

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

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

DEPARTMENT OF INFORMATION TECHNOLOGY



B.Tech. INFORMATION TECHNOLOGY **CURRICULUM AND SYLLABI**

REGULATION 2021

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION, Kumaracoil

Regulation: 2021

Curriculum and Syllabi

B.Tech Degree Programme

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH. INFORMATION TECHNOLOGY

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 instill 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 Information and Computer Engineering

Department of Information Technology

Vision of the Department

The Department envisions to become a centre for academic excellence with young efficient Graduates, Researchers, Innovators, and Entrepreneurs and to inculcate values to make them Professionals to take up any kind of challenges in the field of IT and also socially oriented human beings with ethical values.

Mission of the Department

- To offer high-quality education to prepare our graduates to become successful Professionals in IT Industry, Government, Research, Entrepreneurial pursuit and consulting firms.
- To enhance students knowledge to the latest advancements in IT by organizing and participating in Technical programs.
- To inculcate innovative thinking among students by encouraging them to pursue research and higher studies for better adaptability towards meeting global needs.
- To empower our students to unleash their abilities for the substantial development of the society.

Description of the programme

B. Tech programs in IT are designed to align with the latest industry trends and technologies. Students stay updated with advancements such as cloud computing, big data analytics, cyber security and forensics, artificial intelligence, Internet of Things (IoT), and mobile app development

Programme Educational Objectives - PEO	
PEO-01	To graduate students to attain solid foundation in the fundamentals of IT with an aim to pursue continuing education.
PEO-02	To educate students to excel as multi-skilled IT Professionals capable of developing technical solutions for real world problems and carry out research or advance study leading to novel innovations in the field of IT and interrelated disciplines.
PEO-03	To enable the students to cope with the advancements in technologies and concepts and to design and implement engineering solutions that prioritize sustainability, resource optimization and environmental protection. Students with an entrepreneurial mind set can assess the impact of projects on environment and society.
PEO-04	To mould graduates to acquire and exercise efficient communication skills, eminent leadership qualities and team work to challenge the contemporary issues with advanced digital skill sets and analytics to optimize processes and improved decision making.
PEO-05	To prepare graduates recognize the importance of life-long learning with an ethical attitude to fulfill their personal and organizational goals and apply a mind set that aims at utilizing the potential of interdisciplinary approach to problem solving.

Graduate Attributes-GA	
GA-1	Innovative Engineering Solutions Develop creative and innovative solutions to complex engineering problems, incorporating the latest technologies and approaches to address current and future challenges.
GA-2	Global Perspective in Engineering Understand and apply engineering solutions in a global context, recognizing the diversity of global issues, standards, and the impact of engineering decisions on different cultures and communities.
GA-3	Sustainable Development and Green Engineering Design and implement engineering solutions that prioritize sustainability, resource efficiency, and environmental protection, contributing to a sustainable future.
GA-4	Social Responsibility and Community Engagement Demonstrate a commitment to social responsibility by engaging with and contributing to local communities, understanding societal needs, and addressing social challenges through engineering practices.
GA-5	Adaptability and Lifelong Learning Exhibit a proactive approach to continuous learning and adaptability, keeping pace with technological advancements and industry changes, and engaging in professional development activities.
GA-6	Entrepreneurship and Innovation Foster an entrepreneurial mindset, identifying opportunities for innovation and creating value through new technologies, products, and processes that meet market needs.
GA-7	Interdisciplinary Collaboration Work effectively in interdisciplinary teams, integrating knowledge from various fields to develop comprehensive solutions to complex engineering problems.

GA-8	Ethical Leadership and Integrity Lead with integrity and ethical principles, ensuring transparency, fairness, and respect in all professional and personal interactions.
GA-9	Digital and Data Literacy Utilize advanced digital tools and data analytics techniques to solve engineering problems, optimize processes, and make informed decisions based on data-driven insights.
GA-10	Safety, Health, and Risk Management Prioritize safety, health, and risk management in engineering practices, ensuring the well-being of individuals and communities while minimizing potential risks and hazards.
GA-11	Effective Communication and Negotiation Skills Communicate ideas, solutions, and technical information effectively to a variety of audiences, and engage in negotiation to resolve conflicts and reach consensus.
GA-12	Impact Assessment and Policy Making Assess the impact of engineering projects on society and the environment, and contribute to policy-making processes that promote sustainable and responsible engineering practices.

