

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

(Deemed to be University Under Section 3 of the UGC Act, 1956)
Kumaracoil, Thuckalay

DEPARTMENT OF SOFTWARE ENGINEERING



B.Sc. COMPUTER SCIENCE **CURRICULUM AND SYLLABI**

REGULATION 2021

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION, Kumaracoil

Regulation: 2021

Curriculum and Syllabi

B.Sc. Programme

DEPARTMENT OF SOFTWARE ENGINEERING

B. Sc. COMPUTER SCIENCE

Vision of the University

To be recognized by the Government and society at large as an institution able to deliver excellence with relevance in the field of higher education and research focusing on the needs of the nation in tune with the technological revolution to cope with the knowledge explosion and global competence.

Mission of the University

To develop the institution as a Centre of Excellence, keeping pace with the advances in the field, so as to provide quality higher education to the students and instil in them high standards of discipline and ethics so that they become enlightened individuals in the service of humanity and to carry out focused research in the frontier areas of science and technology.

Faculty of Computer Science

Department of Software Engineering

Vision of the Department

To deliver excellent education with relevance to technical education focusing on the needs of the nation.

Mission of the Department

To raise the quality of computer education and research so that it will become a national/international Centre of excellence in the area of software engineering and information technology.

Description of the programme

B Sc Computer Science means Bachelor of Science in Computer Science, it is a three-year undergraduate degree focused on problem solving, application development with wider scope of application in science, engineering, technology and social sciences etc. The B. Sc CS curriculum includes programming languages like C, C++, Java, .Net, Python, Computer Architecture, Database Management System, Graphics, Networking, and Software Engineering, providing a strong foundation in computer applications and preparing students for careers in the IT industry.

Programme Educational Objectives - PEO	
PEO-01	Graduates of the programme will be employed in the field computer Science.
PEO-02	Graduates of the programme will pursue higher studies.
PEO-03	Graduates of the programme will apply new technologies in Computer Science to serve the needs of industry, and society.
PEO-04	Graduates will have skills and knowledge to excel in their professional career in Computer Applications and related disciplines
PEO-05	Graduates will contribute and communicate effectively within the team to grow into leaders
PEO-06	Use current computing technologies and methods for the design and implementation of solutions in industry.
PEO-07	Able to identify, formulate, and develop solutions to computational challenges.
PEO-08	Able To implement real world problems using different programming languages.
PEO-09	Able to use appropriate techniques, skills, and tools necessary for computing practice.
PEO-10	An ability to apply design and development principles in the construction of software systems of varying complexity.
PEO-11	To provide communication skill development courses for the benefits of student's career.
PEO-12	To make professional graduates with ethical and social responsibilities.

Graduate Attributes-GA	
GA-1	Foundational Scientific Knowledge Acquire a deep understanding of fundamental principles across core scientific disciplines, including physics, chemistry, biology, and mathematics, providing a strong foundation for further learning and research.
GA-2	Practical Skills and Laboratory Competence Develop hands-on laboratory skills and the ability to conduct experiments, analyze data, and apply scientific methods to real-world problems in various scientific domains.
GA-3	Research and Analytical Thinking Foster research capabilities and critical thinking skills, enabling the design and execution of scientific investigations, interpretation of experimental results, and formulation of evidence-based conclusions.
GA-4	Data Analysis and Statistical Techniques Utilize modern data analysis techniques and statistical tools to interpret experimental data, draw meaningful conclusions, and solve complex scientific and mathematical problems.

GA-5	Interdisciplinary Knowledge and Applications Integrate knowledge from multiple scientific disciplines to approach problems holistically, understanding how different scientific fields contribute to innovation and real-world applications.
GA-6	Environmental Awareness and Sustainability Demonstrate an understanding of environmental issues and the impact of scientific practices on the environment, promoting sustainability and responsible use of natural resources in all scientific endeavors.
GA-7	Ethical Conduct and Scientific Integrity Uphold ethical standards and integrity in scientific research and practice, ensuring honesty, accuracy, and responsibility in data handling, experimentation, and reporting.
GA-8	Communication and Presentation Skills Develop effective communication skills to articulate scientific concepts, research findings, and technical information clearly and
GA-9	Technology Integration and Innovation Apply cutting-edge technologies and tools in scientific experimentation and research, leveraging innovation to drive progress and stay at the forefront of scientific discovery.
GA-10	Lifelong Learning and Adaptability Cultivate a mind-set of continuous learning, staying informed about scientific advancements and adapting to new tools, methods, and technologies to remain competitive in a rapidly evolving scientific landscape.

Programme Outcome - PO	
PO-A	Can apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.
PO-B	Will Create, Select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modelling.
PO-C	Programme will produce graduates proficient in multiple software platforms.
PO-D	Apply computer and mathematical logics for creating apps for the society specific domains.
PO-E	Will craft a computer science professional who can address every area of automation.
PO-F	The students can gain knowledge in the working principles using different simulation tools.
PO-G	Understand the impact of the professional software engineering solutions in societal and environmental contexts
PO-H	Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PO-H	H	H	A	A	A	H	H	H	H	H
PO-I	H	H	H	H	H	H	H	H	H	H
PO-J	H	H	H	H	H	H	H	H	H	H

H- Highly Associated

A- Associated

Not – Not Associated

Mapping of Programme Educational Objective (PEOs) and Programme Outcomes (POs)

PEO PO	PEO-01	PEO-02	PEO-03	PEO-04	PEO-05	PEO-06	PEO-07	PEO-08	PEO-09	PEO-10	PEO-11	PEO-12
PO-A	H	H	H	H	A	A	A	A	H	A	A	H
PO-B	H	H	A	A	H	H	H	H	H	H	H	H
PO-C	H	A	H	H	H	H	H	H	H	H	H	H
PO-D	A	A	H	H	H	A	H	H	A	H	H	A
PO-E	H	A	H	H	A	H	H	A	A	H	A	A
PO-F	H	H	H	A	A	H	H	H	H	H	H	H
PO-G	A	A	H	H	H	H	A	A	H	A	A	H
PO-H	H	A	H	H	A	H	H	H	H	H	H	H
PO-I	H	H	H	A	A	H	H	H	H	H	H	H
PO-J	A	A	H	H	H	H	H	H	A	H	H	A

H- Highly Associated

A- Associated

Not – Not Associated

Duration of the programme: 3 Years/ 6 Semesters

Total credit: 141

CURRICULUM & SYLLABI**SEMESTER I**

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	MS36T1 / MS36M1 / MS36H1	Language I – Tamil / Malayalam / Hindi	3	0	0	3
2.	EG3601	English I	3	0	0	3
3.	MA3605	Discrete Mathematics	3	0	0	3
4.	CS3601	Fundamentals of Computers	4	0	0	4
5.	CS3602	Programming in C	3	1	0	4
6.	GE3603	Value Based Education	2	0	0	2
PRACTICAL						
7.	CS3671	Programming in C- Practical	0	0	2	2
8.	CS3672	Office Automation- Practical	0	0	2	2
TOTAL						23

SEMESTER II

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	MS36T2 / MS36M2 / MS36H2	Language II – Tamil / Malayalam / Hindi	3	0	0	3
2.	EG3602	English II	3	0	0	3
3.	MA3606	Mathematical Foundations of Computer Science	3	0	0	3
4.	CS3603	Object Oriented Programming in C++	3	1	0	4
5.	CS3604	Database Management Systems	4	0	0	4

6.	GE3602	Environmental Studies	2	0	0	2
PRACTICAL						
7.	CS3673	Programming in C++ - Practical	0	0	2	2
8.	CS3674	RDBMS Laboratory – Practical	0	0	2	2
TOTAL						23

SEMESTER III

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	MA3607	Fundamentals of Statistics	3	0	0	3
2.	CS3605	Data Structures	3	1	0	4
3.	CS3606	Computer Architecture	4	0	0	4
4.	CS3607	Operating Systems	4	0	0	4
5.	CS3608	JAVA Programming	3	1	0	4
PRACTICAL						
7.	CS3675	Data Structures Laboratory	0	0	2	2
8.	CS3676	JAVA Programming Laboratory	0	0	2	2
TOTAL						23

SEMESTER IV

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	CS3609	Python Programming	3	1	0	4
2.	CS3610	Computer Networks	4	0	0	4
3.	CS3611	Web Technology	3	1	0	4

4.	CS3612	Computer Graphics	4	0	0	4
5.	CS3613	Software Engineering	4	0	0	4
PRACTICAL						
7.	CS3677	Python Programming Lab – Practical	0	0	2	2
8.	CS3678	Web Technology Lab – Practical	0	0	2	2
TOTAL						24

SEMESTER V

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	CS3614	Visual Programming	3	1	0	4
2.	CS3615	Multimedia and Design	3	1	0	4
3.	CS3616	Cryptography	4	0	0	4
4.	CS3617	Internet of Things	4	0	0	4
5.	CS36XX	Elective I	3	0	0	3
6.	GE3604	Sustainability and Social Responsibility	2	0	0	2
PRACTICAL						
7.	CS3679	Visual Programming Lab- Practical	0	0	2	2
8.	CS3680	Multimedia Lab- Practical	0	0	2	2
TOTAL						25

SEMESTER VI

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	CS3618	Mobile Application Development	4	0	0	4

2.	CS3619	Virtualization and Cloud Computing	4	0	0	4
3.	CS3620	Data Mining and Data Warehousing	4	0	0	4
4.	CS36XX	Elective II	3	0	0	3
PRACTICAL						
7.	CS36P1	Major Project	0	0	8	8
TOTAL						23

Elective List

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	CS36A1	Compiler Design	3	0	0	3
2.	CS36A2	Software Testing	3	0	0	3
3.	CS36A3	Cyber Security	3	0	0	3
4.	CS36A4	Artificial Intelligence and Machine Learning	3	0	0	3
5.	CS36A5	Big Data Analytics	3	0	0	3
6.	CS36A6	Open Source Computing	3	0	0	3

SEMESTER I

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	MS36T1 / MS36M1 / MS36H1	Language I – Tamil / Malayalam / Hindi	3	0	0	3
2.	EG3601	English I	3	0	0	3
3.	MA3605	Discrete Mathematics	3	0	0	3
4.	CS3601	Fundamentals of Computers	4	0	0	4
5.	CS3602	Programming in C	3	1	0	4
6.	GE3603	Value Based Education	2	0	0	2
PRACTICAL						
7.	CS3671	Programming in C- Practical	0	0	2	2
8.	CS3672	Office Automation- Practical	0	0	2	2
TOTAL						23

MS36T1	TAMIL -I	L	T	P	C
		3	0	0	3

Course Outcome - COs		Cognitive Skill
CO-01	செய்யுள் பகுதி மூலம் மாணவர்கள் பாரதியார், பாரதிதாசன் போன்றோர்களின் படைப்புகளை கற்று அறிவு பெற்றனர்	U
CO-02	இலக்கணப் பகுதி மூலம் மாணவர்கள் எழுத்துக்களை பேசும் போதும் எழுதும் போதும் பிழையின்றி பயன்படுத்த கற்றுக் கொண்டனர்	A
CO-03	உரைநடை பகுதி மூலம் மாணவர்கள் தமிழ் மொழியின் இன்பம் இலக்கியங்களைப் பற்றி கற்று வாழ்க்கையை முறைப்படுத்தினர்.	R
CO-04	சிறுகதை பகுதி மூலம் மாணவர்கள் மூடநம்பிக்கை பேராசை, தற்கொலை எண்ணம் போன்றவற்றிலிருந்து தற்காத்துக் கொண்டனர்	U
CO-05	இலக்கிய வரலாறு பகுதி மூலம் மாணவர்கள் தமிழ் இலக்கிய வரலாற்று நிகழ்வுகளை கற்று மேம்பாடு அடைந்தனர்.	R

R-Remember,U-Understand,A-Apply,An-Analyze,E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	L	M	S	S	L	S	S	S	M	S
CO-02	L	L	L	S	L	S	L	M	S	S
CO-03	L	S	S	L	L	L	S	S	M	S
CO-04	L	S	L	M	L	L	L	S	M	S
CO-05	S	M	S	M	S	S	S	M	S	S

S-Strong, M-Medium,L-Low,N-Not relevant

அலகு I: செய்யுள்

9

அன்னையை வேண்டதல் - பாரதியார்- தொழிலாளர் விண்ணப்பம் - பாரதிதாசன் - ஒற்றுமையே உயர்நிலை-தேசிகவிநாயகனார்- மாணவனுக்கு -இராமலிங்கம்- புதுமை-சுரதா- இருபதுகட்டளைகள்- வைரமுத்து- தம்பி உனக்காக-சிற்பிபாலசுப்பிரமணியன்- மரங்கள் - மூ. மேத்தா- மனிதத் தத்துவங்கள்- கண்ணதாசன்- ஊமைராகங்கள் மதியழகன்- ஏரி-சல்மா- டவுண் பஸ் - சிவசோமன்- கவனஈர்ப்புத் தீர்மானம்

உமாஹரிஹரன்- ஹைக்கூக் கவிதைகள்- கழனியூரான், முருகேஷ், ராஜமுருகுபாண்டியன்- நாட்டுப்புறப் பாடல்கள் - பஞ்சமும் மழையும்

.அலகு II: இலக்கணம்

9

எழுத்துபற்றியவிளக்கம்- முதலெழுத்துசார்பெழுத்துக்கள்- சுட்டெழுத்துக்கள், வினாவெழுத்துக்கள்- கிரந்தஎழுத்துக்கள்.- வல்லினம் மிகும், மிகா இடங்கள்.

அலகு III: உரைநடை

9

சங்ககால வாழ்வியல் நெறிகள்- தமிழர்களின் விஞ்ஞானப் பார்வை- பத்துப்பாட்டில் சமூக அறம்- அகநானூற்றில் தமிழர் வழக்காறுகள்- புறநானூற்றில் மனிதநேயம்- ஆற்றுப்படை இலக்கியங்கள்- கலித்தொகைகாட்டும் பழந்தமிழர் பண்பாடு- செவ்வியல் மொழிதமிழ்- தமிழ் இலக்கியங்களில் மூலிகைமருத்துவம்- தமிழ் மாந்தர் கடமை.

அலகு IV: சிறுகதை

9

இதுவும் ஒரு சரஸ்வதி பூஜை- கிணறு- தொண்டன்- ஊர்க்குருவியும் பருந்தும்- அனாதைகள்

.அலகு V: இலக்கியவரலாறு

9

புதுக்கவிதை-தோற்றமும் வளர்ச்சியும்- சிறுகதை-தோற்றமும் வளர்ச்சியும்- புதினம் - தோற்றமும் வளர்ச்சியும்- நாட்டார் பாடல்கள்- தகவல் தொடர்புச் சாதனங்களும் தமிழ் வளர்ச்சியும்

TOTAL: 45 HOURS

பார்வை நூல்கள்

1. உரைநடை - சங்கத் தமிழர் வாழ்வியல் - தா. நீலகண்டபிள்ளை
2. சிறுகதை-நோன்பு - டி. செல்வராஜ்
3. இலக்கியவரலாறு- மு. வரதராசனார்

MS36H1	HINDI- I	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To acquire knowledge regarding fundamental concepts in Hindi grammar.
- To acquire the ability to master translation skills
- To develop writing skills for official documentation - Letter, Banking terminologies

Course Outcome		Cognitive Skill
CO-01	Improve the Hindi communication skills	U
CO-02	Identify Eminent Hindi Writers.	R,U
CO-03	Framing Sentences.	An
CO-04	Official Documentation Skills	An, S
CO-05	In Depth Application of Hindi Language	A,An,S

R-Remember,U-Understand,A-Apply,An-Analyze,E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	L	M	S	S	L	S	S	S	M	S
CO-02	L	L	L	S	L	S	L	M	S	S
CO-03	L	S	S	L	L	L	S	S	M	S
CO-04	L	S	L	M	L	L	L	S	M	S
CO-05	S	M	S	M	S	S	S	M	S	S

S-Strong, M-Medium,L-Low,N-Not relevant

UNIT I : PROSE

- Jeevan Aur Shikshan
- Torch Bechne Wala
- Nayi Sanskrithi ki Aur

UNIT II : SHORT STORIES

- Thakur ka Kuwa
- Heli Bone Ki Bathakein
- Umas
- Nail Cutter

UNIT III : GRAMMAR

- Saghya
- Sarvanam
- Visheshan
- Kriya

UNIT IV : LETTER WRITING

UNIT V : TRANSLATION

TEXT BOOKS :

1. Gandhya Prathibha -Dr. Basavaraj K Barkaer, Published by Jawahar Pusthakalay Sardar Bazar, Madurai
2. Kahani Sankalan Thatha Vyavaharik Hindi Sunil Kumar Published by Orient Black Swan. Himalayanth Nagr, Hyderabad
3. Vyakaran Pradeep Ram Dev Published by Hindi Bhavan. Allahabad

REFERENCES :

1. Kahani Sankalan Thatha Vyavaharik Hindi Sunil Kumar Published by Orient Black Swan, Himalayanth Nagr, Hyderabad

EG3601	ENGLISH-I	L	T	P	C
		3	0	0	3

Aim:

1. To empower learners with fundamental knowledge and communicative competence in English, fostering effective communication skills.
2. To cultivate an understanding and appreciation of various literary genres such as poetry, prose, and short stories, along with a solid grasp of grammar.
3. To cultivate proficiency in the basics of letter writing and enhance reading comprehension skills among students.

