema Thareja, Data Structures Using C, 2nd edition, Oxford University Press, 2014.		
Reference Books			
1.	Schaums Outline Series-Theory and problems of Data Structures McGraw Hill Book Company, 2011.		
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
List of Challenging Experiments (Indicative)			
1.	Applications of stack and queue		6 hours
2.	Linked list		6 hours
3.	BST		6 hours
4.	Sorting and Searching		6 hours
5.	Experiment title		6 hours
Total Laboratory Hours			30 hours
Mode of Assessment: Project/Activity			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC2002	Object Oriented Programming	L	T	P	J	C
		3	0	2	4	5
Pre-requisite	**CSC1003**	**Syllabus version**				
		V1.0				

Course Objectives:

1. Understand the features of object oriented approach over other approaches and develop programs using these principles.
2. Develop the applications to handle heterogeneous data.
3. Develop the applications with proper initialization constructs and finalizer constructs to avoid wastage in resources.
4. Design and Create new applications by interconnecting many classes and reuse the code.
5. Develop generic software components.

Expected Course Outcome:

On completion of course, the students will be able to

1. Demonstrate the features of object oriented programming approach and basic constructs of C++.
2. Implement modular programming using functions and its overloading.
3. Formulate user define data type using classes and objects.
4. Discuss various methods to initialize an object using constructors and destructors.
5. Illustrate the concepts of friend functions and polymorphism using operator overloading.
6. To choose and design reusable applications.
7. Idealize the concepts of generic programming using templates.

Module:1	**Introduction to OOP**	**6 hours**

Principles of Object Oriented Programming (OOP) Software Evaluation OOP Paradigm Basic Concepts Benefits of OOP Applications of OOP. Tokens Keywords Identifiers Basic Data types User Defined data types-Derived Data types-Symbolic Constants-Type Compatibility-Declarations and Dynamic Initialization of Variables - Operators in C++ - Precedence Rule - Scope Resolution Operators-Type cast Operators.

Module:2	**Functions**	**5 hours**

Functions in C++ - Function Prototyping - Call by reference Return by reference- inline functions - Default arguments, function overloading.

Module:3	**Classes and Objects**	**6 hours**

Declaring objects, Defining member functions, Data hiding or encapsulation, Classes objects and memory, Static data member and functions, Static objects, objects as function arguments.

Module:4	**Constructors and Destructors**	**6 hours**

Constructors with arguments, overloading constructors, Constructor with default arguments, Copy constructors, Destructors, Calling constructors and Destructors.

Module:5	**Friend functions, Friend classes**	**5 hours**

Friend functions, Friend classes, constant member function, Local classes.

Module:6	**Operator overloading**	**6 hours**

Operator overloading rules, Overloading Unary Operator and Binary Operator

Module:7	**Inheritance**	**6 hours**
Types of Inheritance: Single Inheritance, Multiple Inheritance, Hierarchical Inheritance and Hybrid Inheritance-Virtual base Class- Abstract Class. Virtual Function with suitable examples.		
Module:8	**Generic Programming**	**5 hours**
Function templates, class templates, templates with multiple arguments		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	E. Balagurusamy Object Oriented Programming with C++ - TMH 2018.
Reference Books	
1.	Robert LaforeGalgotia Object Oriented Programming in Microsoft C++ - 2018.
2.	Herbert Schildt, The Complete Reference C++- 5th Edition, TMH, 2018.
3.	Ira Pohl Object Oriented Programming Using C++ - Pearson Education 2017.

Mode of Evaluation: CAT1,CAT2,Digital Assignment,Quiz,FAT

List of Challenging Experiments (Indicative)

1.	Inline function.	1 hour
2.	Call by Reference & Call by value	2 hours
3.	Function overloading	2 hours
4.	Functions and Default arguments	1 hour
5.	Classes and objects	2 hours
6.	Constructors and Destructor	2 hours
7.	Array of objects	2 hours
8.	Passing Objects to functions	2 hours
9.	Friend functions and friend classes	2 hours
10.	Overloading unary operators	1 hour
11.	Overloading arithmetic operators	1 hour
12.	Overloading relational, logical operators	1 hour
13.	Single Inheritance	1 hour
14.	Multiple Inheritance	2 hours
15.	Multipath Inheritance	2 hours
16.	Virtual Functions	2 hours
17.	Function template	2 hours
18.	Class template	2 hours
	Total Laboratory Hours	30 hours

Mode of evaluation: Digital Assignment 1-5 and FAT

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC2003	Database Management Systems	L	T	P	J	C
		3	0	2	4	5
Pre-requisite	**CSC1004**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To impart the fundamentals of Relational Database Management Systems.
2. To emphasize the significance of Database Design and Normalization.
3. To familiarize the concepts of Transaction Processing, Concurrency Control, Query Processing and Optimization

Expected Course Outcome:

On completion of course, the students will be able to

1. Acquire a good understanding of the architecture and functioning of Database Management Systems.
2. Construct an Entity Relationship model and derive the relational schemas from the model.
3. Apply constraints and joins on relational schemas.
4. Analyze and apply the principles and practices of good database design.
5. Use the concepts of normalization to analyze, measure and evaluate the performance of a database application.
6. Analyze transaction schedules for serializability.
7. Grant and revoke privileges and comprehend database recovery techniques.
8. Construct efficient SQL queries to retrieve and manipulate data as required.

Module:1	**INTRODUCTION TO DATABASES**	**5 hours**

Introduction-Characteristics and Advantages of DBMS Approach-Data Models, Schema and Instances-Three schema Architecture and Data Independence-Database Languages and Interfaces-Centralized and Client/Server Architecture for DBMS.

Module:2	**DATA MODELING USING ENTITY-RELATIONSHIP MODEL**	**5 hours**

Entity Types, Entity sets, Attributes and Keys-Relationship Types, Relationship Sets, Roles and Structural Constraints-ER Diagrams, naming Conventions and Design Issues

Module:3	**RELATIONAL DATA MODEL AND CONSTRAINTS**	**7 hours**

Relational Model Constraints-Relational database Schemas-Unary Relational Operations: Select and Project- Binary Relational Operations: Join and Division

Module:4	**BASICS OF FUNCTIONAL DEPENDENCY**	**4 hours**

Introduction-Design Guidelines-Relational Schemas-Inference Rules.

Module:5	**NORMALIZATION FOR RELATIONAL DATABASES**	**5 hours**
Normal forms based on primary keys-Definition of Second and Third Normal Form - Boyce-Codd Normal Form		
Module:6	**TRANSACTIONS AND CONCURRENCY CONTROL**	**7 hours**
Introduction to Transaction Processing-Transaction and System Concepts-Properties of Transactions- Concurrency Control-Two Phase Locking-Timestamp based Ordering		
Module:7	**RECOVERY TECHNIQUES AND SECURITY**	**7 hours**
Database Recovery Concepts-NO-UNDO/REDO Recovery based on Deferred Update-Immediate Update-Database Security Issues-Access Control based on Granting and Revoking Privileges.		
Module:8	**QUERY PROCESSING AND OPTIMIZATION**	**5 hours**
Translating SQL Queries into Relational Algebra - Algorithms for External Sorting, Select and Join Operations, Project and Set Operations		
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	Elmasri and Navathe, Fundamentals of Database Systems, Addison Wesly, 6th Edition, 2011.

Reference Books

1.	Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, Mc-Graw-Hill, 3rd Edition,2003.
2.	Abraham Silberschatz, Henry F. Korth, and S. Sudarshan ,Database System Concepts, McGraw Hill Financial, 6th Edition, 2010.
3.	HctorGarca-Molina, Je_rey Ullman, and Jennifer Widom, Database Systems-The Complete Book, Pearson Education India ,2nd Edition, 2008

Mode of Evaluation : CAT / Assignment / Quiz / FAT / Project / Seminar

List of Challenging Experiments (Indicative)

1.	Data Definition Language Queries (create,alter,rename,drop)	3 hours
2.	Data Manipulation Language Queries (Insert, Select)	3 hours
3.	Data Manipulation Language Queries (Update, Delete)	3 hours
4.	Establishing Integrity Constraints	3 hours
5.	Aggregate Functions	3 hours
6.	Date and String Functions	3 hours

7.	Establishing Joins			3 hours
8.	Sub Queries			3 hours
9.	Managing Views			3 hours
10.	PL/SQL			3 hours
Total Laboratory Hours				30 hours
Mode of Assessment : Project/Activity				
Recommended by Board of Studies	16-06-2015			
Approved by Academic Council	No. 37th	Date	16-06-2015	

CSC3001	Java Programming	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	**CSC2002**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To learn the basic syntax and semantics of the Java language and programming environment.
2. Understand fundamentals of object-oriented programming in Java.
3. Including defining classes invoking methods, Inheritance, Polymorphism, Interfaces etc.
4. Have the ability to write a java program to solve specified problems.

Expected Course Outcome:

On completion of course, the students will be able to

1. Analyze and explain the behavior of programs involving the fundamental program constructs.
2. Design, write, and test a Java program to implement a solution to a given problem Specification.
3. Develop Java applications using object oriented concepts.
4. Build event-driven programming using Interface.
5. Develop Applet programming for a specific application.
6. Identify and describe the properties of a variable such as its associated value and scope.

Module:1	INTRODUCTION TO JAVA PROGRAMMING	5 hours

Overview of JAVA Language: Introduction, Java Virtual Machine, Simple Java Program, Java Program Structures, Java Tokens, Java Statements, Programming style, Constants, Variables, Data Types, Declaration of Variables, Standard Default Values Scope of Variables, Symbolic Constants. Getting the values of Variables (Buffered Reader, Scanner and Data Input Stream), Displaying the values of Variables

Module:2	OPERATORS AND EXPRESSIONS	5 hours

Type Casting, Implementing a Java Program, Command Line Arguments , Operator and Expressions, Java Special Operators, Precedence of Operators, Associativity, Arithmetic Expressions, Evaluation of Expressions, Mathematical Functions.

Module:3	DECISION MAKING, BRANCHING AND LOOPING	5 hours

Decision Making and Branching: Introduction, Decision Making with IF Statement, Simple IF Statement, The if…else Statement, Nesting of if….else statements, The else if Ladder, The Switch Statement, The?: Operator. Decision Making and Looping: Introduction, The While statement, do-while statement, for loop, Enhanced for loop, break, continue.

Module:4	ARRAYS AND STRINGS	6 hours

Methods, Arrays, Strings and Vectors: Arrays, Creating an Array, One dimensional Arrays, Two dimensional Arrays, Strings, String Methods, String Buffer classes, Wrapper Classes, Vectors

Module:5	CLASSES AND OBJECTS	6 hours

Introduction and Defining a Class, Adding Variables, Adding Methods ,Creating Objects, Accessing Class members, Constructors

Module:6	**INHERITANCE**	**6 hours**
Methods Overloading, Static Members, Nesting of Methods, Inheritance, Extending a class, Visibility Control, Multilevel and Hierarchical Inheritance.		
Module:7	**INTERFACES AND ABSTRACT CLASSES**	**6 hours**
Interface-Defining, Accessing and Implementing an Interface. Overriding Methods, Final Variables and Methods, Finalizer Methods, Abstract Methods and Classes.		
Module:8	**MULTITHREADED PROGRAMMING**	**6 hours**
Multithreaded Programming, Creating Threads, Extending the Thread Class, Lifecycle of a Thread, Thread Exceptions, Implementing the Runnable Interface, Applet Programming		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	1. E. BalaGuruswamy- Programming with JAVA, A Primer 5th Edition -2014.
Reference Books	
1.	P. Naughton and H.Schildt - The Complete Reference Java -9th Edition-2014.
2	K. Arnold and J.Gosling- Java Programming Language- Pearson Education -4th Edition– 2006.