Programme Outcome – POs

Programme Outcome - PO	
PO-A	Apply the knowledge of mathematics, science and engineering principles to the problems related to the domain of Information Technology.
PO-B	Select and apply modern engineering and IT tools to tackle and solve complex computing and communication problems.
PO-C	Design and develop secure computing systems and infrastructure to meet the industry and society needs with suitable consideration for the public health and safety and environmental considerations.
PO-D	Apply reasoning acquired through contextual knowledge to assess the public, legal, and security issues relevant to the professional engineering practice.
PO-E	Demonstrate the knowledge of contemporary issues for sustainable development in the field of IT.
PO-F	Commit to professional ethics and responsibilities and norms of the engineering practice.
PO-G	Work effectively as an individual and also a member/leader in multidisciplinary teams.
PO-H	Effectively communicate with engineering community and society about their field of expertise to write reports, design documentation and make presentations.
PO-I	Demonstrate and apply the knowledge of information technology and management principles to manage projects in multidisciplinary environments.
PO-J	Recognize the technology changes completely and enrich the knowledge by life-long learning.

Mapping of Graduate Attributes and Programme Educational Objectives (PEO)

GAs PEOs	G A- 01	GA- 02	GA- 03	GA- 04	GA- 05	GA- 06	GA- 07	GA- 08	GA- 09	GA- 10	GA- 11	GA- 12
PEO-01	A	H	A	A	A	A	H	A	A	A	H	A
PEO-02	H	A	H	A	H	H	H	A	H	A	H	H
PEO-03	H	A	H	A	H	H	H	A	H	A	H	H
PEO-04	H	A	H	A	H	H	H	A	H	A	H	H
PEO-05	A	A	A	A	A	A	A	A	H	A	H	A

H- Highly Associated

A- Associated

Not – Not Associated

Mapping of Graduate Attributes and Programme Outcomes (PO)

GAs POs	G A- 01	GA- 02	GA- 03	GA- 04	GA- 05	GA- 06	GA- 07	GA- 08	GA- 09	GA- 10	GA- 11	GA- 12
PO-A	A	H	A	H	A	H	H	A	A	H	A	A
PO-B	H	A	A	A	A	A	H	H	A	H	A	H
PO-C	H	A	H	H	H	H	A	H	A	A	H	H
PO-D	A	A	H	H	A	A	H	A	A	A	A	H
PO-E	A	A	H	A	A	A	A	A	A	H	A	H
PO-F	H	H	A	A	A	A	A	H	A	A	A	H
PO-G	A	A	H	H	H	A	A	A	A	A	A	H
PO-H	H	A	H	H	A	A	A	A	A	H	A	A

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

H- Highly Associated

A- Associated

Not – Not Associated

Duration of the programme: 4 Years/ 8 Semesters

Total credits: 162

**CURRICULUM & SYLLABI
SEMESTER I**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3101	Technical English	3	1	0	4
2.	MA3101	Engineering Mathematics – I	3	1	0	4
3.	BS3101	Engineering Physics	3	0	0	3
4.	BS3102	Engineering Chemistry	3	0	0	3
5.	CS3101	Fundamentals of Computing and Python Programming	3	0	0	3
PRACTICAL						
6.	CS3171	Fundamentals of Computing and Python Programming Laboratory	0	0	4	2
7.	BS3171	Physics and Chemistry Laboratory	0	0	4	2
TOTAL			15	2	8	21

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3102	Communicative English	3	0	0	3
2.	MA3102	Engineering Mathematics – II	3	1	0	4
3.	BE3101	Basic Electrical and Electronics Engineering	3	0	0	3
4.	BE3102	Basic Civil and Mechanical Engineering	3	0	0	3
5.	ME3101	Engineering Graphics	3	0	2	4
PRACTICAL						
6.	BE3171	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
7.	BE3172	Basic Civil and Mechanical Engineering Laboratory	0	0	2	1
TOTAL			15	1	6	19