Objectives:

1. To make the students acquire basic knowledge in English with communicative competence.
2. To enable them to develop their communication skills effectively.
3. To make them get exposure to English prose, poetry, short story and grammar.

Course Outcome		Cognitive Skill
CO-01	The students will be able to learn the various themes, styles and the nuances of modern English prose written by great masters of prose writing in the 20 th century.	R
CO-02	The students will be able to grasp the poetical language, the rhythm and cadence of poetry, the themes and styles of different masters of English poetry.	U
CO-03	The students will be able to understand the elements of a short story, narrative techniques employed and its brevity and wisdom from the great masters of storytelling.	U
CO-04	The students will learn basic grammar and vocabulary that will enrich their communicative competence.	A
CO-05	The students will learn the format, the basics and the requirements of letter writing, understand the different types of letters, their characteristics and the formalities involved in writing them, and learn how to skim and scan passages for comprehension.	A

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcomes with Programme Outcomes

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	L	M	L	L	M	M	M	M	M	M
CO-02	L	L	L	M	M	M	M	M	L	M
CO-03	M	M	L	L	M	M	M	M	M	M

CO-04	L	M	L	M	M	M	L	M	M	M
CO-05	M	L	L	L	M	M	M	L	M	M

S-Strong, M-Medium, L-Low, N-Not relevant

UNIT - I PROSE: A GALAXY OF PRECIOUS PROSE (DETAILED) 12

1. Spoken English and Broken English - George Bernard Shaw
2. Reading for Pleasure - L. A. G. Strong
3. University Days - James Thurber
4. The Model Millionaire - Oscar Wilde
5. On Forgetting - Robert Lynd

UNIT - II POETRY: HARMONY (DETAILED) 12

1. The Solitary Reaper - William Wordsworth
2. Stopping by Woods on a Snowy Evening - Robert Frost
3. Enterprise - Nissim Ezekiel
4. Lead, Kindly Light - Cardinal Newman
5. Where the mind is without fear - Rabindranath Tagore

UNIT - III SHORT STORY: POPULAR SHORT STORIES (NON-DETAILED) 6

1. The Gift of the Magi - O. Henry
2. The Ant and the Grasshopper - W. Somerset Maugham
3. The Mark of Vishnu - Kushwant Singh

UNIT - IV GRAMMAR: 6

1. FUNCTIONAL ENGLISH - Parts of Speech, Articles, Prepositions, Auxiliaries and Modals, Agreement of subject with verb

2. VOCABULARY - Antonyms, Synonyms, Suffixes, Prefixes, One-word Substitutes, Odd words out

UNIT - V 9

Basics of Letter Writing - Reading Comprehension

TOTAL: 45 PERIODS

REFERENCES

1. Galaxy of English Prose, Ed. Dr. B. Symala Rao, Blackie Books, Madras.
2. An Anthology of Poems, Harmony, Ed. Biyot K. Tripathy.

MA3605	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

AIM

To impart the fundamental concept of discrete mathematics to the students in order to achieve well founded knowledge.

OBJECTIVES

- To extend student's Logical and Mathematical maturity
- Ability to deal with abstraction

- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

Course Outcome - COs		Cognitive Skill
CO-01	Recognize graph models and its application in technical sectors	R, U, A, An, E, S
CO-02	Know about the shortest path algorithm for solving real life situation	R, U, A, An, E, S
CO-03	Gain knowledge about various Cryptosystem for securing data	R, U, A, An, E, S
CO-04	Know about Product of two Posets and its applications	R, U, A, An, E, S
CO-05	Understand the Minimal spanning tree and algorithms	R, U, A, An, E, S

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

UNIT-I GRAPH THEORY

9

An introduction to graph, Definition of a Graph, Graphs as models, More definitions, Vertex Degrees, Sub graphs, Paths and cycles The matrix representation of graphs (definition and example only) Trees, Binary trees, Binary search trees and traversals.

UNIT-II EULER TOURS AND HAMILTONIAN CYCLES

9

Euler's paths and cycles, Hamiltonian paths and cycles, Minima's Path Application (Flow charts and state transition Graphs, Algorithm for determining cycle and minimal paths.

UNIT-III INTRODUCTION TO CRYPTOGRAPHY

9

From Caesar Cipher to Public key Cryptography, the Knapsack Cryptosystem.

UNIT-IV POSET AND LATTICES

9

Diagrammatical Representation of a Poset, Isomorphism, Duality, Product of two Posets, Lattices, Semilattices, Complete Lattices, Sublattices.

UNIT-V NETWORK MODELS

9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – coefficient quantization error - limit cycle oscillation – signal scaling – Applications of DSP.

L: 45 = TOTAL: 45 PERIODS

TEXT BOOKS:

1. John Clark Derek Allen Holton - A first look at graph theory, Allied Publishers
2. David M Burton - Elementary Number Theory 6th Edition TMH
3. Vijay K. Khanna - Lattices and Boolean Algebras- First Concepts, Vikas Publishing House Pvt. Ltd
4. Kenneth H. Rosen, "Discrete Mathematics and its applications", fifth edition, Tata McGraw Hill, 2003 (UNIT V)

REFERENCES:

1. Douglas B West Peter Grossman - Introduction to Graph Theory
2. W.D. Wallis - A Beginner's Guide to Discrete Mathematics, Springer

3. R. Balakrishnan, K. Ranganathan - A textbook of Graph Theory, Springer International Edition
4. S.Arumugham, S. Ramachandran - Invitation to Graph Theory, Scitech. Peter Grossman,
5. J.K Sharma - : Discrete Mathematics (2nd edition), (Macmillian)
6. S. A. Choudam –A First Course in Graph Theory (Macmillian)Theory (Macmillian)

CS3601	FUNDAMENTALS OF COMPUTERS	L	T	P	C
		4	0	0	4

Aim: To understand the fundamentals computer hardware, operating systems, networking systems and internet.

Objectives :

The student should know about

- Learns part of computer (hardware components).
- Get a deep insight on processing and storing data.
- Learn about operating systems and network
- Study the importance of online and internet.
- Familiar with software programming and database.

Course Outcome - COs		Cognitive Skill
CO-01	Ability to understand and identify essential computer hardware.	U
CO-02	Ability to process and store data effectively in machines.	A
CO-03	Ability to remember operating system and network basics.	R
CO-04	Ability to understand internet and analyse benefits of online process.	U, An
CO-05	Ability to understand and remember software programming and database management.	U, R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- - I	PO- J
CO-01	S	S	S	S	M	S	L	M	L	L
CO-02	S	S	S	M	M	S	L	M	L	L
CO-03	S	S	S	M	M	S	L	M	L	L
CO-04	S	S	S	M	M	S	L	M	L	L
CO-05	S	S	S	S	M	S	L	M	L	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: INTRODUCING COMPUTER SYSTEMS**12**

Exploring computer and their uses – Looking inside the computer system – Parts of a computer - Using keyboard and mouse – Other ways of data input and output – Interacting with computer - Essential computer hardware - Seeing data – Hearing data – Video and sound – Optical input devices – Sound systems – Printing data – Commonly used printers – Peripherals.

UNIT II: PROCESSING AND STORING DATA**12**

Data and information – How computer process data – CPU and memory - The bus - Modern CPU – Processor comparison – Parallel processing - Computer and other devices – Types of storage devices – Removable media – Backing up data – Solid state storage devices - Optimizing disk performance – Drive interface standards.

UNIT III: OPERATING SYSTEM AND NETWORKS**12**

Operating system basics – Types of operating systems – Managing hardware – Enhance operating system with utility software – PC operating systems – Network operating systems – Embedded operating systems – Networking basics – Uses of network – Types of network – hybrid networks – Network hardware – Data communications – Wireless networks.

UNIT IV: INTERNET AND ONLINE WORLD**12**

Internet history – World Wide Web – Major services of internet - Web browsers – HTML and URL - Search engine – Navigating the web – E mail – Features of the internet - FTP – Web based chat – Online services – Connecting to the internet – Online shopping – Online banking – Intranet and extranet – Internet security – Ethical issues.

UNIT V: SOFTWARE PROGRAMMING AND DATABASE MANAGEMENT**12**

Database management systems – Working with database – Survey of database systems – Common DBMS – Creating computer programs – Hardware software interaction – Evolution of programming languages – High level languages – World Wide Web development languages – Software development life cycle – Careers in programming.

Total L: 60

TEXT BOOKS

1. Peter Norton - “Introduction to computers”, Tata-McGraw Hill companies , New delhi, Special Indian edition, Seventh edition 2017.

REFERENCES

1. Stephen. J. Bigelow – Troubleshooting and Repairing PC's, Tata McGraw Hill Publishing Company Ltd, Fifth edition, 2017.
2. Scott Mueller – Upgrading and repairing PC's, Prentice Hall of India, 2015.
3. Computer Fundamentals by P.K. Sinha, BPB publications, sixth edition 2004.

CS3602	PROGRAMMING IN C	L	T	P	C
		3	1	0	4

Aim: Aims to gain an idea for using C programming, arrays, Character arrays and strings

Objectives

- Analyze the program and follow the programming style.
- Develop efficient program in C using conditional and Looping statements.
- Demonstrate the use of Arrays and Strings.
- Develop programs using Functions and structures.
- Analyze the use of pointers and Files.

Course Outcome - COs		Cognitive Skill
CO-01	To get knowledge about the fundamental concepts of C language	R,U
CO-02	Will be able to understand and apply Decision making and branching, Decision making and looping statements	U,A
CO-03	Will gain an idea for using arrays , Character arrays and strings	U,A
CO-04	Will be able to understand and apply user defined functions Structures and Unions.	U. A
CO-05	Will be able to understand and apply Pointers, Files.	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	S	S	S	S	S	S	S
CO-02	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	S	S	S	S	S
CO-04	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	S	S	S	S	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Input/ Output

9

Constants, Variables and data types – Managing input and output operations: Reading a character – Writing a character – Formatted input – Formatted output – Operators and expressions: Arithmetic operator – Relational operator – Logical operator – Assignment operator – Increment and decrement operator – Conditional operator – Bitwise operator – special operator – Arithmetic expressions – Type conversion in expression.

UNIT II: Decision making and branching

9

Decision making and branching; If statement – The if else statement – The else if ladder – The switch statement – The Goto statement – Decision making and looping: The while statement – The do statement – The for statement.

UNIT III: Arrays**9**

Arrays: One dimensional arrays: Declaration – Initialization – Two dimensional arrays: Initializing two dimensional arrays – multi dimensional arrays – dynamic arrays – Character arrays and strings: Declaring and initializing string variables – Reading strings – Writing strings – Comparison of two strings – String handling functions.

UNIT IV: Functions**9**

User defined functions – Structures and unions: Defining a structure – Declaring structure variables – Accessing structure members – Structure initialization – Copying and comparing structure variables – Arrays of structures – Arrays within structures – Structures and functions – Unions – Bit fields.

UNIT V: Pointers**9**

Pointers: Understanding pointers – Accessing the address of a variables – Declaring pointer variables – Initialization of pointer variables – Accessing a variable through its pointer – Pointer expressions – Pointer increments – Pointer arrays – File management in C.

L : 45, T : 15, Total : 60

Text Book:

1. E. Balagurusamy, “Computing fundamentals and C Programming”, Tata Mcgraw – Hill, 2017.

Reference Book:

1. Byron Gottfrid, “Programming with C” third edition, Mcgraw Hill companies, 2017.

GE3603	VALUE BASED EDUCATION	L	T	P	C
		2	0	0	2

Objective:

- To enable the students to understand the social realities and to inculcate an essential value system towards building a health society.
- To study the ethical and social values in respect of different cultures.

Unit I Social Justice**6**

Definition – Need – Parameters of Social Justice – Factors Responsible for Social Injustice – Caste and Gender – Contributions of Social Reformers. Concept of Human Values - Self - Introspection- Self-Esteem.

Unit II Human Rights and Marginalized People**6**

Concept of Human Rights – Principles of Human Rights – Human Rights and Indian Constitution – Rights of Women and Children – Violence Against Women – Rights of Marginalized People – Like Women - Children – Dalits – Minorities - Physically Challenged Etc.

Unit III Social Issues and Communal Harmony**6**

Social Issues – Causes and Magnitude – Alcoholism - Drug Addiction – Poverty - Unemployment Etc – Communal Harmany –Concept –Religion and its Place in Public in Public Domain – Separation of Religion from Politics –Secularism Role of Civil Society

Unit IV Media Education and Globalized World Scenario**6**

Mass Media –Functions –Characteristics –Need and Purpose of Media Literacy – Effects and Influence - Youth and Children – Media Power – Socio Cultural and Political Consequences

PO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
-----------	------	------	------	------	------	------	------	------	------	------

CO										
CO-01	S	S	S	S	S	S	S	S	S	S
CO-02	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	S	S	S	S	S
CO-04	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	S	S	S	S	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

List of Experiments

Implementation of

1. Input / output function
2. Control Functions
3. Functions
4. Arrays
5. Pointers
6. Structures and Unions
7. Files

Using case studies on : Roots of a quadratic equation, Measures of location – Matrix Operations – Evaluation of trigonometric functions – Pay roll problems. String operations like substring, concatenation, finding a string from a given paragraph, finding the number of words in a paragraph.

CS3672	COMPUTER AND OFFICE AUTOMATION LABORATORY	L	T	P	C
		0	0	2	2

Aim: This lab educates word processing, worksheets and database.

Objectives :

The student should

- Understand the components of the Computer
- Perform system administration tasks
- Understand different Office Automation tools.
- Develop skills in preparing a document/worksheet/presentation/database

Course Outcome - COs		Cognitive Skill
CO-01	To get a deep knowledge on Starting Up Applications, common controls, Command prompt choices.	U
CO-02	Able to understand comfortable editing and composing on Word documents, formatting Documents.	A
CO-03	Will be able to understand Worksheet creation , Manipulation of worksheets and workbooks.	An
CO-04	To get an idea on Designing and creating presentations, Adding animations and Multimedia	E

CO-05	To get a detailed idea on Access database, creating tables and queries, Reports.	E
-------	--	---

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	N	L	M	N	N	S	L	L	N
CO-02	M	S	S	M	M	M	M	N	M	N
CO-03	M	M	L	S	N	N	S	S	L	N
CO-04	L	L	M	M	S	L	S	L	S	N
CO-05	M	M	L	N	N	L	S	M	L	N

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS.

Evolution of computers – Organization of Modern Digital Computers – Single user

Operating System – Multitasking OS – GUI.

2. OFFICE AUTOMATION

- Word Processing
- Data Base Management System
- Spread Sheet Package
- Presentation Software.