Mode of Evaluation: CAT1, CAT 2,Digital Assignment, Quiz, FAT

List of Challenging Experiments (Indicative)		
1	Write a Java program to print sum of the squares of first n natural numbers	2 hours
2	Write a Java program to find the maturity value of a principal(P) due to the rate of compound interest(r).	2 hours
3	Get a string from the user and perform the following (i) Take the last char and return a new string with the last char added at the front and back.("bat"□"tbatt") (ii) Return a new string where the first and last chars have been exchanged. ("bat"□"tab")	2 hours
4	Write a Java Program to sort the string in a given array.	2 hours
5	Write a Java code to find the distance from VIT University to major cities of India. Hint: Create String array of major cities and integer array of distances. User gives the city name and the same is searched (use binary search) in the respective array and displays result.	2 hours
6	Write a Java program which has two classes which initializes a String in its constructor (i) A Generic class with 2 type Parameters (ii) Create a Generic Class reference for the above 2 Class and try to print the message inside the constructor (Use to string method).	4 hours

7	Create a super class, Student, and two subclasses, Undergrad and Grad. The Super class Student should have the following data members: name, ID, Grade, age, and address. The super class, Student should have one method: booleanisPassed (double grade) The purpose of the is passed method is to take one parameter, grade (value between 0 and 100) and check whether the grade has passed the requirement for passing a course. In the Student class this method should be empty as an abstract method. The two subclasses: Grad and Undergrad, will inherit all data members of the Student class and override the method is Passed. For the Under Grad class, if the grade is above 70.0, then is Passed returns true, otherwise it returns false. For the Grad class, if the grade is above 80.0, then Is Passed returns true, otherwise returns false. Create a test class for your three classes. In the test class, create one Grad object and one Undergrad object. For each object, provide a grade and display the results of the is Passed method.	4 hours
8	Write a Java program which has Interface class for Stack Operations. (i) A Class that implements the Stack Interface and creates a fixed length Stack. (ii) A Class that implements the Stack Interface and creates a Dynamic length Stack.	4 hours
9	Write a Java program using Synchronized Threads, which demonstrates Producer Consumer concepts.	4 hours
10	Write a Java program which handles Mouse and Keyboard Event using Applet.	4 hours
	Total Laboratory Hours	30 hours

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37	Date	16-06-2015

CSC3002	Computer Networks	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	**CSC1004**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To be familiar with the basics of data communication, Networking architectures and protocols and its applications
2. To provide an opportunity to do network programming using TCP/IP.
3. To prepare the students to enter advanced courses in Networking

Expected Course Outcome:

On completion of course, the students will be able to

1. Interpret the concepts of data communications system and its components
2. Contrast different types of Networking structures, models and categories of network
3. Exploring various switching techniques and analyze the performance of the network
4. Compare various error detection techniques, flow control mechanisms, IP addressing and routing schemes.
5. Identify and analyze transport and application layer protocols for specific applications
6. Identify different types of networking devices and their functions within a network

Module:1	**Introduction**	**5 hours**

Data Communications - Components - Data Flow - Networks - Physical Structures – Network Models -Categories of Networks - Protocols - Standards - Layered Architecture - OSI Model and TCP/IP protocol Suite

Module:2	**Physical Layer**	**4 hours**

Networking Topology - Transmission Media - Guided Media - Unguided Media - Networking Parameters.

Module:3	**Switching and Data Link Layer**	**8 hours**

Circuit Switching - Packet Switching - Virtual Circuit Network Error Detection and Correction - Block Coding - Cyclic Coding- Checksum-Flow and Error Control Protocols - Noiseless and Noisy Channels-Piggybacking-Multiple Access-Aloha-CSMA/CD and CSMA/CA

Module:4	**Network Layer**	**7 hours**

Inter-networking-IP addressing methods Internet Protocol (IPv4,IPv6)-Address mapping-Address-Resolution Protocol-Reverse address resolution Protocol- Routing Distance Vector Routing Link State Routing

Module:5	**Transport Layer**	**6 hours**

User Datagram Protocol (UDP) Transmission Control Protocol (TCP) Sockets - Congestion Control Quality of services (QOS) Parameters.

Module:6	**Application Layer**	**4 hours**

Application Layer Protocols - Domain Name Space (DNS), SNMP - Case Study : TELNET-SMTP-FTP-HTTP

Module:7	**Networking Devices and IEEE Standards**	**5 hours**
Networking Devices - Wireless Access points-Modem - Firewall and Proxies-Virtual Private Networks - IEEE Standards- Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11		
Module:8	**Network Security:**	**6 hours**
Introduction - Cryptography - Symmetric and Asymmetric algorithms - Key Distribution algorithm- Diffie Hellman- Transport layer security		
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	Data Communications and Networking, Behrouz A. Forouzan, McGraw Hill Education, 5th Ed., 2012
2	TCP/IP Protocol Suite, Behrouz A. Forouzan, McGraw-Hill Education, 4 Ed., 2009.

Reference Books

1.	Data and Computer Communications, William Stallings, Pearson Education, 10th Ed,2013..

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Challenging Experiments (Indicative)

1.	Demo session of all networking hardware and Functionalities	2 hours
2.	Network configuration commands using Linux	2 hours
3.	Error detection and correction mechanisms	3 hours
4.	Flow control mechanisms	3 hours
5.	ARP and RARP implementation	2 hours
6	IP addressing – Classless addressing	2 hours
7	Demo and simple Exercises - Learn to use Packet Tracer	2 hours
8	Prototyping a Network and observing packets across the network	3 hours
9	Performance analysis of Routing Protocols	3 hours
10	Message Transfer using UDP protocols	3 hours
11	Multi client chatting using TCP	3 hours
12	DNS protocol Implementation	2 hours
	Total Laboratory Hours	30 hours

Mode of evaluation: FAT/Project/Activity

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC3003	Software Engineering	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	**CSC2003**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To teach the concepts of process, project and product
2. To elucidate the knowledge of requirement analysis, design and testing concepts.
3. To apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Expected Course Outcome:

On completion of course, the students will be able to

1. Apply the principles of Software engineering methodology during software development and deployment process.
2. Demonstrate an ability to use the techniques and tools necessary for significant application domains
3. Ability to document various process like Requirement Engineering, Design and Testing.
4. Analyze the effectiveness of managing software projects through various techniques like Estimations, Scheduling and Quality Models
5. Evaluate basic understanding and knowledge of contemporary issues addressed during system analysis and design, testing and maintenance activities.

Module:1	**Introduction to Software Engineering**	**6 hours**
Software engineering problem - Software process models - Characteristics of a software process.		
Module:2	**Requirement Engineering**	**6 hours**
Requirements elicitation - Requirements analysis - Functional and Non-functional requirements.		
Module:3	**Requirement Specification**	**5 hours**
Modelling technique (Use case model) - IEEE SRS standard requirement specification		
Module:4	**Planning a Software project**	**6 hours**
Cost Estimation – Project Scheduling - Staffing and Personal planning.		
Module:5	**Software Design**	**6 hours**
Design Principles - Module level concepts (WBS) - Design notation and specification		
Module:6	**Advanced Design**	**6 hours**
Function oriented design – Object oriented design.		
Module:7	**Software Testing**	**5 hours**
Testing process - Test plan - Black-box and white-box testing – Unit - Integration.		
Module:8	**Maintenance and Quality**	**5 hours**

Characteristics of maintainable software – Capability Maturity Model.		
	Total Lecture hours:	**45 hours**
Text Book(s)		
1.	Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, 3rd Edition, Reprint 2014.	
Reference Books		
1.	R. S. Pressman, Software Engineering, A Practitioner's Approach, McGraw Hill Education India Pvt Ltd, 7th Edition 2014.	
2.	Ian Sommerville, "Software Engineering", Pearson Education, 9th Edition 2014.	
Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT		
List of Challenging Experiments (Indicative)		
1.	**Problem Statement, Scope, Scheduling Diagrams** 1. Role of Software 2. Identify the problem related to software crisis for a given scenario 3. Identify suitable software development model for the given scenario 4. Identify the various requirement development activities viz. elicitation, analysis, specification and verification for the given scenarios. 5. Identify the various elicitation techniques and their usage for the Banking case study	6 hours
2.	**Software Requirement Specification** Classify the requirement into functional and non-functional requirements. Identify the elements in software Requirements Specification document. To verify the requirements against the quality attributes.	6 hours
3.	**Software Design Specification** Identify the elements and relationship by analysing the class diagram of Easy Shop Retail Application case study. Identify the design principle that is being violated in relation to the given scenario.	6 hours
4.	**Execution/Implementation**	5 hours
5.	Testing and CASE Tools Unit Testing, Integration Testing Apply of any open source CASE tool	7 hours
	Total Laboratory Hours	**30 hours**

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC4001	Software Quality Assurance / Testing	L	T	P	J	C
		3	0	0	0	3
Pre-requisite	CSC3003	Syllabus version				
		V1.0				

Course Objectives:

1. To make students to learn how to establish polices for entire software development process.
2. To impart design and validate test cases for diversified application.
3. To enable the students to use various testing tool for automation of testing process.

Expected Course Outcome:

On completion of course, the students will be able to

1. Ability to apply software testing knowledge and engineering methods for various applications.
2. Apply software testing methods and modern software testing tools for testing projects.
3. Ability to understand the importance of software test automation and develop a test tool to support test automation.
4. Evaluate basic understanding and knowledge of contemporary issues in advance software testing methodologies.
5. Apply various communication methods and skills to communicate with the teammates to conduct

practice-oriented software testing project.

Module:1	Software Testing Strategy and Environment & Software Testing Methodology	10hours

Software Testing Strategy and Environment: Establishing testing policy- structured approach to testing, test factors - Economics of System Development Life Cycle (SDLC) Testing

Software Testing Methodology Defects hard to find- verification and validation - functional and structural testing -workbench concept -eight considerations in developing testing methodologies - testing tactics checklist

Module:2	Software Testing Techniques	5hours

Black-Box - Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing - Inspections – JADs -Pareto Analysis, Prototyping - Random Testing - Risk-based Testing - Regression Testing - Structured Walkthroughs -Thread Testing - Performance Testing -White-Box Testing

Module:3	Software Testing Tools	4hours

Taxonomy of Testing tools - Methodology to evaluate automated testing tools -Load Runner, Win runner and Rational Testing Tools

Module:4	Testing Process Eleven Step Testing Process:	6hours

Testing Process Eleven Step Testing Process: Assess Project Management Development Estimate and Status - Develop Test Plan -Requirements Phase Testing - Design Phase Testing - Program Phase Testing - Execute Test and Record Results - Acceptance Test - Report test results - testing software installation - Test software changes - Evaluate Test Effectiveness.

Module:5	**Software Quality Assurance Framework and Standards SQA Framework**	**6hours**
What is Quality? - Software Quality Assurance, Components of Software Quality Assurance – Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards – CMM		
Module:6	**Software Quality Assurance Metrics and Measurement Software Quality Metrics:**	**4hours**
Product Quality metrics, In-Process Quality Metrics Metrics for Software Maintenance		
Module:7	**Software Quality metrics methodology:**	**5hours**
Establish quality requirements - Identify Software quality metrics - Implement the software quality metrics - analyze software metrics results -validate the software quality metrics		
Module:8	**Case Study**:	**5hours**
Testing Specialized Systems and Applications Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security		
	Total Lecture hours:	**45 hours**

Text Book(s)

1. Effective Methods for Software Testing, 2nd Edition, William E. Perry, Second Edition, Wiley India,2006.
2. Rex Black Erik van Veenendaal Dorothy Graham Isabel Evans Dorothy. Graham Van Veenendaal, Foundations of Software Testing,2012.

Reference Books

1. Solis Tech, Quality Assurance :Software Quality Assurance made easy, Kindle Edition,2016
2. Meir Liraz, Quality Assurance :How to set up and manage a Quality Control System, Kindle Edition,2013
3. Software Testing and continuous Quality Improvement, by William E.Lewis,GunasekaranVeerapillai, Third Edition, 2009, CRC Press. Auerbach Publications.

Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC4002	Web Development	L	T	P	J	C
		3	0	2	4	5
Pre-requisite	**CSC3001**	**Syllabus version**				
		V1. 0				

Course Objectives:

1. Understand the concepts of Web programming and Internet protocols.
2. Demonstrate competency in the use of common HTML code and understand the role of CSS, client side scripting using JavaScript in web page design.
3. Develop an interactive web applications using Server side scripting technologies.

Expected Course Outcome:

On completion of course, the students will be able to

1. Employ fundamental computer theory to basic programming techniques, use fundamental skills to create web pages.
2. Select and apply mark-up languages for processing, identifying and presenting of informationin web pages.
3. Incorporate aesthetics and formal concepts of layout and organization to design websites.
4. Use scripting languages and web services to add interactive components to web pages.
5. Create functional web pages that can react to DOM Events and dynamically alter the contents and style of their webpage.
6. Design and code data transfer scripts using XML languages for the transfer of data.
7. Develop JSP applications implementing Database Connectivity to handle data and to understand the importance of web based applications for today's e-world.

Module:1	**Internet Basics**	**3 hours**

Introduction-History- People and Organization-layered architecture-IP-TCP- World Wide Web-Web servers and browsers-Web protocols-DNS-URL- Web standards-Audience requirement.

Module:2	**HTML5**	**6 hours**

Introduction-Structure tags-Form tags-Media tags.

Module:3	**CSS3**	**6 hours**

Introduction-Selectors and Pseudo Classes-Fonts and Text Effects-Background-Borders and Box effects-Transitions, transforms, animations-Embedding Images and Media- Navigation Bar

Module:4	**JavaScript Basics and Objects**	**6 hours**

Introduction-Data types-Variables-Constants-Arithmetic operators-Expression-Decision making-Control statements- Functions-Arrays-Built -in objects:-Math, String, Date, Boolean and Number object.

Module:5	**JavaScript Event handling and Form Validation**	**6 hours**

DOM nodes and trees-Traversing and modifying a DOM tree- Dynamic styles- JavaScript forms-creating simple forms - validation of forms.