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3201	Engineering Mathematics III	3	1	0	4
2.	IT3201	Computer System Architecture	3	0	0	3
3.	IT3202	Digital Principles and Design	2	1	0	3
4.	IT3203	Object Oriented Programming using C++	2	1	0	3
5.	IT3204	Principles of Communication	3	0	0	3
6.	IT3205	Data Structures	2	1	0	3
PRACTICAL						
7.	IT3271	Data Structures Laboratory	0	0	2	1
8.	IT3272	Digital Laboratory	0	0	2	1
9.	IT3273	Object Oriented Programming using C++ Laboratory	0	0	2	1
TOTAL			15	4	6	22

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3204	Statistics and Numerical Methods	2	1	0	3
2.	BS3201	Environmental Studies	2	0	0	2
3.	IT3206	Data Communication and Computer Networks	3	0	0	3
4.	IT3207	Database System Concepts	3	0	0	3
5.	IT3208	Operating System Concepts	3	0	0	3
6.	IT3209	Software Engineering Principles	3	0	0	3
PRACTICAL						
7.	IT3274	Data Communication and Computer Networks Laboratory	0	0	2	1

8.	IT3275	Database Systems Laboratory	0	0	2	1
9.	IT3276	Operating System Concepts Laboratory	0	0	2	1
10.	IT32P1	Summer Internship-I	0	0	0	2
TOTAL			16	1	6	22

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MS3201	Professional and Business Ethics	2	0	0	2
2.	IT3210	Information Security Basics	3	0	0	3
3.	IT3211	Embedded Systems and IOT	3	0	0	3
4.	IT3212	Object Oriented Analysis and Design	2	1	0	3
5.	IT3213	Fundamentals of Java Programming	2	1	0	3
6.	*****	Elective - I	3	0	0	3
PRACTICAL						
7.	IT3277	Embedded Systems and IOT Laboratory	0	0	2	1
8.	IT3278	Object Oriented Analysis and Design Laboratory	0	0	2	1
9.	IT3279	Java Programming Laboratory	0	0	2	1
TOTAL			15	2	6	20

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	AI32D1	Fundamentals of Artificial Intelligence	3	0	0	3
2.	IT3214	Cyber Forensics Basics	3	0	0	3
3.	IT3215	Web Programming	3	0	0	3
4.	IT3216	Full Stack Web Development	2	1	0	3
5.	*****	Elective-II	3	0	0	3
6.	*****	Elective-III	3	0	0	3
PRACTICAL						
7.	IT3280	Cyber Security Laboratory	0	0	2	1
8.	IT3281	Web Programming Laboratory	0	0	2	1
9.	IT3282	Full Stack Web Development Laboratory	0	0	2	1
10.	IT32P2	Summer Internship-II	0	0	0	2
TOTAL			17	1	6	23

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MS3202	Principles of Management	2	0	0	2
2.	IT3217	Cloud Computing Essentials	3	0	0	3
3.	*****	Elective-IV	3	0	0	3
4.	*****	Elective-V	3	0	0	3
5.	*****	Open Elective - II	3	0	0	3
PRACTICAL						
6.	IT3283	Cyber Forensics Lab	0	0	2	1

7.	IT3284	Cloud Computing Essentials Lab	0	0	2	1
8.	IT32P3	Project -I (Machine Learning)	0	0	6	3
TOTAL			14	0	10	19

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	*****	Elective-IV	3	0	0	3
2.	*****	Elective-V	3	0	0	3
PRACTICAL						
3.	IT35P1	Project Work - II	0	0	20	10
TOTAL			6	0	20	16