SEMESTER II

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	MS36T2 / MS36M2 / MS36H2	Language II – Tamil / Malayalam / Hindi	3	0	0	3
2.	EG3602	English II	3	0	0	3
3.	MA3606	Mathematical Foundations of Computer Science	3	0	0	3
4.	CS3603	Object Oriented Programming in C++	3	1	0	4
5.	CS3604	Database Management Systems	4	0	0	4
6.	GE3602	Environmental Studies	2	0	0	2
PRACTICAL						
7.	CS3673	Programming in C++ - Practical	0	0	2	2
8.	CS3674	RDBMS Laboratory – Practical	0	0	2	2
TOTAL						23

MS36T2	TAMIL II	L	T	P	C
		3	0	0	3

Course Outcome		Cognitive Skill
CO-01	செய்யுள் பகுதி மூலம் மாணவர்கள் சைவம், வைணவம், நீதி நூல்களை கற்று அறிவு பெற்றனர்.	U
CO-02	இலக்கணப் பகுதி மூலம் மாணவர்கள் சொல்லின் பொது இலக்கணத்தை கற்று பிழையின்றி பயன்படுத்த கற்றனர் .	A
CO-03	உரைநடை பகுதி மூலம் மாணவர்கள் படித்தாலே இனிக்கும், வெட்டி அருகில் தான் போன்ற தத்துவங்களை கற்றுக் கொண்டனர்.	R
CO-04	வாழ்க்கை வரலாறு பகுதி மூலம் மனோன்மணியம் சுந்தரனார் வாழ்வும் பணியும் கற்று வாழ்க்கையை முறைப்படுத்திக் கொண்டனர்.	U
CO-05	இலக்கிய வரலாறு பகுதி மூலம் பன்னிரு திருமுறைகள், சமண இலக்கியங்களை கற்று வாழ்க்கையை மேம்படுத்திக் கொண்டனர்.	R

R-Remember,U-Understand,A-Apply,An-Analyze,E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L	PO-M
CO-01	L	M	S	S	L	S	S	S	M	S	L	L	L
CO-02	L	L	L	S	L	S	L	M	S	S	S	S	S
CO-03	L	S	S	L	L	L	S	S	M	S	S	S	M

CO-04	L	S	L	M	L	L	L	S	M	S	M	S	S
CO-05	S	M	S	M	S	S	S	M	S	S	S	S	M

S-Strong, M-Medium, L-Low, N-Not relevant

அலகு: 1 செய்யுள்

9

சமய இலக்கியங்கள்- சைவம்- தேவாரம் - திருஞானசம்பந்தர்- திருநாவுக்கரசர்- சுந்தராதிருவாசகம் - மாணிக்கவாசகர்- திருமந்திரம் - (அன்புடைமை) திருமூலர்- திருவருட்பா-வள்ளலார்- **வைணவம்-** திருப்பாவை-ஆண்டாள்- **கிறித்தவம்-** கிறிஸ்து மொழிக்குறள் - திரு.வி.க- **இசுலாமியம்-** இறைஞ்ச இயல்பு - அப்துல் கபூர்- **நீதி இலக்கியங்கள்- பதினெண்கீழ்க்கணக்கு நூல்கள்** - திருக்குறள் - திருவள்ளுவர்- நாலடியார் - சமணமுனிவர்கள்- இன்னாநாற்பது-கபிலர்- இனியவைநாற்பது- பூதஞ்சேந்தனார்- முதுமொழிக் காஞ்சி-மதுரைகூடலூர்க்கிழார்

அலகு: 2 இலக்கணம்

9

சொல்லின் பொது இலக்கணம்- பெயர்ச் சொல் - அறுவகைப் பெயர்கள்- வினைச்சொல் - ஏவல், வியங்கோள், செய்வினை, செயப்பாட்டுவினை, தன்வினை, பிறவினை- இடைச்சொல் - ஏ, ஓ, உம் இடைச்சொற்கள்- உரிச்சொல்- கடிதங்கள்

அலகு: 3 உரைநடை - இலக்கியஉலா (ம.திருமலை)

9

படிப்பதுஎப்படி.- ஹைக்கூக் கவிதைகளில் இயற்கை.- கூட்டுக் குஞ்சுகள் (ராஜம் கிருஷ்ணன்)-நாவலில் தொழிலாளர் நிலை.- மகாகவிவள்ளத்தோள்.- மாணிக்கவாசகரின் சிவபுராணம்.

அலகு: 4 வாழ்க்கைவரலாறு

9

பாட்டாளிக் கவிஞர் பட்டுக்கோட்டைகல்யாணசுந்தரம் - (கார்த்திகேயன்)

அலகு: 5 இலக்கியவரலாறு

9

நீதி நூல்களும் சமய இலக்கியங்களும்- பதினெண்கீழ்க்கணக்கு நூல்கள்- பன்னிருதிருமுறைகள்- கிறித்தவம், இசுலாமியம் தமிழுக்குசெய்ததொண்டு.

TOTAL: 45 HOURS

பார்வை நூல்கள்

1. உரைநடை - இலக்கியஉலா- ம. திருமலை
2. வாழ்க்கைவரலாறு- பட்டுக்கோட்டைகல்யாணசுந்தரனார் - தொகுப்பாசிரியர் கார்த்திகேயன்
3. இலக்கியவரலாறு- மு. வரதராசனார்

MS36H2	HINDI II	L	T	P	C
		3	0	0	3

OBJECTIVES

- To acquire knowledge regarding fundamental concepts in Hindi grammar.
- To acquire the ability to master translation skills.
- To develop writing skills for official documentation –Letter, Banking terminologies

Course Outcome	Cognitive Skill
----------------	-----------------

CO-01	In depth knowledge regarding the one act plays	An,E
CO-02	Identify eminent modern Hindi poets	R,An
CO-03	Framing Sentences	E
CO-04	Applications of mass media – Advertisement .	R,U
CO-05	Comprehension..	A, An

R-Remember,U-Understand,A-Apply,An-Analyze,E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L	PO-M
CO-01	L	M	S	S	L	S	S	S	M	S	L	L	L
CO-02	L	L	L	S	L	S	L	M	S	S	S	S	S
CO-03	L	S	S	L	L	L	S	S	M	S	S	S	M
CO-04	L	S	L	M	L	L	L	S	M	S	M	S	S
CO-05	S	M	S	M	S	S	S	M	S	S	S	S	M

S-Strong, M-Medium,L-Low,N-Not relevant

UNIT 1 : ONE ACT PLAY

- Dus Hassar
- Dus Minute
- Bor ka Thara

UNIT II : MODERN POETRY

- Iago Phir Ek Baar
- Kya Poojan Kya Archan Re
- Kitne Navvon mein Kitne Baar
- Waqt

UNIT III : GRAMMAR

- Kriya Visheshan
- Sampantha Bodhan Abhvyay
- Sammuchak Bodha Avyay
- Vismayathi Bodhak Avyay

UNIT IV : MEDIA AND ADVERTISEMENT

UNIT V : COMPREHENSION

TEXT BOOKS :

1. Ekangi Panjamruth-Dr Ram Kumar - Published by Jawahar Pusthakaly Madurai
2. Kavya Ras-Dr. V Bhaaskar Published by Pachorri Press, Sadar Bhazar, Madurai
2. Vyakaran Pradeep - Ram Dev MA-Published by Hindi Bhavan, Allahabad
3. Prayojan Moolak Hindi Dariyaganj, New Delhi Published by Sinthant Aur Prayog Vani Publication

EG3602	ENGLISH-II	L	T	P	C
		3	0	0	3

Aim:

1. To empower learners with fundamental knowledge and communicative competence in English, fostering effective communication skills.
2. To cultivate an understanding and appreciation of various literary genres such as poetry, prose, and short stories, along with a solid grasp of grammar.
3. To instil the basics of non-verbal communication, contributing to a comprehensive and well-rounded English language proficiency for the learners.

Objectives:

1. To make the learners acquire basic knowledge in English with communicative competence
2. To enable them to communicate effectively in English
3. To make them understand and assimilate the genres of poetry, prose, and short story and grammar, and imbibe the basics of non-verbal communication

Course Outcomes		Cognitive Skill
CO-01	The students will be able to learn the various themes, styles and the nuances of modern English prose written by great masters of prose writing.	R
CO-02	The students will be able to grasp the poetical language, the rhythm and cadence of poetry, the themes and styles of different masters of English poetry.	U
CO-03	The students will be able to understand the elements of a short story, narrative techniques employed and its brevity and wisdom from the great masters of storytelling.	U
CO-04	The students will learn basic grammar and vocabulary that will enrich their communicative competence.	A
CO-05	The students will have a broader understanding of Non-Verbal communication and a focused view of the various components of non-verbal communication such as eye contact, postures, gestures, etc.	A

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	L	M	L	L	M	M	M	M	M	M
CO-02	L	L	L	M	M	M	M	M	L	M
CO-03	M	M	L	L	M	M	M	M	M	M
CO-04	L	M	L	M	M	M	L	M	M	M
CO-05	M	L	L	L	M	M	M	L	M	M

S-Strong, M-Medium, L-Low, N-Not relevant

UNIT- I: PROSE : A GALAXY OF PRECIOUS PROSE: (DETAILED)

9

1. Water the Elixir of Life – C. V. Raman
2. An Astrologer's Day - R. K. Narayan
3. Hazards of Sensual Drugs - Hardin B Jones

UNIT- II POETRY : HARMONY (DETAILED)

9

1. La-Belle Dame Sans Merci – John Keats
2. All the World's a Stage – William Shakespeare
3. Palanquin Bearers – Sarojini Naidu

UNIT III SHORT STORY : POPULAR SHORT STORIES (NON –DETAILED)

9

1. The Necklace – Guy De Maupassant
2. The World Renowned Nose – V. M. Basheer
3. The Selfish Giant – Oscar Wilde

UNIT IV GRAMMAR :

9

1. FUNCTIONAL ENGLISH- Articles, Preposition, Conditional clauses, Direct Speech, Indirect Speech
2. Vocabulary- Homonyms, Homophones, Parts of Speech, Sentence formation,

UNIT V

9

Non-Verbal Communication

L: 45 = TOTAL: 45 PERIODS

TEXT BOOKS

1. Galaxy of English Prose, Ed. Dr. B. Symala Rao, Blackie Books, Madras.
2. An Anthology of Poems, Harmony, Ed. Biyot K. Tripathy.
3. Popular Short Stories.

MA3606	Mathematical Foundations of Computer Science	L	T	P	C
		3	0	0	3

AIM

To provide a foundation in symbolic logic, set theory, differentiation and two dimensional geometry.

OBJECTIVES

- To familiarize symbolic logic concepts

- To learn set theory and its applications
- To learn differentiation and its applications
- To gain concepts of two dimensional geometry

Course Outcome		Cognitive Skill
CO-01	Translate ordinary English language statements and arguments into symbolic form. Use formal methods of propositional and predicate logic for analyzing the logical structures of ordinary language statements, and for determining the validity of deductive arguments.	R, U, A, An, E, S
CO-02	Understand the basic principles of sets and operations in sets. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.. Demonstrate an understanding of relations and functions and be able to determine their properties. Determine when a function is 1-1 and "onto"	R, U, A, An, E, S
CO-03	Describe binary relations between two sets .Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, combinations Apply counting principles to determine probabilities. Understand the concept of Boolean Algebra.	R, U, A, An, E, S
CO-04	Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point. Compare and contrast the ideas of continuity and differentiability. Finding maxima and minima, critical points and inflection points of functions and to determine the concavity of curves.	R, U, A, An, E, S
CO-05	Study of lines in 2dimension. Finding equation in various form of line, pair of straight lines and circle	R, U, A, An, E, S

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

UNIT-I SYMBOLIC LOGIC

9

Proposition, Logical operators, conjunction, disjunction, negation, conditional and bi-conditional Operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II SET THEORY

9

Sets, set operations, Venn diagram, Properties of sets, number of elements in a set, Cartesian product, relations and functions, Relations: Equivalence relation. Equivalence class, partially and totally Ordered sets, Functions: Types of Functions, Composition of Functions.

UNIT-III BINARY OPERATIONS

9

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties, Permutations and Combinations.

UNIT-IV DIFFERENTIATION

9

Simple problems using standard limits, Differentiation, successive differentiation, Leibnitz theorem, partial differentiation, Applications of differentiation, Tangent and normal, angle between two curves, Maximum and Minimum values (Second derivative test), Curvature and radius of Curvature (Cartesian coordinates), Envelopes.

TEXT BOOKS:

1. B.S.Grewal, 'Higher Engineering Mathematics, Khanna Publishers, 40th Edition.
2. Kenneth H. Rosan, "Discrete Mathematics and its applications", fifth edition, Tata McGraw – Hill, 2003
3. Manicavachagompillay and Natarajan. Analytical Geometry part I - Two Dimension - S. Viswanathan (printers and publication) Put Ltd., 1991.

REFERENCES:

1. P.R. Vittal, Mathematical Foundations - Margham Publication, Chennai.
2. U. Rizwan, Mathematical Foundation - SciTech, Chennai
3. V. Sundaram and Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.
4. P. Duraipandian and Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.

CS3603	OBJECT ORIENTED PROGRAMMING AND C++	L	T	P	C
		3	1	0	4

Aim: Object-oriented programming aims to implement real-world entities like inheritance, hiding, polymorphism, etc in programming. The main aim of OOP is to bind together the data and the functions that operate on them so that no other part of the code can access this data except that function.

Objectives

- To Understand Object Oriented Programming Paradigm.
- To study the Basic concepts of OOP and to Develop Programs Using C++.
- To understand Code Reuse through Inheritance.
- To Manage Console I/O Operations and Files.

Course Outcome - COs		Cognitive Skill
CO-01	Will able to understand how C++ improves C with object oriented features	R
CO-02	Students will able to learn how to write inline functions for efficiency and performance.	A
CO-03	Ability to learn how to implement copy constructors and class member functions	U, An
CO-04	Able to learn how inheritance and virtual functions implement dynamic binding with polymorphism	E
CO-05	Students will learn how to use exception handling in C++ programs.	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	S	S	S	S	S	S	s	S	S	S
CO-02	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	S	M	M	S	S
CO-04	S	S	S	S	S	S	S	S	M	L
CO-05	S	S	S	S	M	S	S	S	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction to Object-Oriented Programming

12

Principles of Object-Oriented Programming – Software Crisis – Software Evolution – Procedure-Oriented Programming – Object-Oriented Programming – Basic Concepts – Benefits –Object-Oriented Languages – Applications of OOP - Beginning With C++ – C++ – Applications of C++ –Simple C++ Program – C++ Statements – Example with Class – Structure of C++ Program – Creating the Source File – Compiling and Linking –Tokens, Expressions and Control Structures.

UNIT II: Functions

12

Functions in C++ – Introduction – The Main Function – Function Prototyping – Call by Reference – Return by Reference – Inline Functions – Default Arguments – const Arguments – Function Overloading – Friend and Virtual Functions – Math Library Functions – Classes and Objects.

UNIT III: Constructor

12

Constructors and Destructors – Introduction – Parameterized Constructors – Multiple Constructors in a class – Constructors with Default Arguments – Dynamic Initialization of Objects – Copy Constructor – Dynamic Constructors – Constructing Two-dimensional Arrays – const Objects – Destructors – Operator Overloading and Type Conversions.

UNIT IV: Inheritance

12

Inheritance: Extending Classes – Introduction – Derived Class – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Classes – Constructors in Derived Classes – Member Classes: Nesting of Classes – Pointers, Virtual Functions and Polymorphism.

UNIT V: Input and Output Operations

12

Managing Console I/O Operations – Working With Files – Introduction – Classes for File Stream Operations – Opening and Closing File – Detecting end-of-file – File Modes – File Pointers and Their Manipulations – Sequential Input and Output Operations – Updating a File – Error Handling During File Operations – Command-line Arguments.

L : 45, T : 15 , Total : 60

TEXT BOOK

E. Balagusamy, “Object Oriented Programming with C++”, 6th edition, McGraw Hill Education, 2013.

REFERENCES

1. JeganathanSwaminathan, “Mastering C++ Programming”, Packt Publishing, First Edition, 2017.

Herbert Schildt “C++ - The Complete Reference”, McGraw Hill Education, Fourth Edition, 2003.

CS3604	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		4	0	0	4

AIM : The primary goal of a DBMS is to provide an environment that is both convenient and efficient to use in retrieving and storing data base information.

OBJECTIVES

- To learn the fundamentals and issues in database systems
- To appreciate the design of databases using relational models
- To learn data definition and query languages
- To understand the importance of transaction management in databases
- To emphasize the need for sorting and indexing in databases
- To learn advanced representations of databases suited for real-time applications.

Course Outcome - COs		Cognitive Skill
CO-01	Understand database concepts and structures and query language.	U
CO-02	Understand the principles of storage structures	An, A
CO-03	Understand and apply the relational model and apply various Normalization techniques	U, A
CO-04	Understand and analyze query processing and techniques involved in query optimization.	A
CO-05	Execute various advance SQL queries in Locking using concept of Concurrency control	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	M	M	S	S	M	M	L	S
CO-02	S	S	S	M	S	S	M	L	M	L
CO-03	S	M	S	S	S	S	M	M	L	S
CO-04	S	S	S	S	M	M	M	L	L	L
CO-05	S	S	S	M	S	M	S	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I Introduction

12

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling.