Module:6	**XML, XML Schemas, XML Style sheet**	**6 hours**

Introduction-XML document structure-Namespaces-XSD-XSLT		
Module:7	**Server Side Technologies: Servlet and JSP**	**6 hours**
Introduction-Servlet Life cycle-Handling HTTP request-Get and post request-Redirecting request-JSP Overview-Objects-standard actions-directives-File Uploading-Email		
Module:8	**Database Connectivity**	**6 hours**
Introduction to MYSQL queries, Performing database CRUD operations with JSP and MySQL connectivity.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Martyr Steep, Jessica Miller and Victoria Kirst, Web Programming Step by Step, Step by Step, Publishing, 2nd edition, 2012.
2.	John Pollock, JavaScript: A Beginner's Guide, 4th edition, McGraw Hill, 2013.
3.	Joel Murach and Michael Urban, Murach's Java Servlets and JSP, Murach Books, 3rd edition, 2014
Reference Books	
1.	Elizabeth Castro, Bruce Hyslop, HTML5 and CSS3, Peachpit Press,7th edition, 2012
2.	Jeffery Jackson, Web Technologies-A Computer Science Perspective, Prentice Hall, 2007
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar	

List of Challenging Experiments (Indicative)		
1.	Creating a basic website using HTML. The website should containthe following pages: a. User Registration page, Login Page, Home Page b. Profile page, Product details page c. Shopping Cart page and Payment Page	3 hours
2.	Implement CSS for the website using inline, internal and external style sheets	3 hours
3.	Event Handling in the website using JavaScript	3 hours
4.	Validate the registration, user login and payment details using JavaScript	3 hours
5.	Design a scientific calculator using JavaScript	3 hours
6.	Implement the following using JavaScript: a. Find factorial of the given number. b. Find if a given number is an Armstrong number c. Find if a given number is Automorphic	3 hours
7.	Create an XML document, which contains 10 users information. Implement a program, which takes User Id as an input and returns the user details by taking the user information from theXML document.	3 hours
8.	Create an XML document for library. Display the books for any particular subject in table form using XSLT.	3 hours
9.	Handling form elements in servlets.	2 hours

10.	Program for finding whether a given number is palindrome or not using JSP	2 hours
11.	Create user information and product information table in MySQL database and perform user verification via JSP	2 hours
	Total Laboratory Hours	30 hours
Mode of Assessment: CAT, QUIZ ,Project/Activity & FAT		

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

MAT1013	Discrete Mathematics for Computer Science	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	**None**	**Syllabus Version**				
		V1.0				

Course Objectives :

The course is aimed at

1. Motivating the learners for understanding the fundamental concepts in discrete mathematics.
2. Acquiring the required knowledge for computer science such as sets, proof techniques, functions, relations, counting principles, combinatorics, mathematical logics, Boolean algebra and graph theoretical approaches with applications.
3. Implementing the learned discrete mathematical ideas in realistic projects of computer science, theoretical computer skills, computer algorithms, networks and data structures.

Course Outcomes :

At the end of the course, the student should be able to

1. Know the basic concepts, properties and operations of sets, relations & functions; and also analyse the proof techniques by the mathematical induction.
2. Apply the basic principles of counting, permutations and combinations for solving various practical problems.
3. Recognize the Mathematical logic through the truth tables, normal forms and predicate calculus.
4. Understand the notions of Boolean algebra and its minimization techniques.
5. Learn graph theory, shortest path algorithms, concepts of trees and minimum spanning tree algorithms; and also implement the learned techniques to realistic problems.

Module:1	**Set Theory**	**5 hours**

Sets and Elements – Subsets – Venn Diagrams – Set Operations – Algebra of Sets – Duality – Finite Sets – Counting Principle – Classes of Sets – Power Sets – Partitions – Mathematical Induction.

Module:2	**Relations and Functions**	**8 hours**

Relations – Operations on Relations – Equivalence Relation – Partitions and Equivalence Classes – Functions – One-One and Onto Functions – Special Type of Functions – Invertible Functions – Compositions of Functions – Recursively Defined Functions

Module:3	**Techniques of Counting**	**6 hours**

Basic Counting Principles – Permutations – Combinations – Pigeonhole Principle – Inclusion-Exclusion Principle.

Module:4	**Logic**	**6 hours**

Propositions and Logical Operations – Truth Tables – Equivalence – Implications – Laws of Logic –Normal Forms – Predicates and Quantifiers

Module:5	**Boolean Algebra**	**5 hours**

Basic Definitions – Truth Tables – Boolean Functions – Representation and Minimization of Boolean Functions

Module:6	**Graphs**	**7 hours**

Basic Concepts of Graph Theory – Matrix Representation of Graphs – Graph Isomorphism –

Connectivity – Eulerian and Hamiltonian Paths – Shortest Path Problems		
Module:7	**Trees**	**6 hours**
Introduction to Trees – Application of Trees – Tree Traversals – Spanning Trees – Minimum Spanning Trees.		
Module:8	**Contemporary Issues**	**2 hours**
Industrial Expert Lectures		
	Total Lecture hours:	**45 hours**
Tutorial	A minimum of 5 problems to be worked out by students in every Tutorial class Another 5 problems per Tutorial Class to be given for practice. Mode: Individual Exercises / Team Exercises / Online Quizzes / Online Discussion Forums.	**30 hours**

Text Book(s)

1.	Discrete Mathematics and its Applications, Kenneth H. Rosen, 8th Edition, Tata McGraw Hill, 2019.

Reference Books

1.	Discrete Mathematical Structures with Applications to Computer Science, J.P. Trembley and R. Manohar, Tata McGraw Hill, 35th Reprint, 2017
2.	Discrete Mathematical Structures, Kolman, R.C. Busby and S.C. Ross, 6th Edition, Pearson, 2018
3.	Discrete Mathematics, Richard Johnsonbaugh, 8th Edition, Prentice Hall, 2019.
4.	Elements of Discrete Mathematics – A Computer Oriented Approach, C.L. Liu, D. Mohapatra, Tata McGraw Hill, Special Indian Edition, 2017.
5.	Discrete Mathematics, S. Lipschutz and M. Lipson, 6th Edition, McGraw Hill Education, 2017.

Mode of Evaluation

Digital Assignments, Quizzes, Continuous Assessment Tests (CATs) and Final Assessment Test (FAT).

Recommended by Board of Studies	03-06-2019		
Approved by Academic Council	No. 55	Date	13-06-2019

CSC1006	Open Source Programming	L	T	P	J	C
		2	0	2	4	4
Pre-requisite	**NIL**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To introduce students to open source software and client-server model.
2. To integrate HTML and Sever-side scripting
3. To develop interactive web applications.

Expected Course Outcome:

On completion of course, the students will be able to

1. Explicate common open source licenses and the impact of choosing a license
2. Exemplify client-server architecture and able to design simple PHP programs.
3. Develop PHP applications using arrays and strings
4. Design web applications using session and cookies.
5. Identify the role of backend for web applications
6. Integrate PHP with MySQL to design applications to solve real time problems.

Module:1	**INTRODUCTION TO OPEN SOURCE**	**5 hours**

Open Source-Definition- Licences- Closed Vs. Open Source-Advantages of Open Sources Software - OSS Development Model.

Module:2	**PHP FUNDAMENTALS**	**6 hours**

Architecture of Web Development – Role of Web Browser - Structure of a PHP Script-Blank Lines and Layout – Comments. Variable –Types of Variable, Constant-Logical Constant - Numbers, String-PHP Keywords-Assignment Statements.

Module:3	**PHP ARRAYS AND CONTROL STRUCTURES**	**6 hours**

Arrays-Syntax and Types-Numeric Array-Associative Array- Multidimensional Arrays. Conditional Statements – If-Else- Switch-Looping-while-for loop-Paring and Sorting Arrays.

Module:4	**PHP FUNCTIONS, SESSION AND COOKIE**	**5 hours**

Functions-Basic Syntax-User Defined Functions-Predefined Functions –Recursive Functions- Session Management – Creating Session-Maintaining Session Variable-Destroying Session-Cookie –File Handling.

Module:5	**PHP AND MYSQL DATABASE MANAGEMENT**	**8 hours**

MySQL-Database Introduction-Basic SQL Queries-Create- Insert-Select-Update-Delete Table values –Import and Export Database. PHP-MySQL Database Predefined Functions - MySQL database programming – Connecting Database – Table creation – Record Insertion – Updating (Connect, Insert, Select, Update and Delete Operations) using PHP.

Total Lecture Hours	**30 hours**

Text Book(s)			
1. Bramer, Max. Web Programming with PHP and MySQL: A Practical Guide.Springer, 2015.			
Reference Books			
1. Nixon, Robin. Learning PHP, MySQL, JavaScript, and CSS: A step-by-step guide to creating dynamic websites. OReilly Media, Inc.", 2012. 2. Meloni, Julie C. Sams teach yourself PHP, MySQL and Apache all in one. Sams Publishing, 2012. 3. Raymond, Eric S. The Cathedral the Bazaar: Musings on Linux and open source by an accidental revolutionary. " O'Reilly Media, Inc.", 2001.			
List of Challenging Experiments (Indicative)			
1	Setting up LAMP (Linux, Apache, MySQL and PHP) Environment		1 hour
2	Practice with HTML5 Form Elements		2 hours
3	Integrating HTML and PHP		2 hours
4	PHP String Manipulation		2 hours
5	Handling Arrays in PHP		4 hours
6	PHP JSON Parsing		2 hours
7	Session and Cookie with Web Forms		2 hours
8	Client Side and Server Side Validation		2 hours
9	Manipulating MySQL Queries		6 hours
10	PHP MySQL DB Management with Forms		7 hours
	Total Laboratory Hours		30 hours
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

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CSC1007	Mobile Application Development	L	T	P	J	C
		2	0	2	4	4
Pre-requisite	**CSC3001 -Java Programming**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To compare the components and structure of a mobile development framework-Android Studio).
2. Apply mobile application models/architectures and patterns to the development of a mobile software application.
3. To demonstrate advanced Java programming competency by developing a maintainable and efficient cloud based mobile application.

Expected Course Outcome:

On completion of course, the students will be able to

1. Summarizing mobile operating system and its architecture for basic usage.
2. Plan and carry out a design work including developing a prototype that can be evaluated with a specified user group.
3. Extend the specific requirements, possibilities and challenges when developing for a mobile context.
4. Develop practical skills and knowledge to construct software for a mobile application.
5. Inspect the ability to reflect over possibilities and demands in collaborative software development.
6. Compare techniques for deploying and testing mobile applications, and for enhancing their performance and scalability.

Module:1	INTRODUCTION TO MOBILE DEVICES	7 hours

Mobile devices vs. desktop devices - ARM and Intel Architectures, Power Management, Screen resolution, Touch interfaces, App Store, Google Play, Windows Store, Development environments-XCode-Android Studio-Visual Studio-PhoneGAP. Comparing and Contrasting architectures of all three – Android, iOS and Windows

Module:2	INTRODUCTION TO ANDROID	7 hours

What is Android? - Setting up development environment -Dalvik Virtual Machine .apk file extension Fundamentals- Android Studio - Installation and Configuration - Simulators. Activities, Services, Broadcast Receivers -Content providers

Module:3	BASIC BUILDING BLOCKS	6 hours

UI Components - Views & notifications - Components for communication -Intents & Intent Filters - Android API levels (versions version names). First sample Hello World Application- Android Manifest.xml - uses-permission uses-SDK - Resources & R.java - Assets – Layouts Drawable Resources - Activities and Activity lifecycle.

Module:4	**ANDROID ACTIVITIES AND UI DESIGN**	**5 hours**
Understanding Intent, Activity, Activity Lifecycle and Manifest - Creating Application and new Activities - Expressions and Flow control, Android Manifest - Simple UI -Layouts and Layout properties.		
Module:5	**DATABASE - SQLITE**	**5 hours**
Introduction to SQLite – SQLite Open Helper and creating a database - Opening and closing a database - Working with cursors Inserts, updates, and deletes		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	Griffiths, D., & Griffiths, D. Head First Android Development. (2015), O'Reilly Media.
Reference Books	
1.	Annuzzi, J., Darcey, L., &Conder, S. Introduction to Android Application Development: Android Essentials. Pearson Education, 2013
2	Horstmann, C. S., & Cornell, G. Core Java Volume I--Fundamentals. Pearson Education, 2015
3	McWherter, J., &Gowell, S. Professional Mobile Application Development. Wiley, 2012.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Challenging Experiments (Indicative)		
1.	Developing Simple Applications for Android	3 hours
2.	Creating Applications with Multiple Activities and a Simple Menu using ListView	3 hours
3.	Creating Activities For Menu Items and Parsing XML Files	3 hours
4.	Writing Multi-Threaded Applications	3 hours
5.	Using WebView and Using the Network	3 hours
6.	Using Audio Functions in Android	3 hours
7.	Graphics Support in Android	3 hours
8.	Preferences and Content Providers	3 hours
9.	Location Services and Google Maps in Android	3 hours
10.	Simulating Sensors	3 hours
	Total Laboratory Hours	30 hours

Mode of evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1008	2D Animation	L	T	P	J	C
		2	0	2	4	4
Pre-requisite	**NIL**	**Syllabus version**				
		v.1.0				

Course Objectives:

1. Familiarize with the principle of animation and animate characters based on the principles.
2. Sketch key emotions and body language.
3. Gain knowledge on utilizing functions and features in Adobe Flash and Photoshop.