PROFESSIONAL ELECTIVE COURSES

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT32A1	Cyber Forensics and Incident Response	3	0	0	3
2	IT32A2	Cyber Law and Cyber Crime Investigation	3	0	0	3
3	IT32A3	Ethical Hacking	3	0	0	3
4	IT32A4	Intrusion Detection and Prevention System	3	0	0	3
5	IT32A5	Machine Learning	3	0	0	3
6	IT32A6	Risk Assessment and Security Audit	3	0	0	3
7	IT32A7	Biometric Image Processing	3	0	0	3
8	IT32A8	OS Forensics	3	0	0	3
9	IT32A9	File System Forensics Analysis	3	0	0	3
10	IT32B1	Cryptography and Network Security	3	0	0	3
11	IT32B2	Software Testing Principles	3	0	0	3
12	IT32B3	Data Warehousing and Data Mining	3	0	0	3
13	IT32B4	C# and .NET Programming	3	0	0	3
14	IT32B5	Free and Open Source Software	3	0	0	3

Syllabus Format

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3101	Technical English	3	1	0	4
2.	MA3101	Engineering Mathematics – I	3	1	0	4
3.	BS3101	Engineering Physics	3	0	0	3
4.	BS3102	Engineering Chemistry	3	0	0	3
5.	CS3101	Fundamentals of Computing and Python Programming	3	0	0	3
PRACTICAL						
6.	CS3171	Fundamentals of Computing and Python Programming Laboratory	0	0	4	2
7.	BS3171	Physics and Chemistry Laboratory	0	0	4	2
TOTAL			15	2	8	21

EG3101	TECHNICAL ENGLISH	L	T	P	C
		3	1	0	4

OBJECTIVES

- To develop the linguistic, communicative and critical thinking competencies of First Year Engineering students
- To enhance the understanding of the complex grammatical structures of the English language to students
- To improve the language proficiency of students in English with emphasis on Vocabulary, Grammar, Listening, Speaking, Reading, and Writing skills
- To introduce the students to the basic phonetics of English and make them grasp the various sounds of the English language to improve their pronunciation

Course Outcome		Cognitive Skill
CO-01	The students will be able to improve their vocabulary relating to Engineering and Technology, and use articles and prepositions effectively in sentences.	R
CO-02	The students will be able to learn grammatical items like tense, voice, compound nouns etc. and thereby enhance their linguistic competence.	U

CO-03	The students will be able to learn definitions of technical terms, relative pronouns etc. which will develop their language competence.	A
CO-04	The students will be able to acquire the essentials of writing skills relating to CV, Resume, Formal and Business Letters.	U
CO-05	The students will be able to learn English phonemes such as Vowels, Diphthongs and Consonants which will be instrumental in improving their pronunciation and speaking skills.	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
CO-01	S	M	M	S	S	M	S	S
CO-02	M	S	M	M	S	S	M	S
CO-03	S	M	M	S	M	M	S	M
CO-04	M	S	M	M	S	M	S	M
CO-05	S	M	S	S	M	S	M	S

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

Unit I

9

Word formation with prefixes and suffixes – Articles – Conjunctions – Prepositions – Expansion of Abbreviations and Acronyms – Writing Checklists – Writing Instructions.

Unit II

9

Tense – Voice – Punctuation – Expansion of Compound Nouns – Writing Recommendations – Paragraph Writing – Types, Structures and Features of a Paragraph – Creating Coherence – Organizing Principles of Paragraphs in Documents.

Unit III

9

Discourse Markers – Gerunds and Present Participles – Relative Pronouns – Conditional Clauses – Definitions of Technical Terms – Transcoding: Bar Chart - Flow Chart - Pie Chart - Tree Diagram - Tabular Column.

Unit IV

9

Concord – Clauses – Phrases – Numerical Adjectives – CV/Resume Writing – Virtual Communication: E-Mail Writing – Essay Writing: Basic Format of an Essay - Types – Examples.

Unit V

9

Basic Phonetics: Phonemes – Vowels, Diphthongs and Consonants – Classification: Pure Vowels/Monophthongs – Vowel Glides /Diphthongs.

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

EXTENSIVE READING:

Shiv Khera, You Can Win, Milan, Delhi, 2004

NOTE:

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA3101	ENGINEERING MATHEMATICS - I	L	T	P	C
		3	1	0	4

OBJECTIVES

The course objective is to develop the required skill of the students in the area of Engineering Mathematics with special emphasis on the characteristic equation of matrices, differential calculus, Beta and Gamma functions and to develop basic knowledge to the students in double and triple integration.