UNIT II Storage Structures

12

Secondary storage Devices – RAID Technology – File operations – Hashing Techniques – Indexing – Single level and Multi- level Indexes – B+ tree – Indexes on Multiple Keys

UNIT III Relational Model

12

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Constraints – Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus – overview of commercial RDBMSs – Database Design – Functional Dependencies – Normal Forms – 1NF – 2NF – 3NF – BCNF – 4NF – 5NF – Database Tuning.

UNIT IV Query and Transaction Processing

12

Algorithms for Executing Query Operations – using Heuristics in Query operations – Cost Estimation – Semantic Query Optimization – Transaction Processing – Properties of Transactions – Serializability – Transaction support in SQL.

UNIT V Concurrency, Recovery and Security

12

Locking Techniques – Time Stamp ordering – Validation Techniques – Granularity of Data Items – Recovery concepts – Shadow paging – Log Based Recovery – Database Security Issues – Access control – Statistical Database Security.

Total L: 60

Text Book

1. RamezElamassri and Shankant B- Navathe, “Fundamentals of Database Systems”, Third Edition, Pearson Education Delhi, 2002.

References

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan, “Database System Concepts”, Fourth Edition, McGraw Hill, 2002.
2. C.J. Date, “An Introduction to Database Systems”, Seventh Edition, Pearson Education Delhi, 2002.

GE3602	ENVIRONMENTAL STUDIES	L	T	P	C
		2	0	0	2

Objectives:

- To understand the complexity of ecosystems and possibly how to sustain them
- To understand the relationships between humans and the environment.
- To understand major environmental problems including their causes and consequences.

UNIT-I: Environmental Sciences

(6)

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: Ecosystem

(6)

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem. Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity.

UNIT-III: Environmental Pollution

(6)

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: Environmental Ethics

(6)

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act

UNIT-V: Human Health

(6)

Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

TOTAL: 30 PERIODS

BOOKS FOR REFERENCE:

1. Gupta N.C.; Social Auditing of Environmental Law in India, edited book, New Century Publications, Delhi-2003.
2. Divan, Shyam and RosenCeran; Armin. Environmental Law and Policy in India, Cases, materials and statutes, second edition, Oxford University Press, 2001.
3. Uberoi, N.K.; Environmental Management, Excel Books, New Delhi, 2000.
4. Agarwal, A, Narain; S. State of India's Environment, Published by Centre for Science and Environment, New Delhi, 1999.
5. Joseph, Casio, Woodside, Gayle and Mitchell, Philip.; ISO 14000 guide- The new Environmental Management Standards, McGraw Hill, New York, 1996.

CS3673	PROGRAMMING IN C++ - PRACTICAL	L	T	P	C
		0	0	2	2

Aim: C++ supports different ways of programming like procedural, object-oriented, functional, and so on. This makes C++ powerful as well as flexible.

Objectives

- To Practice Object Oriented Programming Paradigm.
- To Practice the basic concepts of OOP and to Develop Programs Using C++.
- To Practice Code Reuse through Inheritance.

Course Outcome - COs			Cognitive Skill
CO-01	Students will implement inline functions and friend functions for efficiency and performance	effi	E

CO-02	Able to learn how to implement copy constructors and class member functions	An, A
CO-03	Able to learn how inheritance and virtual functions are implemented using polymorphism	E
CO-04	Students will able to implement insert, update and delete a record from a file	A, E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	S	S	S	S	S	S	S
CO-02	S	S	S	S	M	S	S	S	S	S
CO-03	S	S	L	S	S	S	M	M	S	S
CO-04	S	S	S	S	S	S	S	S	M	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. Simple Programs in C++.
2. Programs to implement Control Structures.
3. Functions in C++.
4. Classes and Objects.
5. Constructors and Destructors.
6. Inheritance.
7. Function Overloading.
8. Operator Overloading.
9. Virtual Functions.
10. Use of Pointers.
11. Console I/O Operations.
12. File Manipulation.

CS3674	RDBMS LABORATORY- PRACTICAL	L	T	P	C
		0	0	2	2

Aim: The RDBMS provides an interface between users and applications and the database, as well as administrative functions for managing data storage, access, and performance.

Objectives

- To understand data definitions and data manipulation commands
- To learn about the use of nested and joint queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical data base applications

Course Outcome - COs		Cognitive Skill
CO-01	Analyze the database language commands to create simple database	An
CO-02	Analyze the database using queries to retrieve records	An
CO-03	Applying PL/SQL for processing database	A
CO-04	Analyze front end tools to design forms, reports and menus	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	M	M	L	S	M	M	M	S	S	M
CO-02	M	M	S	S	M	S	S	M	M	S
CO-03	S	M	M	M	M	M	S	M	M	M
CO-04	S	S	S	S	M	S	M	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

Implementation of following problems using SQL

1. Data Definition Commands
2. Data Manipulation Commands
3. Data Control Commands
4. Views - Creation and Manipulation
5. High level language extensions – PL/SQL Or Transact SQL – Packages
6. Use of Cursors, Procedures and Functions
7. Database Connectivity
8. Oracle or SQL Server Triggers
9. Working with Forms, Menus and ReportWriters for a application project in any domain
10. Front-end tools –Visual Basic/Developer 2000

SEMESTER III

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	MA3607	Fundamentals of Statistics	3	0	0	3
2.	CS3605	Data Structures	3	1	0	4
3.	CS3606	Computer Architecture	4	0	0	4

4.	CS3607	Operating Systems	4	0	0	4
5.	CS3608	JAVA Programming	3	1	0	4
PRACTICAL						
7.	CS3675	Data Structures Laboratory	0	0	2	2
8.	CS3676	JAVA Programming Laboratory	0	0	2	2
TOTAL						23

MA3607	FUNDAMENTALS OF STATISTICS	L	T	P	C
		3	0	0	3

AIM

The probabilistic models are applicable in all areas of science and technology. This course provides necessary mathematical support to solve real life problems

OBJECTIVE

To have the fundamental knowledge of basic statistical and probability concepts, the standard distributions and equip the students with different statistical techniques which are essential to solve practical problems.

Course Outcomes		Cognitive Skill
CO1	Define the basic concepts of sampling, Categorize the different sampling methods, know the complementary relationship of skewness with measures of central tendency and dispersion in describing a set of data, 'moments' as a convenient and unifying method for summarizing several descriptive statistical measures.	R, U, A, An, E, S
CO2	Apply the axioms of probability in assigning probabilities to the basic outcomes in a sample space, Compute conditional probabilities using Bayes' theorem and the law of total probability, probability mass functions for discrete random variables and continuous random variables and expectation.	R, U, A, An, E, S
CO3	Calculate the moments and formulate the Moment Generating Function, Describe the characteristics and compute probabilities using Binomial, Poisson, Uniform, Exponential and Normal distributions.	R, U, A, An, E, S
CO4	Calculate and interpret the correlation between two variables, Determine whether the correlation is significant, the simple linear regression equations for a set of data	R, U, A, An, E, S

CO5	Understand problem of statistical inference, Conduct hypothesis test about population mean and proportions using sample tests, To understand how to use <i>F</i> -test to judge whether two population variances are equal	R, U, A, An, E, S
------------	--	-------------------

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT 1 DESCRIPTIVE STATISTICS 9

Introduction to Statistics, Basic concepts, population and sample, Collection of data, census and sampling .Methods of sampling - Random and Non-random sampling methods. Frequency distributions-Measures of central tendency, measures of dispersion, moments, skewness and kurtosis.

UNIT II PROBABILITY AND RANDOM VARIABLES 9

Axioms of probability - Conditional probability – Independent Events - Total probability – Baye’s theorem- Random variables - Probability mass functions - Probability density functions - Properties – Expectation

UNIT III STANDARD DISTRIBUTIONS 9

Moments and Moment generating function- Binomial, Poisson, Uniform, Exponential and Normal distributions (simple problems only)

UNIT IV CORRELATION AND REGRESSION ANALYSIS 9

Scatter diagram -Types of correlation, Karl Pearson’s correlation coefficient, properties of correlation coefficient. Rank correlation. Linear regression

UNIT V TESTING OF HYPOTHESIS 9

Sampling distribution – Standard error – Sample size –Type I error and Type II error - One tailed and two tailed tests – Proportions – means – Small sample tests – student’s t-test – Single mean, difference of means – F- test for variances

TOTAL:45+15= 60

TEXT BOOK

1. Gupta, S.C, and Kapur, J.N., “Fundamentals of Mathematical Statistics”, Sultan Chand, Ninth Edition , New Delhi ,1996.

Unit 1 : Chapter 1: Sections 1.1, 1.2, Chapter 14: Section 14.2,

Chapter 2: Sections 2.4,2.5, 2.6, 2.7, 2.8, 2.9, 2.13, 2.15, 2.16, 2.17

Unit 2 : Chapter 3: Sections 3.8,3.10, 3.12, Chapter 4: Section 4.2,

Chapter 5: Sections 5.1, 5.2, 5.3, 5.4.1, Chapter 6: Sections 6.1, 6.2.

Unit 3 :Chapter 2: Sections 2.15, Chapter 7: Section 7.1,

Chapter 8: Sections 8.4, 8.5, Chapter 9: Sections 9.2, 9.3, 9.8.

Unit 4 :Chapter 10: Sections 10.1, 10.2, 10.3, 10.4, 10.7 Chapter 11: Section 11.1, 11.2

Unit 5 :Chapter 14: Sections 14.3, 14.4, 14.5, 14.7, 14.8, Chapter 16: Section 16.5, 16.6.1,

Chapter 8: Sections 8.4, 8.5, Chapter 9: Sections 9.2, 9.3, 9.8

REFERENCES

1. Hogg R.V.& Craig A.L. Introduction to Mathematical Statistics, American publishing Co Pvt Ltd.
2. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, “Probability and Statistics for Engineers and Scientists”, Seventh Edition, Pearsons Education, Delhi , 2002.
3. Lipschutz. S and Schiller. J, “Schaum’s outlines - Introduction to Probability and Statistics”, McGraw-Hill, New Delhi, 1998.

CS3605	DATA STRUCTURES	L	T	P	C
		3	1	0	4

Aim: Data structure provides the right way to organize information in the digital space. To understand the abstract data types stack, queue, and list. To be able to implement the ADTs stack, queue

Objective:

Learning program independent view of data structures, including its representation and operations performed on them. Which are then linked to sorting, searching and indexing to increase the knowledge of usage of data structures in algorithmic perspective.

Course Outcome - COs		Cognitive Skill
CO-01	To get a detailed idea on various sorting methods and merging.	R
CO-02	Study about basic concepts of stack and queue.	U
CO-03	Will be able to understand linked list.	An
CO-04	To get a deep knowledge on trees and tree traversal.	A
CO-05	Will be able to understand the concept of graphs.	S

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	M	S	M	M	M	S	S	M	L	M
CO-02	M	S	S	L	S	M	M	S	M	S
CO-03	M	M	S	S	S	S	S	S	L	S

CO-04	L	L	M	M	S	S	S	L	S	M
CO-05	M	S	L	M	S	L	S	M	L	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction to Data Structures

9

Introduction, Data Structures, Fundamentals of DS, Operations on Data Structure. **Arrays** – Introduction, Memory/Storage Representation of One and Two Dimensional Array. Sorting- Definition of Sorting, Comparison of Sorting Method, Bubble Sort, Insertion Sort, Selection Sort, Merging. **Searching**- Definition, Type of Searching (Binary Search, Linear Search.)

UNIT II: Stacks and Queues

9

Stacks- Introduction & Definition, Application of Stack, Various Representation of Stack, Operation on stack (Push and Pop) Hierarchy of Operation, Representation of Arithmetic Expression (Infix, Postfix, Prefix) Multiple Stack.

Queues- Introduction, Applications of Queue, Various Representations of Queue, Operation on queue. Concept of Deque, Priority Queues, Circular Queue.

UNIT III: Linked List

9

Introduction, Application of Linked List, and Representation of Linked List, Singly Linked List- Operation on Linked List (Inserting, Removing, Reversing, Searching, Sorting). Concept of Doubly Linked List- Circular Linked List.

UNIT IV: Trees

9

Introduction – Binary Trees – Binary Tree Traversals: Inorder Traversal – Preorder Traversal – Postorder Traversal. Heaps – Binary Search Trees Forests: Transforming a Forest into a Binary Tree.

UNIT V: Graphs

9

The Graph Abstract Data Type-Elementary Graph Operations – Minimum Cost Spanning Trees: Kruskal's Algorithm – Prim's Algorithm. – Shortest Paths and Transitive Closure: Single Source/ All Destination: Nonnegative Edge Costs - All Pairs Shortest Paths.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOK

1. Tremblay, J.P., and Sorenson, P.G., "An Introduction to Data Structures with Applications", II edition, Tata McGraw Hill Publication Company Ltd., New Delhi, 2002.
2. E. Balagurusamy, "C and Data Structures", Tata McGraw Hill Pub. Co., New Delhi, 2002.
3. LipschutzSchaum's "Data Structure" Outline Series, I Edition McGraw Hill Publication Company Ltd., New Delhi, 2006.

REFERENCES

1. A.V. Aho, J.E. Hopcroft and J.D. Ullman "Data Structures and Algorithms" Pearson Education Delhi, 2002
2. Nicklaus Wirth, "Algorithms and Data Structures – Programmes" Prentice Hall of India Pvt. Ltd., New Delhi, 2002
3. Y.Langesam, M.J. Augenstein and A.M. Tenenbaum "Data Structures using C and C++" II edition, Prentice Hall of India, New Delhi, 2002

CS3606	COMPUTER ARCHITECTURE	L	T	P	C
		4	0	0	4

Aim: Aims to understand the basic structure of computer its functionalities and how the instructions can be executed.

Objectives:

- Ability to understand the processing unit of computer and to analyze the difference between various control units.
- Familiar with input output devices

Course Outcome - COs		Cognitive Skill
CO-01	Ability to understand the basic structure of computer its functionalities and how the instructions can be executed.	U
CO-02	Ability to understand the processing unit of computer and to analyze the difference between various control units.	U, R
CO-03	To be familiar with how the system performs arithmetic operations such as addition, subtraction, multiplication and division.	U, An
CO-04	To be familiar with input output devices, interrupts and DMA.	R, E
CO-05	Able to understand memory System RAM, ROM, Cache memories and can evaluate its Performance.	U, An

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	M	S	S	S	M	S	L	L	L	L
CO-02	M	S	S	S	M	S	L	L	L	L
CO-03	M	S	S	S	M	S	L	L	L	L
CO-04	M	S	S	S	M	S	L	L	L	L
CO-05	M	S	S	S	M	S	L	L	L	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I : Basic Computer Organisation And Design

12

Instruction codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Control Memory-Address Sequencing

UNIT II : Central Processing Unit

12

General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data transfer and manipulation – Program Control.

UNIT III : Computer Arithmetic

12

Hardware Implementation and Algorithm for Addition, Subtraction, Multiplication, Division-Booth Multiplication Algorithm-Floating Point Arithmetic.

UNIT IV: Input Output Organization

12

Input – Output Interface – Asynchronous data transfer – Modes of transfer – Priority Interrupt – Direct Memory Access (DMA).

UNIT V : Memory Organization**12**

Memory Hierarchy - Main memory - Auxiliary memory - Associative memory - Cache memory - Virtual memory.

Total : 60 Hours**TEXT BOOKS**

1. Carl Hamacher, Zvonko Uranesic, Safvat Zaby, "Computer Organization", 5th edition, McGraw Hill, 2002.
2. Computer system Architecture - by Morris Mano, Third Edition. P.H.I Private Limited, 2014.

REFERENCES

1. John P Hayes, "Computer Architecture and Organization", 3rd edition, McGraw Hill, 1998.
2. David A Patterson and John L. Hennessy, "Computer Organization and Design The Hardware / Software Interface", 2nd edition, Harcourt Asia, Morgan Kaufmann, 2000.

CS3607	OPERATING SYSTEM	L	T	P	C
		4	0	0	4

Aim:

This course will introduce the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

Objectives

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication.
- To understand how processes are synchronized and learn the mechanisms for handling deadlock.
- To understand different approaches to memory management.
- To understand the structure and organization of the file system.