Expected Course Outcome:

On completion of course, the students will be able to

1. Describe the basic animation techniques
2. Identifying the camera setting and lighting specifications for the digital photography.
3. Draw animated characters and actions sequence for movement.
4. Apply adobe photoshop tools for editing images.
5. Identifying the tasks involved in creating animation using Adobe Flash
6. Implement action sequence for character animation using action scripts.

Module:1	INTRODUCTION	6 hours

Digital 2D Animation orientation – Basic factors affecting the illusion of motion – Prevailing file format standards and other compatibility issues – History and future trends of computer animation application in the visual arts – Basic principles in animation – Follow through and overlapping action – Line of action – Path of action.

Module:2	ESSENTIAL DIGITAL PHOTOGRAPHY	5 hours

Getting started in professional photography - Film and digital cameras: Professional camera tips - Understanding exposure: aperture and depth of field - Looking after your camera - Camera accessories - Portrait Photography, Light, Night and Exposure: Spot metering and matrix metering - Light and how to use it: Night photography - Controlling exposure; controlling aperture - Using flash and fixing red eye - Digital color correction.

Module:3	BASIC DRAWING	5 hours

Strong Basics of drawing: simple shapes - household objects, fruits, flower, landscapes Human and Animal Anatomy - Children figures, Drawing for Animation: Walks – Passing Position or breakdown, Double bounce, Foot action, and Walk spacing, Arm movements, Sneaks- Runs, Jumps and Skips.

Module:4	Adobe Photoshop CS6	6 hours

Introduction to Raster Graphics - Introduction to Adobe Photoshop – Tools and File Format - Working with Layers – Layer Styles - Filters - Masking - Actions, Channels, Scripts - Slices, Tables, Rollovers, Web Content, Optimization, Creating gif animation. GRIDS, Slices, Snap options, Preset palettes, Standards - Color Separation Image Editing – Retouching.

Module:5	Adobe Flash CS6	8 hours

Introduction to Vector animation – Tools - Key frame animation, Reverse key frames – Tweening – Masking - Symbols, Use of Layers, Guide layers – Library - Onion skinning - Animated buttons

- Importing videos - Basic action scripts - Movie control - Exporting with protection for web and other application - Action Script – Time line control - Movie clip control - Hit texts, Scrolling texts, Attaching sound through linkage and sound control.		
	Total Lecture hours:	**30 hours**
Text Book(s)		
1.	Preston Blair, Cartoon Animation (How to Draw and Paint series), Animation Resources, 1997.	
Reference Books		
1.	Frank Thomas, Ollie Johnston (Contributor), Collie Johnston, The Illusion of Life: Disney Animation, Disney Editions, New York, 1995.	
2.	Richard Williams, The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators, Faber and Faber, Second Edition, London, 2012.	
3.	Tony White, The Animator's Workbook: Step-By-Step Techniques of Drawn Animation, WatsonGuptill Publications, New York, 1988.	
4.	Susannah Shaw, Stop Motion: Craft Skills for Model Animation, Tylor & Francis, 2008.	
5.	Ken A. Priebe The Advanced Art of Stop-Motion Animation, Course Technology, 2011.	
6.	Tony White, From pencil to pixel by, Tylor & Francis, 2006.	
7.	Mary Murphy Beginner's Guide to Animation: Everything you need to know to get started, WatsonGuptill Publications, 2008.	
8.	Adobe Photoshop CS6, The Official Training Workbook, Adobe Systems, 2012.	
9.	Chris Georgenes and Justin Putney, Animation with Scripting for Adobe Flash Professional CS5, Adobe Press, 2011.	
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar		
List of Challenging Experiments (Indicative)		
1.	Using a DSLR camera, capture a natural scenery and store it in RAW file format. Further, manipulate the image and store it in JPEG format for your webpage.	1 hour
2.	Create a nice colourful multi-gradient background using Photoshop. In order to do this, you can use the following tools and options Brush tool, Smart objects and warp. Finally to boost your image to more contrast by using level adjustment and blending modes.	2 hours
3.	Create some lighting effects with spark in Photoshop. Tools you can use Ellipse Tool(shape), Lasso Tool, Brush Tool Filters, Layer style, Blending mode.	2 hours
4.	Create Masking Effects In Photoshop. By using 1) Layer mask 2) Clipping Mask	2 hours

	3) Vector Mask Layer Mask.	
5.	Create the Text graphics by using Filters and styles Panel Drop shadow, Gradient Overlay, Bevel and Emboss, Glow etc.)	4 hours
6.	i) Draw any 3 animals by using Pen tool and do Color shade using Brush. ii) Draw your own nature scene with Photoshop iii) Finally merge 3 animals with your own nature scene.	2 hours
7.	Create a storyboard for your own storyline.	2 hours
8.	i) Create simple text animation by using Motion tween. ii) Create simple animation to convert square shape into circle shape by using of shape tween.	2 hours
9.	Create an animated button with help of Action Script.	4 hours
10.	i) Create simple animation with the help of Guide layers. ii) Create frame by frame cartoon animation with your own character concept.	2 hours
11.	i) Create a control button to stop and play the sound with the help of Action Script ii) Extract separately some object in the given image by using of masking.	3 hours
12.	i) Create a text animation effect with the help of Tween and Masking. ii) Create the custom mouse pointer with the help of Action Script.	4 hours
	Total Laboratory Hours	30 hours

Mode of Assessment : Project, Activity			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1009	Video Production	L	T	P	J	C
		2	0	2	4	4
Pre-requisite	**None**	**Syllabus version**				
		v.1.0				

Course Objectives:

1. To introduce the fundamentals of video production techniques and its importance.
2. To impart the basic knowledge of video production and editing using respective software's.
3. To apply the various video editing techniques through video editing tool.

Expected Course Outcome:

On completion of course, the students will be able to

1. Demonstrate the usage of video production and describe the various techniques involved in it.
2. Illustrate the video production and video editing techniques.
3. Know the importance of lightning in video production.
4. Interpret the characteristics of camera lenses and camera positions at various angles.
5. Analysis and Capture video sequences and manipulate it.
6. Design video production in various aspects which plays an important role in industry point of view.
7. Manipulation of video sequences with audio clips for streaming purpose.

Module:1	**Video Production**	**4 hours**

Introduction to video production, The need for "know-how", Equipment, Equipment needed, Lighting.

Module:2	**Camera**	**5 hours**

Basic Camera Design and Structure, Camera Working, Camera Operations, Camera Movement, Lens Characteristics.

Module:3	**Production Techniques**	**7 hours**

Conceptualization, Storyboarding, Chroma keying, Single Camera Production.

Module:4	**Video Capturing and Production Phases**	**6 hours**

Video Shooting, Shooting Platform, Capturing Software, Pre-Production, Post-Production.

Module:5	**Video Editing**	**8 hours**

Introduction to video editing, Adobe Premiere, Video and Audio mixing

	Total Lecture hours:	**30 hours**

Text Book(s)

Reference Books

1. Gerald Millerson, Jim Owens, "Video Production Hand Book", Fourth Edition, Taylor & Francis, 2012.

<table>
<tr><td>2.</td><td colspan="4">VasukiBelavadi, “Video Production”, Oxford University Press, 2008.</td></tr>
<tr><td>3.</td><td colspan="4">Dave Viera, John David Viera, Lighting for Film and Electronic Cinematography”, InfoTrac, Wardsworth Publishing, Second Edition, 2005.</td></tr>
<tr><td>4.</td><td colspan="4">Tay Vaughan, “Multimedia: Making it Work”, Seventh Edition, TMGH 2008.</td></tr>
<tr><td colspan="5">Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar</td></tr>
<tr><td colspan="5">List of Challenging Experiments (Indicative)</td></tr>
<tr><td>1.</td><td colspan="3">Video Equipment</td><td>3 hours</td></tr>
<tr><td>2.</td><td colspan="3">Video Adjustments</td><td>3 hours</td></tr>
<tr><td>3.</td><td colspan="3">Lighting Effects</td><td>3 hours</td></tr>
<tr><td>4.</td><td colspan="3">Video Capturing</td><td>4 hours</td></tr>
<tr><td>5.</td><td colspan="3">Video Editing</td><td>5 hours</td></tr>
<tr><td>6.</td><td colspan="3">Adobe Premiere</td><td>5 hours</td></tr>
<tr><td>7.</td><td colspan="3">Adding Special Effects</td><td>3 hours</td></tr>
<tr><td>8.</td><td colspan="3">Audio and Video mixing</td><td>4 hours</td></tr>
<tr><td colspan="4">Total Laboratory Hours</td><td>30 hours</td></tr>
<tr><td colspan="5">List of Projects (Indicative)</td></tr>
<tr><td>1.</td><td colspan="3">Short Film Production</td><td></td></tr>
<tr><td>2.</td><td colspan="3">Making of Educational Video</td><td></td></tr>
<tr><td>3.</td><td colspan="3">Video Production and Audio Mixing using Adobe Premiere</td><td></td></tr>
<tr><td>4.</td><td colspan="3">Making of Short Film applying Special Effects</td><td></td></tr>
<tr><td colspan="4">Total Laboratory Hours</td><td>60 hours</td></tr>
<tr><td colspan="5">Mode of evaluation:CAT1,CAT 2,Digital Assignment, Quiz,FAT</td></tr>
<tr><td colspan="2">Recommended by Board of Studies</td><td colspan="3">16-06-2015</td></tr>
<tr><td colspan="2">Approved by Academic Council</td><td>No. 37th</td><td>Date</td><td>16-06-2015</td></tr>
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CSC1010	Principles of Computer Graphics	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	NIL	Syllabus version				
		v1.0				

Course Objectives:

1. To provide an introduction to computer Graphics.
2. To introduce the basic components of graphics system.
3. To providean understanding of how to scan converts the basic geometrical primitives.
4. To learn the basics of two dimensional and three dimensional graphics.
5. To afford the knowledge of how the objects are viewed based on 2D and 3D graphics.
6. To analyze the various methods of visibility of the objects.

Expected Course Outcome:

On completion of course, the students will be able to

1. Interpret the basic hardware and software components of the graphics system.
2. Implement various algorithms to scan convert the basic geometrical primitives.
3. Explore the knowledge on the attributes of primitives and color models.
4. Apply the transformation on two dimensional objects.
5. Infer and demonstrate how the 2D and 3D objects are viewed and projected.
6. Analyze and implement the various algorithms on visibility of the objects.

Module:1	Introduction to Computer Graphics	4 hours

Video Display Devices – Raster-Scan Systems – Random-Scan Systems – Input Devices – Hard-Copy Devices.

Module:2	Output Primitives	4 hours

Points and Lines – Line-Drawing Algorithms – Circle-Generating Algorithms – Ellipse-Generating Algorithms

Module:3	Attributes of Output primitives and Colour Models	5 hours

Line Attributes – Curve Attributes – Colour and Gray scale Levels – Area-Fill Attributes – Character Attributes – Antialiasing. Colour Models : Properties of light – CIE Chromaticity Diagram – XYZ ,RGB, YIQ, CMY, HSV, HLS colour Models

Module:4	Two-Dimensional Geometric Transformations	6 hours

Basic Transformations: Translation, Rotation, Scaling – Matrix Representations and Homogeneous coordinates – Composite Transformations – Other Transformations: Reflection, Shear

Module:5	Two-Dimensional Viewing	7 hours

The viewing Pipeline – Viewing coordinate Reference Frame – Window-to-Viewport Coordinate Transformation – Clipping: Point Clipping, Line Clipping, Polygon Clipping, Curve Clipping,

Text Clipping.		
Module:6	**Three-Dimensional Geometric Transformations**	**6 hours**
Translation – Rotation – Scaling – Reflection– Shear.		
Module:7	**Three-Dimensional Viewing**	**6 hours**
Viewing Pipeline – Viewing Coordinates – Projections – View Volumes.		
Module:8	**Visible-Surface Detection Methods**	**7 hours**
Classification of Visible-Surface Detection Algorithms – Back-Face Detection – Depth-Buffer Method – A-Buffer Method – Scan-Line Method – Depth-Sorting Method – BSP-Tree Method – Area Subdivision Method – Octree Method – Ray-casting Method – Wireframe Method.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Computer Graphics C Version, Donald Hearn and M. Pauline Baker, 2nd Edition, 2011.
Reference Books	
1.	Computer Graphics: Principles and Practice, Kurt Akeley, Steven K. Feiner, James D. Foley, David F. Sklar, Morgan McGuire, Andries van Dam, John F. Hughes, 3rd Edition, 2013.

Mode of Evaluation: CAT, Assignment, Quiz, FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1011	Object Oriented Analysis and Design	L	T	P	J	C
		3	1	0	0	4
Pre-requisite	**NIL**	**Syllabus version**				
		v1.0				

Course Objectives:

1. To analyze a system in terms of problem-domain concept and seeks to elicit natural interaction and discover natural constraints.
2. To design any task of conversion of the analysis model into concept and abstractions present in the programming style of the target language
3. It assists Software Engineer to understand the problem domain to be communicated to the clients. This includes incompleteness and inconsistency in the client's awareness of the problem domain.
4. To provide necessary tools to perform analyze and design complex software systems after an in-depth analysis.
5. To assess the Unified Process and Unified Modeling Language.
6. To be able to design object oriented program modules.

Expected Course Outcome:

On completion of course, the students will be able to

1. To be able to define how the object oriented approach differs from the traditional approach to system analysis and design.
2. To recognize the difference between various object relationships: inheritance, association, whole-part and dependence relationship.
3. To be able to solve complex systems by performing Unified design and analysis.
4. To be able to measure the level of user satisfaction and quality assurance achieved.
5. To apply the risk management approaches to measure the design models.
6. To create interaction diagram that models the dynamic aspects of a software system using appropriate notations
7. To be able to show the role and function of each UML model in developing object oriented software
8. To be able to understand the facets of the unified process approach to designing, building software systems and testing the models using appropriate tools.

Module:1	**Complexity of Software**	**6 hours**

Structure of complex systems, decomposing complexity, Designing complex systems, Object Model: Evolution

Module:2	**Object Oriented Analysis and Objects - UML Notations**	**6 hours**

Elements of object model, Applying object model, Use Case diagram, Class diagrams, Sequence diagrams, State Transition diagrams, Object diagrams, Interaction diagrams.

Module:3	**Object Oriented Analysis and Objects - Elements of Notation**	**5 hours**

Module diagrams, process diagrams, applying the notation. Principles, micro development process, macro development process.

Module:4	**Management and Planning**	**4 hours**
Staffing, Release management, Reuse, Quality Assurance		
Module:5	**Metrics and Risk Management**	**5 hours**
Metrics, Documentation, Tools, Benefits and Risks of Object Oriented development.		
Module:6	**Introduction to Object-Oriented Paradigm and UML**	**7 hours**
Unified Process, the Requirement Workflow, Object-Oriented Analysis Workflow, Object-Oriented Design Workflow.		
Module:7	**Unified Process, Planning and Estimation**	**6 hours**
Workflow and phases of the Unified process, Planning and Estimating, User Interface system.		
Module:8	**Analysis and Design**	**6 hours**
Case studies, Teams, Testing, Management Issues, Maintenance, Introduction to Web – Based Systems.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Grady Booch and Robert A. Maksimchuk "Object Oriented Analysis and Design with applications", 3rd Edition, Addison Wesley, 2007.
Reference Books	
1.	Schach, Stephen R., "An Introduction to Object-Oriented Systems Analysis and Design with UML and the Unified Process", Tata McGraw Hill, 2003.
	Mode of evaluation : CAT, Quiz, Assessment, FAT

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1012	Data Warehousing	L	T	P	J	C
		3	1	0	0	4
Pre-requisite	**None**	**Syllabus version**				
		v. 1.0				

Course Objectives:

1. To introduce the concepts and techniques of data warehousing.
2. To describe the use of dimensional modelling techniques.
3. To explain OLAP, ETL, data warehousing tools and its applications.

Expected Course Outcome:

On completion of course, the students will be able to

1. Interpret the contribution of data warehousing and data pre-processing techniques in real world data.
2. Design and demonstrate a dimensional model for Data Warehouse.
3. Analyze the strengths and limitations of various data warehousing models.
4. Apply data cubing and OLAP techniques for decision support system.
5. Describe the components of enterprise data warehouse and review the various dataware house server.
6. Extract, cleanse, integrate, and transform heterogeneous data into single enterprise data warehouse.
7. Describe and utilize the range of techniques for designing data warehouse for real world applications

Module:1	**INTRODUCTION TO DATA WAREHOUSING**	**6 hours**

Overview of Data Warehouse, Features, Application Areas, Differences between operational database systems and Data Warehouses, Data Marts, Data warehouse versus Data mart.

Module:2	**DATA PRE-PROCESSING**	**6 hours**

Data cleaning-Data integration-Transformation-Data reduction

Module:3	**DATAWARESHOUE LOGICAL DESIGN**	**4 hours**

Star ,Snowflakes and Fact constellations, schemas for multidimensional databases

Module:4	**CONCEPT HEIRARCHY AND DATA CUBE MODELLING**	**6 hours**

Concept Hierarchy , OLAP Operations in the Multidimensional Data Model

Module:5	**DATA WAREHOUSE ARCHITECTURE**	**6 hours**

Steps for the Design and Construction of Data Warehouses, A Three- Tier Data Warehouse Architecture, Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP

Module:6	**DATA CUBES**	**6 hours**

Efficient Computation of Data Cubes, Indexing OLAP Data, Sql extensions for OLAP

Module:7	**ETL & Metadata & Case study**	**6 hours**
ETL Architecture, Extraction Types, Transformation Types, Loading Types, Metadata. Case study -Store Data Warehouse		
Module:8	**DATAWAREHOUSE IMPLEMENTATION**	**5 hours**
Design and implementation of a Data warehouse for a case study using oracle 11g -Construction and analysis of multidimensional data cubes using oracle workspace manager.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Han J. &Kamber, M, Data Mining: Concepts and Techniques, Third Edition, Morgan KaufmannPublishers**,** 2011
Reference Books	
1.	PaulrajPonniah.,Data Warehousing Fundamentals for IT Professionals, Wiley-Blackwell , 2nd Edition 2010
2.	Immon W. H., Building the Data Warehouse, Wiley Dream Tech, 4th edition, 2005.
3.	Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

Mode of evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1013	System Software	L	T	P	J	C
		3	1	0	0	4
Pre-requisite	**Nil**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To understand the relationship between System Software and machine architecture.
2. To have an understanding of macro processors.
3. To learn the design and implementation of compiler, assemblers, linker and loaders.
4. To experience the use of system software tools.

Expected Course Outcome:

On completion of course, the students will be able to

1. Gains generic knowledge about the architectures and system software.
2. Ability to write interrupts service routines and assembly language programs.
3. Exemplify various features of assembler and design of pass structures of assemblers.
4. Explores the pre-processed macro and macro facilities.
5. Able to identify how linker and loader create an executable program from an object module.
6. Characterize the various debugging techniques and software tools.

Module:1	**INTRODUCTION TO SYSTEM SOFTWARE**	**6 Hours**

System software – machine structure – hypothetical computer model – Simplified Instructional Computer (SIC)-- Complex Instruction Set Computer(CISC)-- Reduced Instruction Set Computer (RISC)- existing computer systems segmentation concepts – internal operation

Module:2	**ARCHITECTURE**	**6 Hours**

Instruction set architecture-- Intel 80386 architecture – addressing modes – instruction set with examples

Module:3	**Interrupts and MASM**	**5 Hours**

Software interrupts - types of interrupts- MASM – assembler directive – programming examples using MASM on an IBM PC – interrupt services in MASM programs

Module:4	**Assemblers**	**6 Hours**

Assembler – functions – Machine independent assembler features - Machine dependent assembler features machine dependent and independent features – assembler design symbol table – Pass Structure of Assemblers - Design of a Two Pass Assembler

Module:5	**Macros and Macro Processors**	**5 Hours**

Macro- Functions- Macro Definition and Call-Macro Expansion Nested Macro Calls -Pass 1 of Macro-Pass 2 of Macro- Advanced Macro Facilities

Module:6	**Loaders**	**6 Hours**

Basic loader functions – Definition- Compile and go loader- General loader- Design of an Absolute loader- A Simple Bootstrap loader- Direct linking loader-Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader -

Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking		
Module:7	**Linkers**	**5 hours**
Introduction to linkers-Relocation and Linking Concepts- Design of a Linker- Self-Relocating Programs		
Module:8	**Compilers and Software tools**	**6 hours**
Phases of the Compiler- Aspects of compilation- software tools – editors – interpreters – program generators – interactive debugging system – subroutine and parameter passing		
	Total Lecture hours:	**45 Hours**

Text Book(s)	
1.	Leland Beck - "System Software – An Introduction to Systems Programming", Third Edition, Pearson Education 2013
2.	Alfred V Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers- Principles, Techniques and Tools", Addison-Wesley 2013
3.	John.R.Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD, 2012
Reference Books	
1.	D. M. Dhamdhere, "Systems Programming and Operating Systems", Tata McGraw Hill Company, Second Edition, 2009
2.	John J. Donovan, "Systems Programming", Tata McGraw Hill Company, Second Edition, 2000
3.	V. Raghavan, "Principles of Compiler Design", Tata McGraw Hill Education Publishers, 2010
Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT	

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	37th	Date	16-06-2015

CSC1014	Cloud Computing	L	T	P	J	C
		3	0	0	4	4
Pre-requisite	**None**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To describe students with basic knowledge of various computing paradigms and cloud computing architecture.
2. To appraise students with the concept of virtualization, various security issues and mapreduce concepts.
3. To explain the students how to deploy an application on cloud service models.

Expected Course Outcome:

On completion of course, the students will be able to

1. Classify various computing paradigms and interpret different cloud deployment models.
2. Comprehend the cloud services SaaS, PaaS, IaaS and issues in cloud computing.
3. Ability to create a virtualized cloud environment.
4. Understand various security issues in cloud infrastructure.
5. Illustrate how parallelization is achieved in cloud computing.
6. Summarizes communication with other cloud services and collaborate with web based tools and implement the concepts in a cloud environment.

Module:1	**Computing Paradigms and Services:**	**5 hours**

Edge Computing, Distributed Computing, Grid Computing, Ubiquitous Computing, Cloud Computing and its history and evolution.

Module:2	**Introduction to Cloud Computing:**	**7 hours**

Cloud Computing Fundamentals: Cloud Computing definition and characteristics, Deployment Models – Private, Public, Hybrid and Community Cloud, Architecture Framework.

Module:3	**Cloud Services:**	**6 hours**

Types of Cloud services: Software as a Service (Sales force) - Platform as a Service (Google App Engine) – Infrastructure as a Service (Amazon EC2).

Module:4	**Issue in Cloud:**	**5 hours**

Issues in Cloud – Design, Resource Management, Security, Fault Tolerance, Service Level Agreement, Mutli-tenancy, Interoperability. 5 2, 8

Module:5	**Virtualization For Cloud:**	**7 hours**

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – Para Full Virtualization, System VM, Process VM, Virtual Machine monitor (Hypervisors), Xen, KVM ,VMWare, Virtual Box.

Module:6	**Security in Cloud:**	**5 hours**

Infrastructure Security – Host level, Network level, Application level, Data Security and Storage, Identity and Access Management.

Module:7	**Parallelization in Cloud Computing:**	**4 hours**
Introduction to MapReduce, GFS, HDFS, Hadoop Framework.		
Module:8	**Collaborating With Cloud:**	**6 hours**
Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing, Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis. Case Study: Eucalyptus - Nimbus - Open Nebula, CloudSim.		
	Total Lecture hours:	**45hours**

Text Book(s)	
1.	Shroff, Gautam. Enterprise cloud computing: technology, architecture, applications. Cambridge University Press, 2010.
2.	Smith, Jim, and Ravi Nair. Virtual machines: versatile platforms for systems and processes. Elsevier, 2005.
Reference Books	
1.	RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Cloud Computing Principles and Paradigms, Wiley, 2010
2.	Mather, Tim, SubraKumaraswamy, and ShahedLatif. Cloud security and privacy: an enterprise perspective on risks and compliance." O'Reilly Media, Inc.", 2009.
3.	Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
4.	AkexAmies, Harm Sluiman, QiangGuo Tang, GuoNing Liu, Developing and Hosting Applications on the Cloud, IBM Press, 2012.

Mode of evaluation:CAT1,CAT 2,Digital Assignment, Quiz,FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1015	Cryptography	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	**NIL**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To understand the fundamentals of Cryptography
2. To be able to secure a message over insecure channel by various means
3. To acquire knowledge on standard algorithms used to provide Confidentiality, Integrity and Availability of a Data
4. To learn about various encryption techniques
5. To understand how to deploy encryption techniques to secure data
6. To study about various key distribution, message authentication and hash functions

Expected Course Outcome:

On completion of course, the students will be able to

1. Analyze the security threats and fundamental concepts of cryptography and number theory.
2. Describe the symmetric cryptographic algorithms and its working principles
3. Describe the Asymmetric cryptographic algorithms and its fundamental
4. Study and analyze the authentication process with hash functions
5. Compare the working principles of hash functions and study about the various types of hash functions in detail
6. Describe about the working principle of digital signature schemes and Compare with various kinds of digital signature schemes.
7. Describe about the network security issues and fundamental requirements of security services
8. Describe the need of security to protect data in computer and communication environments against several different varieties of fraud.

Module:1	**INTRODUCTION**	**6 hours**

Security trends – Attacks and services – Classical crypto systems – Different types of ciphers- Basic Number theory – Congruences – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem

Module:2	**SYMMETRIC and ASYMMETRIC ENCRYPTION**	**6 hours**

Simple DES – Differential cryptoanalysis – DES – Modes of operation – Triple DES – AES – RC4 – RSA – Attacks – Primality test – factoring.