Course Outcome - COs		Cognitive Skill
CO-01	Ability to learn the fundamentals of Operating Systems..	U
CO-02	Ability To learn the mechanisms of OS to handle processes and threads and their communication.	U,A
CO-03	Ability to understand how processes are synchronized and learn the mechanisms of deadlock	U, A
CO-04	Ability to understand different approaches to memory management	U,A
CO-05	Ability to understand the structure and organization of the file system	U

- R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

• **Mapping of Course Outcome with Programme Outcome**

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	S	M	S	L	M	L	L

CO-02	S	S	S	M	M	S	L	M	L	L
CO-03	S	S	S	M	M	S	L	M	L	L
CO-04	S	S	S	M	M	S	L	M	L	L
CO-05	S	S	S	S	M	S	L	M	L	L

- S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction

12

Operating system – Main frame systems – Desktop Systems – Multiprocessor systems– Distributed systems – Clustered systems – Real-Time systems-Hand held systems – Feature Migration –Operating System Structures: System components – Operating System Services – System Calls – System Programs – System Structure – Virtual Machine – Operating System Design and Implementation – System Generation.

UNIT II: Processes

12

Process Concepts – Process Scheduling – Operations on processes – Cooperating Processes – Interprocess Communication. Threads: Overview – Multithreading Models – Threading Issues – CPU Scheduling : Basic Concepts – Scheduling Criteria – Scheduling algorithms – Multiprocessor Scheduling – Real -Time Scheduling.

UNIT III: Process synchronization

12

Background – The critical section Problem – Synchronization Hardware – Semaphores – Classical Problems of Synchronization – Critical Regions – Monitors. Deadlocks: System Model – Deadlock Characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from deadlock.

UNIT IV: Memory Management

12

Background – Swapping – Contiguous Memory allocation – Paging – Segmentation. Virtual Memory: Background – Demand Paging – Process Creation – Page replacement –Allocation of frames – Thrashing.

UNIT V : File System Interface

12

File Concept – Access Method – Directory Structure-- File Sharing –Protection. File System Implementation: File System Structure – File System implementation-Directory implementation – Allocation Methods – Free Space Management.

Total: 60 Hours

Text Books

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”Ninth Edition, John Wiley and Sons and Inc., 2013.
2. Leland –L-Beck, D. Manjula “System Software-An Introduction to Systems Programming for VTU”, Pearson Education Publishers, Third Edition-2011.

References

1. H.M. Deitel, “Operating Systems” Second Edition, Pearson Education Delhi, 2002.
2. A.S. Tanenbaum and A.S. Woodhull “Operating Systems, Design and Implementation”, Second Edition Pearson Education Delhi, 2002.
3. John J. Donovan, “Systems Programming” Tata McGraw-Hill Publishing Company Limited, New Delhi, 2002.

CS3608	JAVA PROGRAMMING	L	T	P	C
		3	1	0	4

Aim: Understand the fundamental concepts of JAVA programming Language

Objectives

- To Understand Object Oriented Programming Paradigm.
- To study the Basic concepts of OOP and to Develop Programs Using JAVA.
- To understand Code Reuse through Constructor & Overloading.
- To Manage JAVA package

Course Outcome - COs		Cognitive Skill
CO-01	Able to understand the fundamental concepts of JAVA programming Language	U
CO-02	Apply the programming language in object oriented software development	A
CO-03	Analyze and design the concept of interfaces and packages	An
CO-04	Propose the use of certain technologies(exception handling, streams) by implementing them in java to solve the given problem	E
CO-05	Able to design applications of JAVA Applet	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	M	S	M	S	M	S	M	S	M
CO-02	M	S	M	S	M	S	S	M	S	M
CO-03	S	M	S	M	S	M	S	S	M	S
CO-04	M	L	S	M	M	S	M	S	S	M
CO-05	S	M	S	S	S	M	S	M	S	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction

9

Java Features – Comparison of Java with C and C++ - Java and Internet – Java Environment – Java program structure – Java tokens – Implementing a Java program – Java virtual machine – Constants – variables – Data types – Scope of variables – Type casting – Operators and expressions – Decision making, Branching and Looping.

UNIT II: Classes and arrays

9

Defining a class – Constructors – Methods – Overloading – static members – Nesting of methods Overriding methods – Final classes – Abstract class – Visibility control – arrays – Creating an array – two dimensional arrays – Strings – String arrays – String methods – String buffer class – Vectors – Wrapper class.

UNIT III: Inheritance, Interfaces and Packages

9

Defining a subclass – Subclass Constructor – Multi level inheritance – Hierarchical Inheritance – Defining interfaces – Extending interfaces – Implementing interfaces – Java API packages – Creating a package – Accessing and using a package – Adding a class to a package – hiding classes.

UNIT IV: Multithreading, Exception handling and files creating threads**9**

Extending the tread class – Thread life cycle – Thread exception – Thread priority – Synchronization – Runnable interface – Exceptions – Throwing own exceptions – Concepts of streams – stream classes – Byte stream classes – character stream classes – Using streams – Using file class – Other stream classes.

UNIT V: Applet programming**9**

Difference between application and applets – Applet life cycle – Creating and executable applet – Designing a web page – Adding applet to HTML File – Passing parameters to Applets.

L: 45 + T: 15 = TOTAL: 60 PERIODS**TEXT BOOK**

1. E. Balagurusamy, “Programming with Java - A primer”, Fifth edition, Tata Mcgraw Hill Education private Limited New Delhi, 2014;

REFERENCE

1. Herbert Schildt, “The Complete Reference Java 2” Fifth edition Tata Mcgraw Hill publishing company, Delhi 2002.

CS3675	DATA STRUCTURES LAB	L	T	P	C
		0	0	2	2

Aim: The aim of the course is to teach programming (with an emphasis on problem solving) and introduce elementary data structures.

Objectives:

- 1 To impart the basic concepts of data structures and algorithms
- 2 To understand concepts about searching and sorting techniques
- 3 To Understand basic concepts about stacks,queues,lists,trees and graphs
- 4 To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Course Outcome - COs		Cognitive Skill
CO-01	To understand and review the underlying details of Arrays and Structures in C.	R, U, An
CO-02	To analyze, design and implement Infix, Postfix, Prefix expressions using stack.	U, E
CO-03	To get expertise in Recursion.	U, An, S
CO-04	To get expertise in Singly Linked list, Doubly linked list.	An, A, S
CO-05	To get expertise in Circular linked list.	A, S
CO-06	To get expertise in Queues as circular list.	A, S

CO-07	To get expertise in Operation on binary trees.	An
-------	--	----

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	M	S	M	M	M	M	M	M	M	M
CO-02	S	S	M	M	M	M	M	M	M	M
CO-03	M	M	M	L	S	M	M	M	M	S
CO-04	M	M	M	S	L	L	S	M	M	M
CO-05	M	M	M	L	L	S	L	M	M	M
CO-06	M	M	M	M	M	M	M	S	S	L
CO-07	L	S	L	M	M	M	M	M	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. To insert an element Item in Sorted Array.
2. To implement the operation of Push, Pop and to know the status of stack.
3. To implement the operation of insertion and deletion on Queue.
4. A menu driven program to implement the operation of addition, deletion, searching, traversing, reversion, sorting, counting number of nodes and at the end erasing the link list. Implementation of stack using linked list.
5. Implementation of Queue using linked list.
6. To arrange the list of number in a Sorted order using Merge Sort.
7. To arrange the list of number in the Sorted order using Quick sort.
8. To check all the element of list is in sorted order or not.
9. To search an element using sequential or linear search .At the end display time required to search an element including number of comparison.
10. To search an item position in sorted list (Binary search).

CS3676	JAVA PROGRAMMING LAB	L	T	P	C
		0	0	2	2

Aim: Practice the basic concepts of OOP and to Develop Programs Using JAVA.

Objectives

- To Practice Object Oriented Programming Paradigm.
- To Practice the basic concepts of OOP and to Develop Programs Using JAVA.
- To Practice Code Reuse through Constructor, Overloading, Multithreading etc.

Course Outcome - COs		Cognitive Skill
CO-01	Ability to write programs using simple if, for loop, statements.	A

CO-02	Ability to write programs using if else, nested if control structures.	A
CO-03	Ability to write programs using class, objects and constructors.	A
CO-04	Ability to write programs using inheritance, interface and multithreading.	A
CO-05	Ability to write programs using Applet and package.	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- - I	PO- J
CO-01	S	S	S	S	S	S	S	S	L	L
CO-02	S	S	S	S	S	S	S	S	L	L
CO-03	S	S	S	S	S	S	S	S	L	L
CO-04	S	S	S	S	S	S	S	S	L	L
CO-05	S	S	S	S	S	S	S	S	L	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. Simple program using Class and objects
2. Program using Nested if statement
3. Program using nesting of methods
4. Constructor
5. Method Overloading
6. Multithreading
7. Implementing interfaces
8. Creating packages
9. Managing errors and exceptions
10. Implementing applet program
11. User defined parameters to applet
12. Interactive input to applet

SEMESTER IV

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	CS3609	Python Programming	3	1	0	4
2.	CS3610	Computer Networks	4	0	0	4

CO										
CO-01	M	S	S	M	S	S	L	L	L	M
CO-02	M	S	S	M	S	S	L	L	L	M
CO-03	M	S	S	S	S	S	L	M	L	M
CO-04	M	S	S	S	S	S	L	M	L	M
CO-05	M	S	S	S	S	S	L	M	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction to Python

9

Origins- Features- Downloading and installing Python- Running Python – Python Documentation – Comparing Python - Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.

UNIT II: Python Program Flow Control Conditional blocks

9

if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

UNIT III: Python Complex data types

9

Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

UNIT IV: Python File Operations

9

Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations. Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, Exception Handling in Databases.

UNIT V: Python packages

9

Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE.

L: 45 + T: 15 = TOTAL: 60 PERIODS

Text book

1. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016
2. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley, 2015

[illegible]

CO-01	M	S	S	M	S	S	L	L	L	M
CO-02	M	S	S	M	S	S	L	L	L	M
CO-03	M	S	S	S	S	S	L	M	L	M
CO-04	M	S	S	S	S	S	L	M	L	M
CO-05	M	S	S	S	S	S	L	M	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: ISO Model

12

Uses of Computer Networks - LAN'S - MAN'S and WAN'S and their characteristics - Protocol hierarchies - Connection oriented and connection services - Overview of OSI Reference Model - TCP/ IP Reference model and its comparisons with OSI Model .

UNIT II: Transmission Media

12

Guided Transmission Media – Magnetic media-Twisted Pair - Coaxial Cable and Optic Fibre - Wireless Transmission - Communication Satellites. Ideas of Multiplexing-frequency division-time division - SONET/SDH.

UNIT III: Data Link Layer

12

Data Link Layer design Issues - Framing Error Control and Flow Control - Error Detection and Correction - Data Link Protocols – Stop and wait Protocol - HDLC - PPP - Carrier sense multiple Access Protocols.

UNIT IV: Network layer

12

Network design Issues - Routing Algorithms - Flooding - Flow based Routing - Distance Vector Routing - Multicast routine - Congestion Control Algorithms General Principles of Congestion Control - Congestion Control for multicasting.

UNIT V : Transport Layer

12

Transport service primitives - Elements of transport protocols - TCP Service model - Issues in application layer - Network Security - Authentication Protocols - Digital Signatures - DNS Signature - Simple Network Management Protocols

TOTAL: 60 Hours

Text book

1. Andrew. S. Tanenbaum,” Computer Networks”, 5th Edition, 2011, Pearson Education.

Reference Book

1. William Stallings,”Computer Networking with Internet Protocols and Technology”, 4thEdition, 2009, Pearson Education.
2. Douglas.E.Comer, ”Computer Networks and Internets”, 2nd Edition, 2002, Pearson Education.

CS3611	WEB TECHNOLOGY	L	T	P	C
		3	1	0	4

Aim

To be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

OBJECTIVES:

1. To teach students the basics of server side scripting using PHP
2. To explain web application development procedures
3. To impart servlet technology for writing business logic
4. To facilitate students to connect to databases using JDBC
5. To familiarize various concepts of application development using JSP

Course Outcome - COs		Cognitive Skill
CO-01	Identify the difference between the HTML PHP and XML documents. .	U
CO-02	Able to create web pages using PHP.	U, R
CO-03	Apply the concepts of Javascript to perform client side validation and create dynamic web pages.	An
CO-04	Create server side applications using servlet and JDBC.	A
CO-05	Understand the concepts of JSP.	R, A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	S	S	S	S	L	L	M
CO-02	S	S	S	S	S	S	S	L	L	M
CO-03	S	S	S	S	S	S	S	M	L	M
CO-04	S	S	S	S	S	S	S	M	L	M
CO-05	S	S	S	S	S	S	S	M	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: XHTML

9

Basic Syntax, Standard structure, Basic Text markup, Images, Hypertext links, Lists, Tables, Frames. **XML:** Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model.

UNIT II: Introduction to PHP

9

Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies.

UNIT III: Client side Scripting**9**

Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations.

UNIT IV: Introduction to Servlets**9**

Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.

UNIT V: Introduction to JSP**9**

The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP.

L: 45 + T: 15 = TOTAL: 60 PERIODS**TEXT BOOKS:**

1. Web Technologies, Uttam K Roy, Oxford University Press, USA, 2010
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill, 2017

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 3rd edition, Wiley Dremtech, 2010.
2. Java Server Pages – Hans Bergsten, 3rd edition, SPD O'Reilly, 2003.
3. Java Script: The Definitive Guide, D.Flanagan, O'Reilly Media, Inc., 7th edition, 2020.
4. Beginning Web Programming with HTML,XHTML and CSS-Jon Duckett WROX, 2nd edition, 2008.

CS3612	COMPUTER GRAPHICS	L	T	P	C
		4	0	0	4

Aim:

Computer graphics is responsible for displaying art and image data effectively and meaningfully to the consumer. It is also used for processing image data received from the physical world, such as photo and video content.

Objectives

- Identify and understand the core concept of computer graphics.
- Learn the basic principles of 2-dimentional and 3-dimentional computer graphics.
- Apply graphics programming techniques to design, and create computer graphics scenes.

Course Outcome - COs		Cognitive Skill
CO-01	To get a deep knowledge on output devices, its types and input devices.	R
CO-02	To get an idea about basic Line algorithms and attributes.	U
CO-03	Will be able to understand 2D geometric transformation and clipping.	An

CO-04	Will be able to generate 3D modelling transformation.	A
CO-05	To get a detailed idea on various visible surface detection method and computer animation	S

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	M	S	L	M	M	S	S	M	L	M
CO-02	M	S	S	L	S	M	M	S	S	S
CO-03	M	M	L	S	S	M	S	S	L	S
CO-04	L	L	M	M	S	L	S	L	S	M
CO-05	M	S	L	M	S	L	S	M	L	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction to Computer Graphics

12

A survey of Computer Graphics – Overview of graphics systems – Video display devices – Raster-Scan Systems – Random-Scan Systems – Input Devices – Hard-Copy Devices.

UNIT II: Lines

12

Points and Lines – Line-Drawing Algorithms – DDA Algorithm – Bresenham's Line Algorithm – Circle-Generating Algorithms – Filled-Area Primitives – Attributes of Output Primitives – Line Attributes – Curve Attributes.

UNIT III: Two Dimensional Geometric Transformations

12

Two Dimensional Geometric Transformations – Basic Transformations – Matrix Representations – Composite transformations – Other transformations – Two-dimensional Viewing – Line Clipping – Cohen Sutherland Line Clipping – Polygon Clipping – Sutherland-Hodgeman Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping.

UNIT IV: Two Dimensional Geometric Transformations

12

Three Dimensional Geometric Modeling transformations – Translation – Rotation – Scaling – Other Transformations – Three Dimensional Viewing – Projections – Clipping.

UNIT V: Visible Surface Detection methods

12

Visible Surface Detection methods – Classification Algorithms – Back-Face Detection – Depth-Buffer Method – A-Buffer Method – Scan-Line method – Depth-Sorting method – BSP-Tree method – Area-Subdivision Method – Octree methods – Ray-Casting method – Computer Animations.