Module:3	**PUBLIC KEY CRYPTOGRAPHY**	**5 hours**

Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange – ElGamal Public key cryptosystems –RSA – ElGamal.

Module:4	**AUTHENTICATION and HASH FUNCTION**	**5 hours**

Authentication requirements - Authentication functions – Message Authentication Codes

Module:5	**HASH FUNCTIONS**	**6 hours**
Hash Functions- Security of Hash Functions and MACs - MD5 message Digest algorithm - Secure Hash Algorithm – HMAC		
Module:6	**DIGITAL SIGNATURES**	**6 hours**
Digital Signatures - Authentication Protocols - Digital Signature Standard.		
Module:7	**NETWORK SECURITY**	**5 hours**
Authentication Applications: Kerberos - X.509 Authentication Service - Electronic Mail Security - PGP - /MIME - IP Security - Web Security		
Module:8	**SYSTEM LEVEL SECURITY**	**6 hours**
Intrusion detection - password management - Viruses and related Threats - Virus Counter measures - Firewall Design Principles – Trusted Systems.		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI, 4th edition, 2006.
Reference Books	
1.	Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRC Press Latest Edition, 2011.
2.	Margaret Cozzens, Steven J Miller, The mathematics of encryption, American Mathematical Society (2013)

Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC1016	Multimedia Systems	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	**Nil**	**Syllabus version**				

Course Objectives:

1. Familiarize with multimedia standards especially on the audio, text, image, animation andvideo.
2. Gain knowledge on recording, editing, processing and authoring audio and video contents.
3. Ability to develop multimedia application based of software life cycle mode.

Expected Course Outcome:

On completion of course, the students will be able to

1. Describe the different elements of multimedia and the way they are used for creating multimedia application.
2. Demonstrate the need for digital representations and signal conversion.
3. Determine the use of image color model and text in multimedia content.
4. Explain audio recording devices and process of audio editing.
5. Analyze the formats of video signals and video editing software.
6. Apply principles of animation to create and edit animations.
7. Associate the multimedia standards on text, audio, image and video for building an application.

Module:1	**Multimedia – An Overview**	**3 hours**

Multimedia Presentation and Production – Characteristics of a Multimedia Presentation – Uses of Multimedia – Promotion of Multimedia based content – Steps for creating a Multimedia Presentation.

Module:2	**Digital Representation**	**5 hours**

Analog Representation – Waves – Digital Representation – Analog to Digital conversion – Digital to Analog conversion – Quantization Error – Fourier Representation – Pulse Modulation.

Module:3	**Text**	**2 hours**

Types of text – Unicode Standard – Font – Insertion of Text – File formats

Module:4	**Image**	**6 hours**

Image types – Color Models – Basic steps for Image processing – Scanner – Digital camera – Interface standards – Color Management System (CMS) – Device Independent color models – Gamma and Gamma Correction – Image Processing Software – File formats – Image Output on Monitor – Image output on printer

Module:5	**Audio**	**12 hours**

Acoustics – Nature of Sound Waves – Fundamental Characteristics of Sound – Musical Note and Pitch – Psycho Acoustics – Element of Audio Systems – Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – Musical Instrument Digital Interface (MIDI) – MIDI messages – MIDI Connections – Basics of Staff Notation – Sound Card- Audio Recording Devices – Audio File Formats and CODECs – Software Audio player – Audio Recording System

– Digital Audio Broadcasting – Audio and Multimedia – Voice Recognition and Response – Audio processing software.		
Module:6	**Video**	**7 hours**
Analog Video camera – Transmission of Video signals – Video-Signal formats – Television Broadcasting standards – Digital Video – Digital Video Standards – PC Video – Video Recording Formats and Systems – Video File formats and CODECs – Video Editing – Video Editing Software		
Module:7	**Animation**	**6 hours**
Uses of Animation – Key frames and Tweening – Types of Animation – Computer Assisted Animation – Creating Movement – Principles of Animation – Some Techniques of Animation – Animation of the web –3D Animation – Cameras – Special Effects – Creating Animation – Rendering Algorithms – Animation Software – File formats.		
Module:8	**Multimedia Application Development**	**4 hours**
Software Life Cycle Overview – ADDIE Model – Conceptualization – Content Collection and Processing – Story – Flowline – Script – Storyboard – Implementation – Authoring Metaphors – Testing and Feedback – Final Delivery – Report Writing/Documentation – Case Study – Computer Games.		
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	Principles of Multimedia, Ranjan Parekh, Tata McGraw –Hill Publication Company Limited, New Delhi, Fifth reprint, 2008.

Reference Books

1.	Multimedia: Computing, Communications & Application, Ralf Steinmetz and Klara Nahrstedt, Pearson Education, 2004
2.	Fundamentals of Multimedia, Le-Nian Li and Mark S. Drew, Pearson Education International, 2004.
3.	K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, PTR, 2000.Multimedia: Making It Work By Tay Vaughan Eighth Edition, TMH, 2011.
4.	Multimedia Technology and Applications, David Hillman, Galgotia Publications Pvt Ltd., First Edition, 2011.

Mode of Evaluation:CAT1,CAT 2,Digital Assignment, Quiz,FAT

List of Challenging Experiments (Indicative)

1.	Conversion of Analog to Digital signals	1 hour
2.	Audio recording	2 hours
3.	Audio Editing	2 hours
4.	Audio Processing	2 hours
5.	Video recording	4 hours
6.	Video Editing	2 hours
7.	Creating animation	2 hours
8.	Key frames and tweening in animation	2 hours

9.	Creating Movement in animation			2 hours
10.	Applying rendering in animation			4 hours
11.	Creating a game			4 hours
12.	Audio and Video mixing			3 hours
			Total Laboratory Hours	30 hours
Mode of evaluation: CAT, Quiz, Project, FAT				
Recommended by Board of Studies	16-06-2015			
Approved by Academic Council	No. 37th	Date	16-06-2015	

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

CSC2004	Computer Architecture	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	**CSC1002**	**Syllabus version**				
		V1.0				

Course Objectives:

The objective of this course is:

1. To acquaint students with the basic concepts of functional components, architecture, register organization and performance metrics of a computer.
2. To impart the knowledge of data representation in binary and understand implementation of arithmetic algorithms in a typical computer.
3. To make students understand the importance of memory systems, IO interfacing techniques and external storage and their performance metrics for a typical computer. And explore various alternate techniques for improving the performance of a processor.

Expected Course Outcome:

On completion of course, the students will be able to

1. Recall the basic building blocks of the computer.
2. Interpret the various addressing modes and instruction formats.
3. Identify the various forms of parallel processing.
4. Categorize the data representation formats.
5. Examine the basic Arithmetic algorithms of computer.
6. Explain the importance of hierarchical memory organization and able to construct larger memories.
7. Describes the importance of input/output interfacing.

Module:1	Introduction and overview	**3 hours**

Introduction to computer systems, History of computers, Organization of Von Neumann machine, General Register and Stack Organization.

Module:2	Instruction types and Formats	**8 hours**

Instruction formats, addressing modes, Instruction types-Data Transfer and manipulation, Program control, RISC and CISC.

Module:3	Pipelining	**8 hours**

Parallel processing, Pipelining, Arithmetic pipelining, Instruction pipeline, RISC pipeline, Vector processing and array processors.

Module:4	Data Representation	**4 hours**

Fixed point representation, Floating point representation, Representation of non-numeric data(character codes)

Module:5	Computer arithmetic	**5 hours**

Computer Arithmetic Addition and Subtraction Multiplication and Division Algorithms.

Module:6	**Memory**	**8 hours**
Memory Organization Memory Hierarchy Types of main memory, Memory Design, AuxiliaryMemory, Cache and Virtual Memory.		
Module:7	Introduction to I/O devices	**4 hours**
Input Output: Input-Output Organization Peripheral devices I/O Interface Isolated I/O and Memory mapped I/O, Asynchronous Data Transfer Strobe and handshaking methods.		
Module:8	Modes of Transfer	**5 hours**
Programmed I/O Priority Interrupt Direct Memory Access I/O Processor Serial Communications.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	M.M. Mano, Computer System Architecture, 3rd Edition PHI -2007.
Reference Books	
1.	W. Stallings, Computer organization and architecture, Prentice-Hall, 8th edition, 2013.
2.	David A. Patterson and John L. Hennessy Computer Organization and Design-The Hardware/Software Interface 5th edition, Morgan Kaufmann, 2013.

Mode of Evaluation : CAT / Assignment / Quiz / FAT / Project / Seminar			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC3004	Visual Programming	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	CSC2002	Syllabus version				
		v1.0				

Course Objectives:

1. To enhance the basic understanding of various elements in VB.
2. To impart UI design and access to back end using various VB objects.
3. To make students familiarize with windows programming through MFC.

Expected Course Outcome:

On completion of course, the students will be able to

1. Design simple programs using simple and multiple forms in VB.
2. Understand various event handling mechanisms in visual basic.
3. Design effective user interfaces and test Visual Basic applications for real time problems.
4. Able to choose various objects to connect with backend databases for the given scenario.
5. Exemplify various Application Programming Interfaces in VB and MFC in VC++ for windows programming.
6. Provide solutions to various contemporary issues using the features of VB and windows programming.

Module:1	Introduction to Visual Basic	6 hours

Introduction - working with forms: Project Types, Design Forms and Use Standard Controls, Add Controls To and Configure the Toolbox, Use of the Properties Window, Frequently Used Control Properties, Name Conventions

Module:2	Event Handlers and Multiple Form Applications	6 hours

Style Guides, Project Structure and Use of Templates, Events and Event□Handlers, Common Events,Multiple Form Applications, Forms and Controls Collections, Standard Menus, Pop□Up Menus, Toolbars, Common Dialog Controls, Preserve User Settings Using the Registry, Control Arrays

Module:3	User Interface Design	5 hours

MDI Applications, MDI Forms, Drag and Drop (Automatic, Manual and OLE)

Module:4	ADO Database Connections	5 hours

Ado controls: Data Access Overview, Ado Object Model, Connection, Command and Record set Objects, Ado Data Control, Data Environments, Intellidrop and Bound Controls

Module:5	Automation in VB6	6 hours

Automation Principles, Set References To Libraries, Declare Object Variables, Object Models, Automation Examples

Module:6	Introduction to Windows programming	6 hours

Windows environment − A simple windows program − Windows and messages − Creating the window − Displaying the window − Message loop

Module:7	**Windows Programming Model**	**5 hours**
The Window procedure − Message processing − Text output − Painting and repainting − Introduction to GDI − Device context − Basic drawing − Child window controls.		
Module:8	**Introduction to VC++ programming**	**6 hours**
Application Framework – MFC library – Visual C++ Components – Event Handling – Mapping modes – modal and modeless dialog – windows common controls – bitmaps		
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	Bryan Newsome "Beginning Visual Basic 2015" Wrox; 1 edition (December 2, 2015)
2.	Gray Cornell, (2006), Visual Basic 6 from the ground up, Tata McGraw□Hill
3.	publications. Roger Mayne ,Introduction to Windows and Graphics Programming with Visual C++: (with Companion Media Pack): World Scientific Publishing Co., 2nd Edition Paperback – July 24, 2015

Reference Books

1.	Visual Basic 2015 Unleashed 1st Edition by Alessandro Del Sole, Pearson education, Inc.
2.	Steve Holtzner, ―Visual C++ 6 Programming‖, Wiley Dreamtech India Pvt. Ltd., 2003

Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT

List of Challenging Experiments (Indicative)

1.	Write a VB code for changing Styles, Size of Fonts. (Use option button , Checkbox) and Change the Color of the Form using HScrollBar, VScrollBar controls	3 hours
2.	Write VB code to generate a number count using Timer Control.	2 hours
3.	Write VB code for displaying a File using DriveListBox, DirListBox, FileListBox and ImageBox controls	2 hours
4.	Using If -else control structures: a) Write VB code for finding the greatest of three numbers b) Design and develop a program for student mark sheet, Calculate the total, average and grade.	4 hours
5.	Using For… Next Looping structures. a) Write a VB program to print the Multiplication table. b) Write a VB program to print the Fibonacci series. c) Write a VB program to print the Factorial Value for thegiven number.	4 hours
6	UsingSelect...Case statements. a) Write a VB program to find the area of square.	3 hours
7.	Using InputBox and MsgBox: a) Write a VB program to check whether the given year is leap year. b) Write a VB program to find whether the given number is	3 hours

	prime or not.	
8	Design a form with PopUp menu and label with specific title. The menu contains one item 'Text appearance' with sub menu items: Bold, Italic, Underline to change style of the text in the label and another item 'Font color' with sub menu items: red, green, blue and yellow to color the text.	3 hours
9	Design a VB form to print multiple names on the form using VB arrays.	2 hours
10	Create a student database and write a VB procedure to access the table and records to obtain the employee details. Using ADO controls perform the operations such as adding, updating, and deleting the records dynamically.	4 hours
	Total Laboratory Hours	**30 hours**

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	37th	Date	16-06-2015

CSC3005	Fundamentals of Data Analytics	L	T	P	J	C
		3	0	0	4	4
Pre-requisite	**CSC2003**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To understand the fundamental processes concepts and techniques of big data.
2. To analyze large amount of data using algorithms and mathematical models.
3. To explain the fundamental techniques and principles in achieving big data analytics with scalability.