TOTAL: 60 Hours

Text Book

1. Donald Hearn, M. Pauline Baker, "Computer Graphics C Version", Second Edition, Pearson Education, 2009.

References

1. Apurva A. Desai, "Computer Graphics", Prentice Hall of India, 2008.

2. AmarendraN.Sinha, Arun D Udai, “Computer Graphics”, TataMcGraw Hill Publications, 2008.

CS3613	SOFTWARE ENGINEERING	L	T	P	C
		4	0	0	4

Aim:

To develop knowledge on Software engineering technologies, software development

Objective

- This course should help you understand theories, methods, and technologies applied for professional software development.
- To define software engineering and explain its importance
- To discuss the concepts of software products and software processes
- To explain the importance of process visibility
- To introduce the notion of professional responsibility

Course Outcome - COs		Cognitive Skill
CO-01	To get a deep knowledge on Software engineering problem, software process, project management process..	R
CO-02	Able to understand Software Requirement Analysis, Problem analysis.	U
CO-03	Will be able to understand Project scheduling, Cost estimation, Quality assurance Plans.	An
CO-04	To get an idea on function oriented Design, Detailed Design & Metrics	A
CO-05	To get a detailed idea on Top down and bottom up approaches, Code inspection and Testing.	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	N	L	M	N	N	S	L	L	N
CO-02	M	S	S	M	M	M	M	N	M	N
CO-03	M	M	L	S	N	N	S	S	L	N
CO-04	L	L	M	M	S	L	S	L	S	N
CO-05	M	M	L	N	N	L	S	M	L	N

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction

12

Introduction – The Software problem – Software Engineering Problem – Software Engineering Approach – Summary – Software Process – Characteristics of a Software Process – Software Development Process – Project Management Process – Software Configuration Management Process – Process Management Process.

UNIT II: Software Requirements	12
Software Requirements Analysis and Specification – Software Requirements – Problem Analysis – Requirements Specification – Validation – Metrics.	
UNIT III: Planning	12
Planning a Software Project – Cost Estimation – Project Scheduling – Staffing and Personnel Planning – Software configuration Management Plans – Quality Assurance Plans – Project Monitoring Plans – Risk Management.	
UNIT IV: Function-oriented Design	12
Function-oriented Design – Design Principles – Module-Level Concepts – Design Notation and Specification – Structured Design – Methodology – Verification – Metrics – Summary. Detailed Design – Module specifications – Detailed Design – Verification – Metrics.	
UNIT V: Coding	12
Coding – Programming Practice – Top-down and Bottom-up - structured programming – Information Hiding – Programming style – Internal Documentation Verification – Code Reading – Static Analysis – Symbolic Execution – Code Inspection or Reviews – Unit Testing – Metrics – Summary Testing – Fundamentals – Functional Testing versus structural Testing – Metrics – Reliability Estimation – Basic concepts and Definitions.	

Total : 60 hours

TEXT BOOK

1. PankajJalote, “An Integrated Approach to Software Engineering”, Narosa Publishing House, Delhi, 2000.

REFERENCES

1. Pressman R.S., “Software Engineering”, Tata McGraw Hill Pub. Co., Delhi, 2000.
2. Sommerville, “Software Engineering”, Pearson Education, Delhi, 2000.

CS3677	PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	2	2

AIM:

Practice the basic concepts of PYTHON and to Develop Programs Using PYTHON

Objectives:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.
-

Course Outcome - COs	Cognitive Skill
-----------------------------	------------------------

CO-01	Write, test, and debug simple Python programs.	R
CO-02	Implement Python programs with conditionals and loops.	U
CO-03	Develop Python programs step-wise by defining functions and calling them.	An
CO-04	Use Python lists, tuples, dictionaries for representing compound data.	A
CO-05	Read and write data from/to files in Python	E

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	S	S	S	S	S	L	L
CO-02	S	S	S	S	S	S	S	S	L	L
CO-03	S	S	S	S	S	S	S	S	L	L
CO-04	S	S	S	S	S	S	S	S	L	L
CO-05	S	S	S	S	S	S	S	S	L	L

S- Strong, M- Medium, L-Low, N- Not Relevant

1. Write a program to demonstrate different number datatypes in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python program to create, append and remove lists in python.
5. Write a program to demonstrate working with tuples in python
6. Write a program to demonstrate working with dictionaries in python
7. Write a python program to find largest of three numbers
8. Write a python program to print prim numbers less than 20:
9. Write a python program to find factorial of a number using recursion:
10. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first the second file.
11. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

CS3678	WEB TECHNOLOGY LAB	L	T	P	C
		0	0	2	2

AIM:

To develop an ability to design and implement static and dynamic web pages.

OBJECTIVES:

1. Choose best technologies for solving web client/server problems
2. Create conforming web pages, Use JavaScript for dynamic effects
3. Use Javascript to validate form input entry, Use appropriate client-side or Server-side applications, Create adaptive web pages, and Implement cookies
4. Deploy Java Applets and Servlets, Create an XML application

1.	CS3614	Visual Programming	3	1	0	4
2.	CS3615	Multimedia and Design	3	1	0	4
3.	CS3616	Cryptography	4	0	0	4
4.	CS3617	Internet of Things	4	0	0	4
5.	CS36XX	Elective I	3	0	0	3
6.	GE3604	Sustainability and Social Responsibility	2	0	0	2
PRACTICAL						
7.	CS3679	Visual Programming Lab- Practical	0	0	2	2
8.	CS3680	Multimedia Lab- Practical	0	0	2	2
TOTAL						25

CS3614	VISUAL PROGRAMMING	L	T	P	C
		3	1	0	4

AIM:

To study the programming concept and application development in Visual Basic 2010.

OBJECTIVES:

- To Study in detail about Windows Programming
- To Study fundamental programming concept of Visual Basic 2010
- To Study the controls supported by Visual Basic 2010
- To Study the concept of backend support in Visual Basic 2010
- To Study how to develop the applications in Visual Basic 2010

Course Outcome - COs		Cognitive Skill
CO-01	Get basic idea about Integrated Development Environment	R,U
CO-02	Know about the Visual Basic functions, subroutines. Handling of errors and exceptions.	U
CO-03	Able to develop applications in Visual Basic using Windows controls	A
CO-04	Working with advanced Windows controls and editing features.	A
CO-05	To Develop simple applications using data controls, and user controls.	A

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	S	S	S	S	M	M	S
CO-02	S	S	S	S	S	S	S	M	M	S
CO-03	S	S	S	S	S	S	S	M	S	S
CO-04	S	S	S	S	S	S	S	M	S	S
CO-05	S	S	S	S	S	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I EXPLORING THE INTEGRATED DEVELOPMENT ENVIRONMENT 9

Project – Form designer - Understanding the IDE Components: IDE Menus - IDE Windows - Setting Environment Options - Building a Console Application – Variables - Types of Variables - Variable options - Converting Variable Types - Widening and Narrowing Conversions - Formatting Numbers - Numeric Format Strings - User-Defined Data Types - Variable's Scope - Variable's Lifetime – Constants – Arrays – Collections

UNIT II VISUAL BASIC PROGRAMMING ESSENTIALS 9

Flow-Control Statements: Decision Statements - Loop Statements - Exit and Continue – Procedures – Subroutines – Functions – Arguments - Argument-Passing Mechanisms - Built-in Functions - Custom Functions - Named Arguments - Functions Returning Arrays - Overloading Functions - Documenting Functions

UNIT III BASIC WINDOWS CONTROLS 9

Text Box Control, List Box, Checked List Box, and Combo Box Controls, Scroll Bar and Track Bar Controls-Working with Forms-Appearance of Forms-Anchoring and Docking-Splitting Forms into Multiple Panes-Form Events-Loading and Showing Forms-Sharing Variables between Forms-Forms versus Dialog Boxes-Building Dynamic Forms at Runtime-Designing Menus-Programming Menu Commands-Using Access and Shortcut Keys-Manipulating Menus at Runtime.

UNIT IV ADVANCED WINDOWS CONTROLS 9

Common Dialog Controls: Font Dialog Control – Open Dialog and Save Dialog Controls – Folder Browser Dialog Control – Rich Text Box Control: Advanced Editing Features - File Menu - Edit Menu - Format Menu - Search & Replace Dialog Box – Tree View Control: Adding Nodes – List View Control: Columns Collection – List View Items and Sub items - Items Collection - Sub Items Collection - Processing Selected Items.

UNIT V DATA PROCESSING 9

Storing Data in Data Sets - Filling Data Sets – Data Adapter Class – Command Builder Class - Accessing the Data Set's Tables - Performing Update Operations - Updating the Database with the Data Adapter - Working with Typed Data Sets - Generating a Typed Data Set - Exploring the Data Set - Data Binding - Designing Data-Driven Interfaces - Binding Hierarchical Tables – Binding Source as a Data Source – Data Grid View Control - Displaying Lookup Columns in a Data Grid View Control - Editing and updating the Data in Hierarchical Tables - Viewing the Deleted Rows

Text Book:

1. Mastering Microsoft Visual Basic 2010 by Evangelos Petroustos, Wiley Publishing, Inc, 2010

REFERENCES:

1. Microsoft Visual Basic 2010 step by step by Michael Harvosen Microsoft Press 2010
2. Programming in Visual Basic 2010 The Very Beginner's Guide by Jim McKeown Dakota State University, CAMBRIDGE UNIVERSITY PRESS 2010
3. Microsoft Visual Basic 2010 Developer's Handbook by Klaus Löffelmann, Sarika Calla Purohit – 2010

CS3615	MULTIMEDIA AND DESIGN	L	T	P	C
		3	1	0	4

AIM

This course aims to introduce the fundamental knowledge of Multimedia and its applications.

OBJECTIVES:

- To have general understanding about Multimedia.
- To make the students understand the elements of multimedia

Course Outcome - COs		Cognitive Skill
CO-01	Describe the meaning of multimedia system and its usage, Understand different fonts and faces	R, U
CO-02	Understand multimedia system sounds and digital audio	U
CO-03	Understand the image file formats such as Macintosh image format, windows imaging file format and analyse the cross-platform formats	A, An
CO-04	Elucidate video recording and shooting videos Describe video editing	An, E
CO-05	Understand the text editing and word processing tools and OCR software	An, E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	M	S	S	S	S	S	M	M
CO-02	S	S	M	S	S	M	M	M	M	M
CO-03	S	S	M	S	S	S	S	M	M	M
CO-04	S	S	S	S	S	M	M	M	S	M

CO-05	S	S	M	S	S	S	S	S	M	M
--------------	---	---	---	---	---	---	---	---	---	---

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT 1: MULTIMEDIA INTRODUCTION AND TEXT

9

Meaning and its Usage-Categories of Multimedia-Features of Multimedia-Applications of Multimedia--Multimedia Skills required in a Team- Fonts and Faces-Selecting Text Fonts-Using Text in Multimedia:-Using Text Elements in a Multimedia Presentation- Use of Text in Webs- Text in Films such as Titles and Credits- Text in Subtitles in a Film or Documentary-Text in Advertisements-Font Editing and Design Tools:- ResEdit- Fontographer- Type-Designer- Font Monger- Cool 3D Text- Font Chameleon.

UNIT 2: SOUND

9

Multimedia System Sounds-Digital Audio:- Preparing Digital Audio Files-Types of Digital Audio File Formats-Editing Digital Recordings-MIDI Audio:- Advantages of MIDI- Audio File Formats:- Uncompressed Audio File Formats- Lossless Compressed Audio Formats-Open File Formats for Storing Digital Data-Proprietary File Formats and Different Formats-MIDI versus Digital Audio

UNIT3: IMAGE

9

Categories of Digital Graphics:-Bitmaps-Vector Drawings-Meta Graphics-Animated Graphics-Three Dimensional (3D) Drawing and Rendering:-Natural Light and Colour-Computerized Colours:- How Computers See Colour?- Colour Palettes:-Display Quality-Safety Palette- Dithering-Gamma Correction-Bandwidth Issues- Colour Palette Generator-Image File Formats:-Graphics Interchange Format (GIF)- Portable Network Graphics (PNG)-Joint Photographic Experts Group (JPEG)

UNIT 4: VIDEO

9

How Video Works?-Using Video- Analogue Video-Digital Video-Video Recording and Shooting Videos:-1 Shooting Platform- Story Boarding-Lighting-Chroma Keys-Composition- Digital Display Standards:-Monochrome Display Adapter (MDA)- Hercules Graphics Card- Colour Graphics Adapter (CGA)- Enhanced Graphics Adapter (EGA)- Video Graphics Array (VGA)- Super VGA (SVGA)

UNIT 5: HARDWARE AND SOFTWARE TOOLS

9

Macintosh versus Windows-Connections-Storage Devices- Input Devices-Output Devices-Text Editing and Word Processing Tools- OCR Software-Painting and Drawing Tools.

L:45+T:15,TOTAL: 60PERIODS

TEXT BOOKS

- 1 Multimedia: Making It Work, Tay Vaughan, 7th Edition, Tata Mc-Graw Hill., 2008.
- 2 Multimedia Systems, John F.Koegel Buford, Pearson edition, 2003

REFERENCE BOOKS

1. Multimedia Systems, Rajneesh Agrawal Excel Books Private Limited, Lovely Professional University,2013.

CS3616	CRYPTOGRAPHY	L	T	P	C
		4	0	0	4

AIM

This course aims to introduce the fundamental and mathematical knowledge of cryptography and its applications.

OBJECTIVES

- To enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.
- To describe the various traditional symmetric key cipher technologies and Algebraic structures such as Group, Ring and Field.
- To apply the cryptanalysis skills to evaluate the technologies such as DES and AES.
- To be familiar with mathematical concepts used in asymmetric key cryptography and examine the different algorithms.
- To learn about message integrity and authentication.

Course Outcome - COs		Cognitive Skill
CO-01	Understand the need for security and basic cryptographic concepts.	U
CO-02	Familiar with traditional symmetric cryptography and algebraic structures.	R
CO-03	Able to understand and analyze the DES and AES algorithms.	U, An
CO-04	Gain knowledge in asymmetric key cryptography.	U, A
CO-05	Master the terminology and concepts of authentication and key distribution.	U, A, R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	S	S	M	M	L	S	L	M	M	M
CO-02	S	S	M	M	L	S	L	M	M	M
CO-03	S	S	M	S	L	S	L	S	M	M
CO-04	S	S	M	S	L	S	L	S	M	M
CO-05	S	S	M	S	L	S	L	S	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I INTRODUCTION

12

Security goals- Cryptographic attacks- Services and Mechanisms- Techniques for security goals implementation-Mathematics of Cryptography-Integer Arithmetic-Modular Arithmetic-Matrices

UNIT II SYMMETRIC KEY ENCIPHERMENT

12

Traditional Symmetric key ciphers-Substitution cipher-Transposition cipher-Stream and block ciphers-Mathematics of Symmetric key cryptography-Algebraic key structures-Group-Ring-GF (2n) Fields-Modern symmetric ciphers-Modern block ciphers-Modern stream ciphers.

UNIT III SYMMETRIC ENCIPHERMENT TECHNIQUES 12

Data Encryption Standard-Introduction-DES structure-DES Analysis-Security of DES-Multiple DES-Advanced Encryption Standard-Introduction-Transformations-Key Expansions-AES Ciphers-Examples-Use of modern block ciphers-Use of Stream ciphers.

UNIT IV ASYMMETRIC KEY ENCIPHERMENT 12

Mathematics of Asymmetric key cryptography- Primes- Primality testing-Factorization-Chinese Remainder theorem-Quadratic Congruence-Exponentiation and Logarithm. Asymmetric key cryptography- RSA Cryptosystem- Rabin Cryptosystem- El Gamel Cryptosystem- Elliptic Curve Cryptosystem.

UNIT V INTEGRITY AND AUTHENTICATION 12

Message Integrity-Message authentication-Digital signature- comparison-process-services-attacks-digital signature schemes-Entity authentication- password based authentication-challenge response authentication-zero knowledge protocols-Bio Metrics.

TOTAL: 60 HOURS

REFERENCES

1. Behrouz.A.Forozoun, Debdeep Mukhopadhyaya, "Cryptography and Network Security", 2016, Mc-Graw Hill.
2. William Stallings, "Cryptography and Network Security-Principles and practices", 2018, Pearson Education.
3. C.K. Shyamala, N. Harini, Dr. T.R. Padmanabhan, "Cryptography and Network Security", 2011, Wiley India.
4. Abhijit Das, C.E. Veni Madhavan, "Public key cryptography-Theory and practice", 2009, Pearson Education.

CS3617	INTERNET OF THINGS	L	T	P	C
		4	0	0	4

AIM

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

Course Objectives:

- To get familiar with the evolution of IOT with its design principles.
- To outline the functionalities and protocols of internet communication.

- To analyze the hardware and software components needed to construct IOT applications.
- To identify the appropriate protocol for API construction and writing embedded code.
- To realize various business models and ethics in Internet of Things.

Course Outcome - COs		Cognitive Skill
CO-01	Comprehend the IoT evolution with its architecture and sensors	U
CO-02	Understand the networking concepts for communication and underlying IoT protocols	U, R
CO-03	Assess the embedded technologies and develop prototypes for the IoT products	U, An
CO-04	Evaluate the use of Application Programming Interface and design an API for IoT in real time	E
CO-05	Recognize the ethics of business models and perform security analysis	U, An

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	M	S	S	S	S	S	S	S
CO-02	S	S	S	S	S	S	S	M	S	S
CO-03	S	M	S	S	S	S	M	S	S	M
CO-04	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	M	S	S	S	S	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I AN OVERVIEW

12

Internet of Things: An Overview : IoT Conceptual Framework – IoT Architectural View – Technology Behind IoT – Sources of IoT - M2M Communication – Examples of IoT – Design Principles for Connected Devices : IoT/M2M Systems Layers and Designs Standardisation – Communication Technologies - Data Enrichment, Data Consolidation and Device Management at Gateway.

UNIT II DESIGN PRINCIPLES FOR WEB CONNECTIVITY

12

Design Principles for Web Connectivity : Communication Protocols for Connected Devices – Message Communication Protocols for Connected Devices – Web Connectivity for Connected Devices – Network Using Gateway , SOAP, REST, HTTP, RESTful and Web Sockets - Internet Connectivity Principles : Internet Connectivity - Internet Based Communication – IP Addressing in the IoT – Media Access Control – Application Layer Protocols: HTTP, HTTPS, FTP, Telnet and Others.

UNIT III DATA ACQUIRING, ORGANISING, PROCESSING AND ANALYTICS

12

Data Acquiring, Organising, Processing and Analytics : Data Acquiring and Storage – Organising the Data – Transactions, Business Processes, Integration and Enterprise Systems

– Analytics – Knowledge Acquiring, Managing and Storing Processes - Data Collection, Storage and Computing Using a Cloud Platform: Cloud Computing Paradigm for Data Collection, Storage and Computing – Everything as a Service and Cloud Service Models.

UNIT IV WIRELESS SENSOR NETWORKS

12

Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks : Sensor Technology – Wireless Sensor Networks Technology - Prototyping the Embedded Devices for IoT and M2M : Embedded Computing Basics – Embedded Platforms for Prototyping.

UNIT V PROTOTYPING AND DESIGNING THE SOFTWARE FOR IOT APPLICATIONS

12

Prototyping and Designing the Software for IoT Applications : Prototyping Embedded Device Software - Devices, Gateways, Internet and Web/Cloud Services Software Development – Prototyping online Component APIs and Web APIs – Security for IoT : Vulnerabilities, Security Requirements and Threat Analysis – IoT Security Tomography and Layered Attacker Model – Security Models, Profiles and Protocols for IoT – IoT Application Case Study : Design Layers, Design Complexity and Designing using Cloud PaaS – IoT / IIoT Applications in the premises, Supply – Chain and Customer Monitoring – Connected Car and its Applications and Services.

TOTAL : 60 PERIODS

Text Books:

1. Raj Kamal , “ Internet of Things Architecture and Design Principles”, McGraw Hill, 2017

Reference Books:

1. Ovidiu Vermesan and Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment” , River Publishers, 2014.
2. Peter Waher, “Learning Internet of Things” ,Packt Publishing, 2015.
3. Donald Norris, “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack”, McGraw Hill, 2015.
4. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
5. Adrian McEwen and Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014.

GE3604	SUSTAINABILITY AND SOCIAL RESPONSIBILITY	L	T	P	C
		2	0	0	2

AIM

This course provides a basic understanding for the undergraduate students on the need and potential of the youth in developing the nation through volunteerism and positive approach.

OBJECTIVES

- To understand the Constitution of India and RTI
- To gain knowledge in Community mobilization
- Able to understand volunteerism
- Gain knowledge in Civil and self defence service
- Can understand Indian history, culture and integration.

Course Outcome - COs	Cognitive Skill
----------------------	-----------------

CO-01	To understand the Constitution of India and RTI	U
CO-02	To gain knowledge in Community mobilization	U, R
CO-03	Able to understand volunteerism	U
CO-04	Gain knowledge in Civil and self defence service	U, A
CO-05	Can analyze Indian history, culture and integration.	An

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	L	L	L	L	L	L	S	S	S	S
CO-02	L	L	L	L	L	L	S	S	S	S
CO-03	L	L	L	L	L	L	S	S	S	S
CO-04	L	L	L	L	L	L	S	S	S	S
CO-05	L	L	L	L	L	L	S	S	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT1: CITIZENSHIP

6

Basic Features of Constitution of India –Consumer awareness and the legal rights of the consumer–Introduction to RTI

UNIT 2: COMMUNITY MOBILISATION

6

Mapping of community stakeholders - Designing the message in the context of the problem and the culture of the community- Identifying methods of mobilization- Youth–adult partnership

UNIT3: VOLUNTEERISM AND SHRAMDAN

6

Indian Tradition of volunteerism - Needs & Importance of volunteerism - Motivation and Constraints of Volunteerism-Shramdan as a part of volunteerism

UNIT4: CIVIL/SELF DEFENSE

6

Civil defense service, aims and objectives of civil defense - Needs for self defense – Self defense training

UNIT5: SOCIAL HARMONY AND NATIONAL INTEGRATION

6

Indian History and Culture - Role of youth in peace-building and conflict resolution –Role of youth in Nation building

TOTAL: 30 PERIODS

References:

1. Constitution of India & Indian polity GanesaSubramanian
2. Community mobilization: methods models – R.R. Prasad
3. Self Defense: The Self Defense Guide for Beginners– Life-style Facets of Indian culture –Vidya, Rajaram, kalpana
4. Role of youth in nation building–Mohan Rao Bhagwat and Smriti Razdan
5. Role of youth in peace–building and conflict resolution – Ozerdem.A.,Podder.S.
6. <https://en.wikipedia.org/wiki/volunteering><http://wikieducator.org/shramdaan>

CS3679	VISUAL PROGRAMMING LAB	L	T	P	C
		0	0	2	2

AIM: To learn about Visual Basic.

OBJECTIVES:

To create applications using Visual Basic.

Course Outcome - COs		Cognitive Skill
CO-01	Learn of code using various control structures and loops.	A
CO-02	Understanding the concept of arrays and methods. Develop console applications for performing string operations	A
CO-03	Creating various applications using IDE tools.	A
CO-04	Studying connectivity with databases.	A

LIST OF EXPERIMENTS

1. Building Simple Applications
2. Working with Intrinsic Controls, Control Arrays
3. Application with Multiple Forms
4. Application with Dialogs
5. Application with Menus
6. Application using Data Controls
7. Application using Common Dialogs
8. Drag and Drop Events
9. Database Management
10. Creating ActiveX Controls
11. Database Object (DAO) and Properties
12. Active Data Objects (ADO) and OLE D

TOTAL: 30 PERIODS

CS3680	MULTIMEDIA LAB	L	T	P	C
		0	0	2	2

AIM: To implement multimedia concepts.

OBJECTIVES:

Students can get expertise in graphics designing work.

LIST OF EXPERIMENTS

1. Design an image by cutting the objects from 3 files and organize them in a single file and apply feather effects.
2. Design an image by applying mirror effect.
3. Design an image by extracting flower only from given photographic image
4. Design an image by applying Text and Transform Tool.
5. Design an image by using patch or healing brush tool to remove damaged parts of an image.
6. Design an image by applying Color Balance to change the color of an image.
7. Design an image by applying Lighting effect Filter.
8. Design an image by applying Blending options to make a text effect.
9. Design an image by applying rainbow effect.
10. Design an image by applying text masking effect.
11. Design a college id card using any tools.
12. Design a banner for your college with images and text

ELECTIVE I

CS36A1	COMPILER DESIGN	L	T	P	C
		3	0	0	3

AIM: Aims to learn and analyze steps in compilation processes.

OBJECTIVES

- To understand the basic concept of compilers.
- To learn and analyze steps in compilation processes.
- To familiarize code generation concepts.

Course Outcome - COs		Cognitive Skill
CO-01	Able to design regular expression and different types of finite automata.	A
CO-02	Ability to analyze and interpret context free grammar.	An
CO-03	Gain knowledge in runtime environment is a state of the target machine which may include software libraries.	U, R
CO-04	Able to apply the code generation algorithms to get the machine code for optimized.	A
CO-05	Ability to choose a solution method appropriate characteristics of a given problem and obtain solution	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	S	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I: Introduction to Compilers

9

Introduction to Compiling – Compilers – Analysis of the Source Program – The Phases of a Compiler – Cousins of a Compiler – The grouping of Phases – Compiler Construction Tools – Lexical Analysis – Role – Input Buffering – Specification of Tokens – Recognition – Finite Automata – Regular expression to an NFA.

UNIT II: Parse Tree

9

Syntax Analysis – Role – Context – Free Grammars – Parse Tree and Derivation - Writing a Grammar – Top down parsing – Bottom –up parsing – Shift Reduce Parsing - Operator precedence parsing.

UNIT III: Stack and Heap Allocation

9

Run-Time environments – Source language issues – Storage organization – Storage – Allocation Strategies – Stack and Heap Allocation - Access to non local names – Parameter passing – Symbol Tables – Hash Tables.

UNIT IV: Code Generation

9

Intermediate Code Generation – Intermediate Languages – Declaration – Assignment Statements – Type Conversions – Boolean Expression – Case Statements – Back Patching - Procedure Calls.

UNIT V: Code Optimization

9

Code Generation – Issues – Run-Time Storage Management – Basic blocks and flow graphs - Next – use information - A simple code generator – Register allocation and assignment. Code optimization – Introduction – The Principal Sources of Optimization – Optimization of basic blocks – Loops in Flow Graphs.

Total L: 45 PERIODS

TEXT BOOK

1. A.V.Aho, R.Sethi, J.D.Ullman, “Compilers – Principles, Techniques and Tools” Pearson Education Delhi, Fifth edition, 2011.

REFERENCES

1. Allen Holub.I, “Compiler Design in C” Prentice Hall of India, Delhi, 2002.
2. D.M.Dhamdhare, “Systems Programming and Operating Systems”, Tata McGraw Hill Company, Delhi, 2002.

CS36A2	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

AIM: To become efficient in Software Testing

OBJECTIVES: To learn Software Quality, Test Case Design, Levels of Testing, Test Management, Controlling and monitoring.

Course Outcome - COs		Cognitive Skill
CO1	Explain the fundamentals of software testing.	A
CO2	Illustrate the test case design.	An
CO3	Analyze the design of test cases for different levels of testing techniques.	U, R
CO4	Create test strategies and plans, design test case, prioritize and execute them.	A
CO5	Apply various testing activities in effective manner.	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	S	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I INTRODUCTION

9

Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester’s Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design–Defect Examples–Developer/ Tester Support for Developing a Defect Repository.

UNIT II TEST CASE DESIGN

9

Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies - Using Black Box Approach to Test Case Design Random Testing – Requirements based testing- positive and negative testing — Boundary Value Analysis – decision tables - Equivalence Class Partitioning state-based testing– cause effect graphing – error guessing – compatibility testing-user documentation testing–domain testing-Using White–Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White–box Based Test Design – code complexity testing – Evaluating Test AdequacyCriteria.

UNIT III LEVELS OF TESTING

9

The Need for Levels of Testing– Unit Test–Unit Test Planning–Designing the Unit Tests–The Test Harness–Running the Unit test and Recording results–Integration tests Designing Integration Tests– Integration Test Planning– scenario testing – defect bash elimination–System Testing–types of system testing–Acceptance testing–performance testing–Regression Testing – internationalization testing – ad-hoc testing -Alpha – Beta Tests – testingOOsystems– usabilityand accessibilitytesting

UNIT IV TEST MANAGEMENT

9

People and organizational issues in testing – organization structures for testing teams –testing services - Test Planning – Test Plan Components – Test Plan Attachments – LocatingTest Items – test management – test process - Reporting Test Results – The role of three groupsin Test Planning and Policy Development – Introducing the test specialist – Skills needed by aatestspecialist– BuildingaTestingGroup.

UNIT V CONTROLLING AND MONITORING

9

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements –project, progress and productivity metrics– Status Meetings – Reports and Control Issues–Criteria for Test Completion–SCM– Types of reviews– Developing a review program – Components of Review Plans– Reporting Review Results. – Evaluating software quality– defect prevention–testing maturity model.

TOTAL: 45 PERIODS

REFERENCES:

1. Srinivasan Desikan and Gopalaswamy Ramesh, “SoftwareTesting–Principles and Practices”, Pearson education, 2006.
2. IleneBurnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2003
3. BorisBeizer, “Software Testing Techniques”, Second Edition, Dreamtech, 2005
4. Elfriede Dustin, “Effective Software Testing”, First Edition, Pearson Education, 2004
5. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004.

CS36A3	CYBER SECURITY	L	T	P	C
		3	0	0	3

AIM

The goal of cyber security is to ensure secure storage, control access and prevent unauthorized processing, transfer, or deletion of data. It safeguards the confidentiality, integrity, and availability of information.

OBJECTIVES:

- Understand various block cipher and stream cipher models
- Describe the principles of public key cryptosystems, hash functions and digital signature
- To get a firm knowledge on Cyber Security Essentials.

Course Outcome - COs		Cognitive Skill
CO1	Exhibit the knowledge in security principles, security architectures and components.	A
CO2	Classify and assess different cryptography and cyber algorithms.	An
CO3	Identify the different cybercrimes and frauds	U, R
CO4	Suggest necessary IT Security controls, plans and procedures for an organization	A
CO5	Compare our cyber laws with International laws and able to practice ethics in cyber world.	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	M	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I Introduction to Security

9

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm.

UNIT II Public Key Cryptography and Hash Algorithms

9

Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange- Hash functions-Hash Algorithms (MD5, Secure Hash Algorithm

UNIT III Fundamentals of Cyber Security

9

How Hackers Cover Their Tracks- Fraud Techniques- Threat Infrastructure- Techniques to Gain a Foothold (Shellcode, SQL Injection, Malicious PDF Files)- Misdirection, Reconnaissance, and Disruption Methods.

UNIT IV Planning for Cyber Security

9

Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies..

UNIT V Cyber Security Management

9

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster – Legal Issues – Protecting programs and Data – Information and the

law – Rights of Employees and Employers - Emerging Technologies - The Internet of Things
- Cyber Warfare.

TOTAL: 45 PERIODS

TEXTBOOK

1. William Stallings, “Cryptography and Network Security”, Pearson Education, 6th Edition, 2013.
2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition, Pearson Education, 2015.

REFERENCES

1. Graham, J. Howard, R., Olson, R., Cyber Security Essentials, CRC Press, 2011.
2. George K. Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013.
3. **Webresources:** Web resources from NDL Library, E-content from open-source libraries

SEMESTER VI

Sl.	Course	Course Title	L	T	P	C
THEORY						
1.	CS3618	Mobile Application Development	4	0	0	4
2.	CS3619	Virtualization and Cloud Computing	4	0	0	4
3.	CS3620	Data Mining and Data Warehousing	4	0	0	4
4.	CS36XX	Elective II	3	0	0	3
PRACTICAL						
7.	CS36P1	Major Project	0	0	8	8
TOTAL						23

CS3618	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
		4	0	0	4

AIM: To expose knowledge in developing mobile applications.

OBJECTIVES:

1. To understand the fundamental concepts such as architecture and design considerations of mobile computing.
2. To describe the system requirements for mobile applications.
3. To generate suitable design using specific mobile development frameworks.

4. To learn graphics and animation to create attractive applications.
5. To develop mobile applications in market place for distribution.

Course Outcome - COs		Cognitive Skill
CO1	Understand fundamental mobile computing concepts and business trends impacting mobile applications.	A
CO2	Describe mobile platforms for developing applications.	An
CO3	Sprucing up mobile applications using graphics and animation.	U, R
CO4	Analyze different testing tools for mobile applications.	A
CO5	To test mobile apps and tracking apps to market.	E

Mapping of Course Outcome with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	M	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Mobile Computing Fundamentals

10

Mobile Computing-Introduction- Architecture for Mobile Computing- Three Tier Architecture- Design Considerations for Mobile Computing- Mobile Computing through Internet- Mobile Computing through Telephony.

Unit II: Getting started with Mobility

12

Mobility landscape- Mobile platforms- Mobile apps development- Overview of Android platform- setting up the mobile app development environment along with an emulator- a case study on Mobile app development.