Expected Course Outcome:

On completion of this course, the students will be able to

1. Identify the main sources of Big Data and summarize the need of data analytics.
2. Demonstrate an ability to use frameworks like Hadoop and related tools.
3. Solve Data Intensive tasks using the Map Reduce Paradigm.
4. Relate the importance of unstructured data.
5. Interpret the application of parallel algorithms in achieving scalable solutions.
6. Apply algorithms for Classifying text, Clustering and finding associations in Big Data.
7. Elucidate the applications, design and implement solutions to real-world problems.

Module:1	**Introduction to Big Data**	**6 hours**
Big data – Characteristic of Big data-Importance of Big Data.		
Module:2	**Big Data Use Cases**	**5 hours**
Patterns for Big data Deployment-Log Analytics-Fraud Detection Pattern-Social Media Pattern.		
Module:3	**Hadoop Framework**	**5 hours**
Hadoop- Components of Hadoop- Hadoop Distributed File System(HDFS)-Hadoop Tools		
Module:4	**Map Reduce Basics**	**7 hours**
Functional Programming Roots-Mapper-Reducer- Partitioners and Combiners		
Module:5	**Unstructured Data Analytics**	**7 hours**
NoSQL- CAP Theorem-Introduction to MongoDB		
Module:6	**Algorithms for Data Analytics**	**7 hours**
Parallel Frequent Pattern mining- Parallel K means-Random Forest Algorithm		
Module:7	**Large Scale Indexing**	**4 hours**
Introduction to Text Analytics		
Module:8	**Contemporary issues:**	**4 hours**
Applications of Big Data-HealthCare, Social Media		

	Total Lecture hours:		**45 hours**
Text Book(s)			
1.	Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill, 2012.		
2.	Tom White, Hadoop, the Definitive guide‖, O'Reilly Media, 2010.		
Reference Books			
1.	Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce Jimmy", Morgan & Claypool Synthesis, 2010.		
2.	Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & Sons, 2012.		
Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT			
Projects (Indicative)			
1. 2. 3.	Traffic Camera Car Tracker Email Connections Open Data Privacy Spectrum		
		Total Laboratory Hours	60 hours
Mode of evaluation:			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC3006	Data Mining	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	Nil					v1.0

Course Objectives:

1. To introduce the fundamental processes and major issues in data mining
2. To impart the knowledge on various data mining concepts and techniques that can be applied to text mining, web mining etc.
3. To offer adequate knowledge on regression techniques and various evaluation methods.

Expected Course Outcome:

On completion of course, the students will be able to

1. Recognize key areas and issues in data mining.
2. Prepare the data needed for data mining using pre-processing techniques.
3. Discover interesting patterns from large amounts of data using Association Rule Mining and Classification techniques
4. Formulate patterns to predict numerical values using regression techniques.
5. Apply evaluation metrics to predict the accuracy of the classifier.
6. Compile data into clusters applying various clustering algorithms.
7. Summarize about the concepts of text mining and web mining.

Module:1	Introduction to Data Mining	4 hours

Introduction to Data Mining – Data Mining Functionalities, Steps in Data Mining Process – Architecture of a Typical Data Mining Systems – Classification of Data Mining systems, Data Mining Task primitives, Major issues in Data mining.

Module:2	Data Pre-processing	4 hours

Data Pre-processing – Data Cleaning – Integration – Transformation – Reduction – Discretization and general concept hierarchies

Module:3	Association Rules	7 hours

Mining Association Rules in Large Databases. Mining Frequent Patterns-- basic concepts - Efficient and scalable frequent item set mining -methods, Apriori algorithm, FP-Growth algorithm

Module:4	Classification	7 hours

Inferring rudimentary rules- 1R algorithm, decision trees, covering rules, introduction to other classification methods, Statistical (Bayesian) classification -Bayesian networks

Module:5	Prediction	4 hours

The prediction task - Instance-based methods (nearest neighbor), Linear models, multiple linear, non-linear regression.

Module:6	Evaluation methods	5 hours

Training data and test data- Training and testing, Estimating classifier accuracy (holdout, cross-validation, leave-one-out). Introduction to bagging and boosting.

Module:7	**Clustering**	**7 hours**
Basic issues in clustering -Partitioning methods: k-means, k-mediods-Hierarchical methods: based agglomerative and divisible clustering methods.		
Module:8	**Advanced Techniques**	**7 hours**
Text mining: extracting attributes (keywords), structural approaches, (parsing, soft parsing), Bayesian approach to classifying text **,** Web mining: classifying web pages, extracting knowledge from the web		
	Total Lecture hours:	**45 hours**

Text Book(s)

1. Jiawei Han and MichelineKambers, "Data Mining –Concepts and Techniques", 3rd edition, MorganKaufman Publications, 2011.
2. Pang-Ning *Tan*, Michael *Steinbach*, Vipin*Kumar*,"Introduction to Data Mining", First Edition,Addison-Wesley Longman Publishing Co., 2005.

Reference Books

1. Ian H. Witten and Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques (Second Edition)*, Morgan Kaufmann, 2005, ISBN: 0-12-088407-0
2. David Hand, HeikkiMannila and Prdhraic Smyth, "Principles of Data Mining", 3rd edition, MorganKaufman Publications, 2009.
3. M. Kantardzic, "Data Mining: Concepts, Models, Methods, and Algorithms", 2nd edition, Wiley-IEEE Press, 2011.

Mode of Evaluation:CAT1,CAT 2,Digital Assignment, Quiz,FAT

Recommended by Board of Studies 16-06-2015

Approved by Academic Council 37^{th} Date 16-06-2017

CSC3007	Design of Algorithms	L	T	P	J	C
		3	0	0	4	4
Pre-requisite	**CSC2001**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To facilitate the understanding of different algorithmic strategies and analysis.
2. To provide an insight into the complexity classes.
3. To furnish some real world applications pertained to graphs.

Expected Course Outcome:

On completion of course, the students will be able to

1. Analyze the performance of algorithms using various asymptotic notations.
2. Analyze the time complexity of algorithms using recurrence relations.
3. Design an efficient algorithm for a real-time problem using a suitable algorithmic strategy.
4. Solve real life computing problems efficiently by using graph algorithms.
5. Illustrate linear time sorting techniques and their applications in real world scenarios.
6. Categorize the feasibility and limitations of solutions to real world problems based on complexity.

Module:1	**ASYMPTOTIC NOTATIONS**	**5 hours**
Big-O, Omega, Theta, little-o and little-omega – definitions and examples		
Module:2	**RECURRENCE RELATIONS**	**5 hours**
Substitution method, Recursion tree, Master's theorem (statement only), Examples based on Master's theorem		
Module:3	**BRUTE FORCE, DIVIDE AND CONQUER**	**6 hours**
Brute-force –Bubble sort, linear search Divide and conquer-Merge sort and Quick sort, Binary search		
Module:4	**BACK TRACKING AND GREEDY STRATEGY**	**6 hours**
Back tracking – 8 Queens problem, Greedy strategy- Activity scheduling and huff man code		
Module:5	**DYNAMIC PROGRAMMING**	**5 hours**
Dynamic programming, Matrix Chain Multiplication (MCM) and Longest Common Subsequence(LCS)		
Module:6	**GRAPH ALGORITHMS**	**6 hours**
Single source shortest path algorithm, Minimum Spanning Tree Algorithm- Prim's and Kruskal's		
Module:7	**SORTING IN LINEAR TIME**	**4 hours**
Decision-Tree model, Counting sort, Bucket sort, Radix Sort		
Module:8	**CLASSES OF COMPLEXITY**	**8 hours**

P,NP, NP-Hard, NP-Complete definitions, reduction technique, Examples for NP-Complete: Clique, Vertex-cover, 3-SAT, Independent set.			
Total Lecture hours:			**45 hours**
Text Book(s)			
1.	Thomas H. Cormen, Charles E. Leiserson,Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, Third Edition, MIT Press, 2009.		
Reference Books			
1.	Ellis Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms, S. P. Publications, 2nd edition, 2007.		
Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC4003	System Administration	L	T	P	J	C
		3	2	0	0	4
Pre-requisite	NIL	Syllabus version				
		V1. 0				

Course Objectives:

1. Use the basic Unix commands to copy and move files and directories.
2. Perform basic file management.
3. Write shell scripts; process text files and generate reports.
4. Install and manage disks and file systems.
5. Use the command line interface for system administration

Expected Course Outcome:

On completion of course, the students will be able to

1. Describe the fundamentals of system administration.
2. Install and administer an operating system.
3. Explain the structure of a file system.
4. Manage users and groups.
5. Administer secondary storage management.

Module:1	INTRODUCTION	6 hours

Introduction

The Unix Architecture and command usage, General Purpose Utilities: cal, date, echo, printf, bc, script, mailx, passwd, who, uname, tty, stty.

Module:2	The File System	6 hours

The File, Home Directory, Parent Child Relationship, Checking Current Working Directory, Changing Current Directory, Making Directories, Removing Directories, Listing Directory Contents.

Module:3	File Handling	4 hours

Commands for handling ordinary files: cat, cp, rm, mv, more, wc, cmp, Compressing and Decompressing files: gzip, gunzip.

Module:4	File Backup Programs	5 hours

The vi Editor to create files, Basic File Attributes: ls, File & Directory permissions, Changing File Ownership, chmod, The Archival Program: tar.

Module:5	Filters and Shell Proramming	6 hours

Simple filters: head, tail, cut, paste, sort, grep. Essential Shell Programming: Using Command Line arguments, Logical Operators, The if Conditional, Computation and String Handling, while and for Loops

Module:6	Essential System Administration	6 hours

The System Administrator's login: root, The System Administrator Privileges, Startup and Shutdown. User Management :useradd; /etc/passwd and /etc/shadow/; usermod and userdel;

Umask; Password Administration.			
Module:7	**Advance System Administration Tools**		**6 hours**
Networking Tools: Checking the network - ping, Remote Login: telnet, ssh, File transfer protocol, IP Configuration – ifconfig			
Module:8	**File System Administration:**		**6 hours**
Security and Protection - Creating Partitions - fdisk, Creating a file system – mkfs, File System Checking – fscd, Mounting and Unmounting file system			
Mode of Evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT			
	Total Lecture hours:		**45 hours**

Text Book(s)	
1.	1. Sumitabha Das: UNIX Concepts and Applications (Fourth Edition), Tata McGraw Hill, 2011.
Reference Books	
1.	Kenneth H Rosen, Douglas A. Host, Rachel Klee, Richard R. Rosinski: UNIX: The Complete Reference, Osborne/ McGraw Hill, 2007.
2.	Steve Moritsugu: Using UNIX, Prentice-Hall India, 2004.
3.	Mark, G. Sobel: A Practical Guide to the UNIX System, Addison Wesley, 2005
4.	Brain Kerninghan and Rob Pike: The UNIX Programming Environment, Prentice-Hall India, 2004.

	Lab (Indicative List of Experiments)	
	1. Install and Configure a UNIX/Linux System;	2 hours
	2. Execution of various file/directory handling commands; Use vi editor to create files;	3 hours
	3. Simple shell script for basic arithmetic and logical calculations;	3 hours
	4. Write script to display current date, time, user name and current directory;	2 hours
	5. Shell scripts to check various attributes of files and directories.	2 hours
	6. Shell scripts to perform various operations on given strings and find the reverse of a given number;	2 hours
	7. Shell scripts to explore system variables such as PATH, HOME etc.	2 hours
	8. Execution of various basic system administrative commands;	2 hours
	9. Use advanced system commands/tools (i.e.: tar, grep, find, etc.);	2 hours

	10. Write a shell script to display list of users currently logged in;	2 hours
	11. Use seed instruction to process /etc/password file;	2 hours
	12. Perform Disaster Recovery using available backup utilities;	2 hours
	13. Use system administrative commands to change file and directory permissions;	2 hours
	14. To manage the user accounts of the system through creating groups and users;	2 hours
	Total Laboratory Hours	**30 hours**

Mode of evaluation: Assessment 1-5, FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC4004	Data Communication and Networking	L	T	P	J	C
		3	1	0	0	4
Pre-requisite	**CSC3002**	**Syllabus version**				
		V1.0				

Course Objectives:

1. To recall the concepts of data communications.
2. To identify the functions of different layers.
3. To examine the principles, and techniques deployed in computer networks
4. To relate the QoS parameters of the networks and protocols with their performance.