Unit III: Building blocks of mobile apps

14

App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle- interaction amongst activities- App functionality beyond user interface –Threads, AsyncTask, Services – states and lifecycle, Notifications, Broadcast receivers, Telephony and SMS APIs- Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

Unit IV: Sprucing up mobile apps

12

Graphics and animation – custom views, canvas, animation APIs, multimedia- audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)

Unit V: Testing mobile apps and Taking apps to Market

12

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, J unit for Android, Robotium, MonkeyTalk, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

TOTAL: 60 HOURS

Text Book

1. AnubhavPradhan, Anil V Deshpande “Mobile Apps Development” SAMS, Edition: I, 2013.

Reference Books

1. Barry Burd, “Android Application Development All in one for Dummies”, SAMS, Edition: I
2. Anil V Deshpande “Teach Yourself Android Application Development In 24Hours” SAMS, Edition: I

CS3619	VIRTUALIZATION AND CLOUD COMPUTING	L	T	P	C
		4	0	0	4

AIM

To get clear knowledge in cloud computing.

OBJECTIVES

- To understand the basics of cloud architecture.
- To learn how to use cloud services.
- To understand the role and types of virtualization.
- To emphasize the need for securing cloud and protecting cloud data.

Course Outcome - COs		Cognitive Skill
CO1	To Understand fundamental concepts of cloud computing.	U
CO2	To describe Cloud computing for community and corporation.	An
CO3	To explore enterprise virtualization	U, R
CO4	Analyze Hypervisor and Virtual Machines	An
CO5	To study cloud security and privacy.	E

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	M	S	S	S	S	M

CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I CLOUD COMPUTING

12

Understanding the Cloud Computing – Cloud Architecture – Cloud Storage – Advantages, Disadvantages of Cloud Computing – Companies in the Cloud Today – Developing Cloud Services – Web: Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On: Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT II CLOUD COMPUTING FOR EVERYONE

12

Centralizing Email Communications – Collaborating on Schedules, To:Do Lists, Contact Lists and Group Projects and Events – Cloud Computing for the Community and Corporation, Using Cloud Services: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications, Online Planning and Task Management – Collaborating on Event Management, Contact Management, Project Management, Word Processing and Databases – Storing and Sharing Files

UNIT III VIRTUALIZATION & CLOUD COMPUTING

12

Virtualization & Cloud Computing Overview – Case Study: Enterprise Virtualization & Cloud Computing – Definitions – Hypervisor / Virtual Machine Monitor Architecture – CPU Virtualization Extensions – Network and Storage Virtualization Architecture

UNIT IV VIRTUALIZED ENTERPRISE

12

Smashing the Virtualized Stack – Case Study: Owning the Virtualized Enterprise – CPU & Chipsets – VMM/Hypervisor/Host – VMs/Guest – Control & Management planes & APIs.

UNIT V CLOUD SECURITY AND PRIVACY

12

Infrastructure security – Data Security and Storage – Identity and access management – Security management in the cloud – privacy – Security as a cloud service.

TOTAL : 60

TEXT BOOK

1. Michael Miller, Cloud Computing: Web:Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

REFERENCES

1. Christofer Hoff, Rich Mogull, Craig Balding, Hacking Exposed: Virtualization & Cloud Computing: Secrets & Solutions [Paperback], McGraw: Hill Osborne .
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On: demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy – An Enterprise Perspective on Risks and Compliance, By O'Reilly Media, 2009

CS3620	DATA MINING AND DATA WAREHOUSING	L	T	P	C
		4	0	0	4

AIM:

To study advanced aspects of data warehousing and data mining, encompassing the principles, research results and commercial application of the technologies.

OBJECTIVES:

- Give students a good overview of the ideas and techniques which are behind recent development in the data warehousing and online analytical processing (OLAP) fields.
- To motivate, define and characterize data mining as process; to motivate, define and characterize data mining applications.

Course Outcome - COs		Cognitive Skill
CO1	Understanding the concept of data warehousing in terms of components, architecture and models	U
CO2	Learn the knowledge of data pre-processing.	A, R
CO3	Enhance the understanding of predictive analysis of data.	An
CO4	Gain knowledge in data warehousing components and architecture.	An
CO5	Know the concept of data mining used in various applications such as multimedia and web.	E

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	M	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT 1 : INTRODUCTION

12

Relation To Statistics, Databases- Data Mining Functionalities-Steps In Data Mining Process-Architecture of a typical Data Mining Systems- Classification of Data Mining Systems – Overview of Data Mining Techniques.

UNIT II: DATA MINING CONCEPTS AND TECHNIQUES

12

Data Preprocessing-Data Cleaning, Integration, Transformation, Reduction, Discretization- Concept Hierarchies-Concept Description: Data Generalization And Summarization Based Characterization- Mining Association Rules In Large Databases.

UNIT III: PREDICTIVE MODELING**12**

Classification and Prediction. Issues Regarding Classification and Prediction- Classification By Decision Tree Induction-Bayesian Classification-Other Classification Methods-Prediction-Clusters Analysis: Types of Data in Cluster Analysis-categorization of Major Clustering Methods: Partitioning Methods – Hierarchical Methods.

UNIT IV: DATA WAREHOUSING**12**

Data Warehousing Components –Multi Dimensional Data Model- Data Warehouse Architecture-Data Warehouse Implementation- -Mapping the Data Warehouse to Multiprocessor Architecture- OLAP.–Need- Categorization of OLAP Tools.

UNIT V : APPLICATIONS**12**

Applications of Data Mining-Social Impacts of Data Mining-Tools-An Introduction to DB Miner-Case Studies-Mining WWW-Mining Text Database-Mining Spatial Databases.

TOTAL: 60 PERIODS**BOOKS FOR REFERENCES:**

1. Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers, 2002.
2. Alex Berson, Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw- Hill, 2004.
3. Usama M.Fayyad, Gregory Piatetsky – Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, “Advances in Knowledge Discovery And Data Mining”, The M.I.T press, 1996.
4. Ralph Kimball, “The Data Warehouse Life Cycle Toolkit”, John Wiley & Sons Inc., 1998.
5. Sean Kelly, “Data Warehousing In Action”, John Wiley & Sons Inc., 1997.

CS36A4	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L	T	P	C
		3	0	0	3

AIM: To learn Artificial Intelligence concepts and Machine Learning techniques

OBJECTIVES:

- To understand the basic concepts and principles of Artificial Intelligence.
- To have a thorough understanding of the different problem solving techniques.
- To evaluate different Knowledge Representation schemes for typical AI problems
- To introduce students to the basic concepts and techniques of Machine Learning and to understand the graphical models of machine learning algorithms.
- To design and implement a typical AI problem to be solved Using Machine Learning Techniques

Course Outcome - COs	Cognitive Skill
-----------------------------	------------------------

CO1	Study the concepts of AI and related searching algorithms.	U
CO2	Study the different problem solving methods in AI	A, R
CO3	Develop the knowledge skills and it's representational structure in AI.	An
CO4	Study the concepts of supervised/unsupervised machine learning and game technique.	An
CO5	Study how design the programming skill in PROLOG, and concepts of pattern recognition approaches.	E

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	M	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNITI: INTRODUCTION

9

Introduction – Definition - Future of Artificial Intelligence – Characteristics of IntelligentAgents–TypicalIntelligentAgents–ProblemSolvingApproachtoTypicalAIproblems

UNITII: PROBLEM SOLVING METHODS

9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics – Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search – Game Playing-Optimal Decisions in Games-Alpha—Beta Pruning-Stochastic Games.

UNITIII: KNOWLEDGE REPRESENTATION

9

First Order Predicate Logic – Prolog Programming - Unification -Forward Chaining – Backward Chaining - Resolution –Knowledge Representation - Ontological Engineering - Categories and Objects –Events - Mental Events and Mental Objects - Reasoning Systems for Categories-Reasoning with Default Information

UNIT IV MACHINE LEARNING

9

Linear Regression Supervised Learning -Classification problem -Linear Regression and Logistic Regression-SVM Concepts-Algorithm and Implementation-K-Nearest Neighbors - Concepts, Algorithm and Implementation- Decision Trees Concepts, Algorithm and Implementation- Naïve –Bayes Algorithms –Concepts, Algorithm and Implementation.

UNITV:APPLICATIONS**9**

AI applications – Language Models - Information Retrieval - Information Extraction –Natural Language Processing - Machine Translation– Speech recognition– Robot–Hardware– Perception–Planning– Moving- Machine Learning and Data Science –Ethical and moral issues and Challenges .

TOTAL:45PERIODS**REFERENCES:**

1. S.Russell and P.Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 3rd Edition, 2009.
2. David L. Poole, Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
3. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009.
4. Machine Learning –An Algorithmic Perspective, Stephen Marsland, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

CS36A5	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

Aim

- Analyze the big data analytic techniques for useful business applications.
- Design efficient algorithms for mining the data from large volumes.
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics
- Explore on Big Data applications Using Pig and Hive
- To understand the fundamental concepts of big data analytics

Objectives

- To explore the fundamentals of various big data analysis techniques
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

Course Outcome - COs		Cognitive Skill
CO1	To provide understanding of Big Data and Data analysis.	U
CO2	To explore various techniques for mining data stream	An, R
CO3	To provide Hadoop and HDFS concepts with its architecture and processing.	R
CO4	To provide the practical exposure for Hadoop management and administration.	A
CO5	To introduce programming tools PIG & HIVE.	E

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S
CO-03	S	M	S	S	M	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I INTRODUCTION TO BIG DATA

9

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis –Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re - Sampling - Statistical Inference -Prediction Error.

UNIT II MINING DATA STREAMS

9

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream –Filtering Streams –Counting Distinct Elements in a Stream – Estimating Moments –Counting Oneness in a Window –Decaying Window -Real time Analytics Platform(RTAP) Applications -Case Studies -Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III HADOOP

9

History of Hadoop -The Hadoop Distributed File System –Components of Hadoop-Analyzing the Data with Hadoop-Scaling Out-Hadoop Streaming-Design of HDFS -Java interfaces to HDFS Basics-Developing a Map reduce Application -How Map Reduce Works-Anatomy of a Map Reduce Jobrun Failures-Job Scheduling-Shuffle and Sort –Task execution -Map Reduce Types and Formats-Map Reduce Features

UNIT IV HADOOP ENVIRONMENT

9

Setting up a Hadoop Cluster -Cluster specification -Cluster Setup and Installation –Hadoop Configuration -Security in Hadoop -Administering Hadoop –HDFS -Monitoring-Maintenance- Hadoop benchmarks - Hadoop in the cloud

UNIT V FRAMEWORKS

9

Applications on Big Data Using Pig and Hive –Data processing operators in Pig –Hive services –HiveQL –Querying Data in Hive -fundamentals of HBase and ZooKeeper -IBM InfoSphere Big Insights and Streams. Visualizations -Visual data analysis techniques, interaction techniques; Systems and applications.

TOTAL: 45 PERIODS

REFERENCES :

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012
4. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.

5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
6. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
7. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
8. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.
9. Da Ruan, Guoqing Chen, Etienne E. Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007
10. Paul Zikopoulos, Dirk de Roos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012
11. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013
12. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011

CS36A6	OPEN SOURCE COMPUTING	L	T	P	C
		3	0	0	3

AIM: To provide the concepts of open source software and enable the students to learn Linux environment and Python Programming.

OBJECTIVES

1. To understand open source software and Linux OS.
2. To study configuring hardware devices and X Window system configuration.
3. To define Setting up a firewall and to understand GNU compiler tools.
4. To identify GNU Libc libraries and linker.
5. To describe basics of the X Windows server architecture and Python programming.

Course Outcome - COs		Cognitive Skill
CO1	Understand open source software, basics of Linux OS and TCP/IP networking.	U
CO2	Do additional hardware devices configuration and X Window system configuration.	An, R
CO3	Setup a firewall and to describe GNU compiler tools.	A
CO4	To describe GNU Libc libraries and linker.	U
CO5	To create applications using Qt, Gtk+ and Python programming.	E

Mapping of Course Outcome with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	S	S	M	L	S
CO-02	S	S	S	M	M	S	S	M	M	S

CO-03	S	M	S	S	M	S	S	S	S	M
CO-04	S	S	S	S	M	L	S	M	L	S
CO-05	S	S	S	S	M	S	S	M	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I OVERVIEW

9

Overview of Free/Open Source Software-- Definition of FOSS & GNU, History of GNU/Linux and the Free Software Movement , Advantages of Free Software and GNU/Linux, FOSS usage, trends and potential—global and Indian.GNU/Linux OS installation-- detect hardware, configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands - logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management ; User and group management, file ownerships and permissions, PAM authentication ; Introduction to common system configuration files& log files ; Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, Ethernet, leased line).

UNIT II HARDWARE AND SYSTEM CONFIGURATION

9

Configuring additional hardware - sound cards, displays & display cards, network cards, modems, USB drives, CD writers ; Understanding the OS boot up process; Performing everyday tasks using gnu/Linux -- accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs ; X Window system configuration and utilities -- configure X windows, detect display devices ; Installing software -- from source code as well as using binary packages. Setting up email servers-- using postfix (SMTP services), courier (IMAP & POP3 services), squirrel mail (web mail services) ; Setting up web servers -- using apache (HTTP services), php (server-side scripting), perl (CGI support) ; Setting up file services – using samba (file and authentication services for windows networks), using NFS (file services for gnu/Linux / Unix networks) ; Setting up proxy services -- using squid (http / ftp / https proxy services) ; Setting up printer services - using CUPS (printspooler), foomatic (printer database)

UNIT III GNU COMPILER

9

Setting up a firewall - Using net filter and ip tables; Using the GNU Compiler Collection – GNU compiler tools; the C pre-processor (cpp), the C compiler (gcc) and the C++ compiler (g++), assembler (gas) ; Understanding build systems --constructing make files and using make, using autoconf and autogen to automatically generate make files tailored for different development environments ;Using source code versioning and management tools -- using CVS to manage source code revisions, patch & diff.

UNIT IV GNU LIBRARIES AND LINKER

9

Understanding the GNU Libc libraries and linker -- linking against object archives (.libraries)and dynamic shared object libraries (.so libraries), generating statically linked binaries and libraries, generating dynamically linked libraries ; Using the GNU debugging tools -- gdb to debug programs, graphical debuggers like ddd, memory debugging / profiling libraries mpatrol and valgrind ; Review of common programming practices and guidelines for GNU/Linux and FOSS ; Introduction to Bash, sed & awk scripting. Basics of the X Windows server architecture.

UNIT V PROGRAMMING

9

Basics of the X Windows server architecture ;Qt Programming ; Gtk+ Programming ;Python Programming ; Programming GUI applications with localization support.

TOTAL: 45 HOURS

REFERENCES:

1. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, BSPublishers; 2005.
2. Matt Welsh, Matthias KalleDalheimer, Terry Dawson, and Lar Kaufman, Running Linux,Fourth Edition, O'Reilly Publishers, 2002.
3. Carla Schroder, Linux Cookbook, First Edition, O'Reilly Cookbooks Series, 2004
Onlinematerial
4. Open Sources: Voices from the Open Source Revolution, First Edition, January1999,ISBN: 1-56592-582-3. URL: <http://www.oreilly.com/catalog/opensources/book/toc.html>
5. The Linux Cookbook: Tips and Techniques for Everyday Use, First Edition, Michael Stutz, 2001. URL: http://dsl.org/cookbook/cookbook_toc.html
6. The Linux System Administrators' Guide, Lars Wirzenius, Joanna Oja, Stephen Stafford, and Alex Weeks, December 2003. URL: <http://www.tldp.org/guides.html>
7. Using GCC, Richard Stallman et al. URL: <http://www.gnu.org/doc/using.html>
8. An Introduction to GCC, Brian Gough. URL: <http://www.networktheory.co.uk/docs/gccintro/>
9. GNU Autoconf, Automake and Libtool, Gary V. Vaughan, Ben Elliston, Tom TromeyAndIan Lance Taylor. URL: <http://sources.redhat.com/autobook/>
10. Open Source Development with CVS, Third Edition, Karl Fogel and Moshe Bar. URL:<http://cvsbook.red-bean.com/>

CS36P1	PROJECT WORK	L	T	P	C
		0	0	8	8

OBJECTIVE

- Students can develop their research skills through project work.
- Students can develop a deeper understanding of subjects through project work.
- Students can explore topics independently through project work.
- Students can develop their problem-solving abilities through project work.

OVERVIEW

Each student will take a specific problem for the Project and solve it using any one of latest tool and submit a report. Further each student will participate in regular project review with project guide / Faculty.