Expected Course Outcome:

On completion of course, the students will be able to

1. Distinguish different modes of data transmission.
2. Describes the different techniques available for digital and Analog transmission.
3. Identifies the basic components in telephone and cable networks.
4. Differentiate the working of various protocols in Data link layer.
5. Associate various connecting devices and components for the construction of LAN.
6. Recalls the use of different protocols in Virtual circuit networks.
7. Interpret the different QoS parameters and outlines specification of different types of protocols in networks layer.

Module:1	**Physical Layer and Media**	**6 hours**
Data and signals- Analog and Digital, periodic analog signals, digital signals, transmission impairment, data rate limits, performance.		
Module:2	**Digital Transmission & Analog transmission**	**5 hours**
Digital to digital conversion, analog to digital conversion, transmission modes, Digital to analog conversion, Analog to analog conversion.		
Module:3	**Telephone and cable networks**	**5 hours**
Telephone network, dial up modems, digital subscriber line, cable networks, cable TV for data transfer		
Module:4	**Data link layer**	**7 hours**
Introduction, Framing, HDLC, Point to Point protocol.		
Module:5	**Connecting LANs**	**6 hours**
Connecting devices, backbone networks.		
Module:6	**Virtual circuit Networks**	**5 hours**
Frame Relay, ATM		
Module:7	**Network layer**	**5 hours**
IPv4 addresses, IPv6 addresses, ICMP, Multicast routing protocols		
Module:8	**QoS**	**6 hours**
Techniques to improve QoS, integrated services, differentiate services		

	Total Lecture hours:		**45 hours**
Text Book(s)			
1.	Behrouz A. Forouzan ,Data Communications and Networking, **,** McGraw Hill Education, 5th Ed., 2013		
Reference Books			
1.	William Stallings, "Data and Computer Communication",8th edition,2010, Pearson Education		
Mode of evaluation: CAT1,CAT 2,Digital Assignment, Quiz,FAT			
Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

CSC4005	Artificial Intelligence	L	T	P	J	C
		3	1	0	0	4
Pre-requisite	**CSC3006**	**Syllabus version**				
		1.0				

Course Objectives:

1. Define scope and structure of basic knowledge representation, problem solving, and learning methods of Artificial Intelligence
2. Assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular engineering problems
3. Develop intelligent systems by assembling solutions to concrete computational problems

Expected Course Outcome:

On completion of course, the students will be able to

1. Gain a historical perspective of AI and its foundations
2. Design simple software to experiment with various AI concepts and analyze results
3. To show the importance of artificial intelligence and knowledge representation in solving real world problems
4. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information also to show how the searching algorithms playing vital role in problem solving
5. To create interactive and rational system using appropriate notation
6. To measure the level of user satisfaction and efficiency of the real time system
7. Manifest an ability to share in discussions of AI in NLP, its current scope and limitations, and societal implications.

Module:1	**Overview of AI**	**6 hours**

Formal Definitions of AI - Evolution of AI - Applications of AI, Classification of AI systems with respect to environment. Overview of Knowledge Inferring systems and Planning, Uncertainty and towards Learning Systems.

Module:2	**Problem Solving by Search**	**5 hours**

Search space - Blind Search – DFS, BFS, Iterative Deepening-Performance measures.

Module:3	**Informed Search**	**6 hours**

Introduction to Heuristics-Variants of heuristic search-uniform cost, A*, Greedy –Adversarial Search – Minimax, Alpha beta pruning.

Module:4	**Basic Knowledge Representation and Reasoning**	**6 hours**

Propositional logic - Constraints - First Order Predicate Logic-Representation –Inference in FOPL

Module:5	**Advanced Topics of Search, Representation and Reasoning**	**6 hours**

Overview of Hill Climbing – Simulated Annealing – Genetic Algorithms – Ontological Representations – Planners - Fuzzy Logic.

Module:6	**Reasoning under Uncertainty**	**5 hours**

Definition of uncertainty – Bayes Rule- Belief Network

Module:7	**Learning Systems**	**6 hours**
Overview of types of Learning – Decision Support Trees – Overfitting issues – Artificial Neural Network.		
Module:8	**Processing Language**	**5 hours**
Introduction to Natural Language Processing – Syntax and semantics –ALICE – ELIZA.		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Prentice Hall, 3rd edition, 2011.
2.	Elaine Rich, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2009.
Reference Books	
1.	Wolfgang Ertel," Introduction to Artificial Intelligence", Second Edition, Springer, 2017.
2.	Stephen Lucci and Danny Kopec," Artificial Intelligence in the 21st Century, Second Edition, Mercury Learning and Information, 2015.
3.	Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Education, 2013.

Mode of evaluation:

1. Students are assessed based on group activities, classroom discussion, assignments (design problems, performance analysis and evaluation), continuous assessment test, and final assessment test.
2. Students can earn additional weightage based on certificate of completion of a related MOOC course.

Recommended by Board of Studies	16-06-2015		
Approved by Academic Council	No. 37th	Date	16-06-2015

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Course code	Course title	L	T	P	J	C
ENG3000	English for Beginners	1	0	2	0	0
Pre-requisite	Not cleared EPT	Syllabus version				
		1				

Course Objectives:

1. To have a better knowledge of English grammar & its usage
2. To identify the correct word order in a sentence
3. To read and understand a short simple text and to speak and write flawlessly

Expected Course Outcome:

On completion of course, the students will be able to

4. Develop a better understanding of basic grammar rules
5. Write grammatically correct simple sentences
6. Listen properly and answer simple questions about personal details
7. Demonstrate the ability to verbally communicate in English as well as compose letters/ Emails
8. Combat MTI (Mother Tongue Influence) during everyday conversation

THEORY

Module:1	Elementary Grammar & Vocabulary	4 Hours

Understanding basic grammar-Parts of Speech; reading newspapers for vocabulary development
Activity:Grammar worksheets with elementary vocabulary exercises

Module:2	Transitional Grammar; Rectifying common mistakes in everyday conversation	4 Hours

Understanding transitional grammar & detecting & rectifying common mistakes in everyday conversation
Activity:Working onGrammar worksheets; Detecting common errors with nouns, most importantly, punctuation, spelling and other parts of speech

Module:3	Text-based Analysis	4 Hours

My Friend Fear: Finding Magic in the Unknown by Meera Lee Patel
Activity: Understanding sentence structures and enriching vocabulary by analyzing the text

Module:4	Correspondence	3 Hours

Informal Letters & Email
Activity: The learners will acquire the necessary traits to compose letters; emails, applications

PRACTICE-SESSIONS

Activity-1	Listening Comprehension	4 Hours

Listening to simple conversations & gap fill exercises
Session: Listen to simple conversations in Indian English using audio-visual materials so that they become exposed to a limited range of accents and fill the gap for simple phrases and expressions.

Activity-2	The Art of Speaking	6 Hours

Self-introduction; role-plays; participating in group- discussions
Session: The students identify their characteristic attitudes, values, and talents and try to speak;

learn to work and interact within groups		
Activity-3	**Reading Exercises**	**4 Hours**
Loud reading with focus on pronunciation by watching relevant video materials Session: The students read aloud simple texts by uttering words, detecting syllables, and visually connecting to the words shown in relevant videos.		
Activity-4	**The Process of Writing**	**6 Hours**
Make sentences using jumbled words & all the seven basic sentence/clause patterns Session: The students form groups to comprehend all the basic patterns in writing and try to frame sentences by implementing relevant grammatical rules		
Activity-5	**Presenting Pictorial Information**	**4 Hours**
Describing pictures and people Session: The students try to describe pictures and people and present them.		
Activity-6	**Understanding Errors in Pronunciation-the Influence of Mother Tongue (MTI).**	**6 Hours**
Practicing common Indian variants in pronunciation Activity: The students practice to comprehend Indian English pronunciation by using audio-visual materials and learn differences between various speech sounds.		
	Total Hours	**45 Hours**

Text Book/ Workbook	
1.	Wren and Martin, (2018) *High School English Grammar and Composition (Revised by Dr.N.D.V.Prasada Rao),* New Delhi; S.Chand& Company Ltd.,
Reference Books	
1.	Meera Lee Patel (2017) *My Friend Fear: Finding Magic in the Unknown*. Self Help Book.
2.	Barrett Grant (2013) *Perfect English Grammar: The Indispensable guide to Excellent writing and Speaking*, California, Callisto Media Incorpated.
3.	Watkins Peter (2018*) Teaching and Developing Reading Skills: Cambridge Handbooks for Language teachers*, Cambridge.
4.	Murphy Raymond (2019*) English Grammar in Use* (5th Ed) , Cambridge
5	Peter Anderson (2015) *Cambridge English Empower Elementary* Workbook with Answers with Downloadable Audio-Workbook Edition, Cambridge

Mode of Evaluation: Quizzes, Presentation, Discussion, Role Play, Assignments & FAT

List of Challenging Experiments (Indicative)		
1	Identifying errors in sentences	8 Hours
2	Reading a text and writing the central idea	8 Hours
3	Role plays on a social theme	8 Hours
4	Poster Presentation	8 Hours
5	Listening to simple conversations and listing vocabulary words used in daily conversations	8 Hours

6	Writing an email to the editor	5 Hours
	Total Laboratory Hours	**45 hours**

Mode of Evaluation: Quizzes, Presentation, Discussion, Role Play, Assignments & FAT			
Recommended by Board of Studies	08-06-2019		
Approved by Academic Council	No. 55	Date	13-06-2019

GER1003	Basic German	L	T	P	J	C
		2	0	0	0	2
Pre-requisite	Nil	**Syllabus version**				
		1.0				

3 year UG Programmes (BCA, BBA, B.Com, B.Sc., BHM) and Integrated 5 year M.Sc., Programme.

Course Objectives:

1. To enhance the proficiency in reading, writing, and speaking in basic German.
2. To make the learners adapt in the German culture by learning basic etiquettes.
3. To introduce basic German vocabulary.

Course Outcomes:

The students will be able to

1. Greet people, introduce oneself and understand basic expressions in German.
2. Understand basic grammar skills to use them in day today life.
3. Remember beginner's level vocabulary.
4. Make sentences in German on a variety of topics with significant precision.
5. Apply good comprehension of written discourse in areas of special interests.

Student Learning Outcomes (SLO):	**2.11**

2. Having a clear understanding of the subject related concepts and of contemporary issues
11. Having interest in lifelong learning

Module:1	**Ausdrueck der kleinen Saetze**	**4 hours**

i Die Begrüßung und das Alphabet
ii. Personalpronomen und Konjugation (Regelmäßige Verben)
iii. Zahlen (1-100), W-Fragen, Nomen- Singular und Plural
iv. Artikelsetzung – Bestimmter und unbestimmter Artikel)

Lernziele:
Sich vorstellen, Grundlegende Kenntnisse von der deutschen Sprache

Module:2	**Bildung der Fragen und Imperativ Satz**	**5 hours**

i. Konjugation der Verben (Unregelmäßige Verben)
ii. das Jahr- Monate, Jahreszeiten und die Woche
iii. Ja-/Nein- Frage; Imperativ mit „Sie''

Lernziele:
Sätze schreiben (über Hobbys, Berufe erzählen, usw.)

Module:3	**Artikel Deklnation und Saetze bilden mit Modal verben**	**5 hours**

i. Possessivpronomen
ii. Negation und Kasus
iii. Modalverben
iv. Präpositionen
Lernziele:
Sätze mit Modalverben, Verwendung von Artikel, Adjektiv beim Verb

Module:4	**Contexual Uebersetzung**	**3 hours**

Übersetzung: (Deutsch – Englisch / Englisch – Deutsch) **Lernziel :** Die Übung von Grammatik und Wortschatz		
Module:5	**Brief Schreiben**	**4 hours**
Leserverständnis. Mindmap machen, Korrespondenz- Briefe und Email		
Lernziel: Übung der Sprache, Wortschatzbildung		
Module:6	**Aufsatz schreiben**	**3 hours**
Aufsätze : Die Familie, Bundesländer in Deutschland, , **Lernziel :** Aktiver, selbständiger Gebrauch der Sprache		
Module:7	**Dialog schreiben mit verschienden Kontext**	**4 hours**
Dialoge: i. Gespräche mit einem/einer Freund /Freundin. ii. Gespräche beim Einkaufen ; in einem Supermarkt ; iii. Hobbys und Berufe		
Module:8	**Erkenntnisse von der Kultur**	**2 hours**
Guest Lectures/ Native Speakers (Einleitung in die deustche Kultur und Politik		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	Netzwerk Deutsch als Fremdsprache A1, Stefanie Dengler, Paul Rusch, Helen Schmtiz, Tanja Sieber, Klett-Langenscheidt Verlag, München : 2019
Reference Book(s)	
1	Das Leben- Deutsch als Fremdsprache, Cornelsen, 2019 (Print und Online)
2	Motive von Hueber verlag, 2014
	www.goethe.de wirtschaftsdeutsch.de hueber.de klett-sprachen.de www.deutschtraning.org

Mode of Evaluation:, CAT, Quiz, Oral Examination, Digital Assignment and FAT			
Recommended by Board of Studies	22-01-2021		
Approved by Academic Council	61	Date	18.02.2021