Course Outcome		Cognitive Skill
CO-01	Understand the characteristic equation and find eigen values and Eigen vector of a real matrix. Compute the eigen value and eigen vector using properties. Verify Cayley Hamilton theorem and its applications. Apply orthogonal transformation of a symmetric matrix.	U, A ,E. R
CO-02	Define the definitions and formula for curvature, radius of curvature, circle of curvature. Apply the formula and solve problems using the required formulas also find the evolute of the curves.	U, A ,E, An
CO-03	Know about the differentiation formulae and apply on partial derivatives, total derivatives and Jacobians. Verify the functions be maximum or minimum and Lagrange's multiplier method. Express the Taylor's expansion for two variables.	U, A ,E. R
CO-04	Know the Fundamental concepts of improper integrals, Beta and gamma function and their properties. Develop the skill in the relation between Beta and Gamma Functions. Calculate definite integral values using Beta and Gamma Functions.	U, A , An,E
CO-05	Evaluate the double and multiple integrals and can apply these concepts to find areas of regions on a plane or in space. Graph Cartesian and polar equations. Convert Cartesian coordinates into polar coordinates.	U, A , 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	PO-K	PO-L
CO-01	S	M	S	M	S	S	S	S	M	S	S	M
CO-02	S	M	M	M	S	S	M	S	M	M	M	M
CO-03	S	M	M	M	S	S	M	M	M	S	S	M
CO-04	S	M	S	M	S	M	S	S	M	S	S	M
CO-05	S	M	S	M	S	M	S	S	M	S	S	M

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

Unit I: Matrices**9**

Characteristic equation - Eigen values and Eigen vectors of a real matrix - Properties of eigen values and eigen vectors(without proof)- Cayley Hamilton theorem (statement only), verification and its applications - Orthogonal and Symmetric matrices and their properties(excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form.

Unit II: Differential Calculus**9**

Curvature - Cartesian co-ordinates and parametric form -Centre and radius of curvature, Circle of curvature - Evolutes.

Unit III: Functions of Several Variables**9**

Partial derivatives - Total derivatives - Jacobians - Properties - Maxima and minima for functions of two variables - Lagrange Multiplier method- Taylor's expansion.

Unit IV: Improper Integrals**9**

Evaluation of improper integrals- Beta and Gamma functions - Properties - Relation between Beta and Gamma functions - Evaluation of integrals using Beta and Gamma functions.

Unit V: Multiple Integrals**9**

Evaluation of double and triple integrals - Area enclosed by plane curves as double integral in cartesian and polar co-ordinates - Change of order of integration- Transformation of Cartesian coordinates into polar coordinates.

L: 45 + T: 15, TOTAL: 60 HOURS**TEXT BOOK**

1. Grewal B.S., "Higher Engineering Mathematics"- 40th Edition , Khanna Publishers, Delhi 2007

REFERENCES

1. M.Immaculate Mary , K.Uma Samundesvari," Engineering Mathematics - I" Revised Edition, R.K Publishers, 2016.
2. Veerarajan T, " Engineering Mathematics (for first year)", Fourth Edition, Tata McGraw- Hill Publishing Company Ltd.,New Delhi , 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Seventh Edition, Wiley India, 2007.
4. P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" Vol,1 ,S.Chand & Company Ltd.2002.
5. B.V. Ramana,"Higher Engineering Mathematics" Second Edition Tata McGraw- Hill, Publishing Company Ltd.,New Delhi, 2006 .

BS3101	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES

The course objective is to provide basic ideas about the principles of physics related to properties of matter, wave optics, heat, quantum concepts and materials engineering problems.

Course Outcome		Cognitive Skill
CO-01	Students will be able to understand and apply knowledge about the properties of materials.	R,U,A
CO-02	Students will be able to understand the types of oscillations and the wave nature of light in interference, diffraction and polarization phenomenon.	R,U,A,E

CO-03	Students will be able to state and explain the various laws of thermodynamics, understand entropy and its application.	R,U,A,An, ,E
CO-04	Students gain basic knowledge about quantum mechanics and will be able to solve time dependent and time independent Schrodinger equation for simple potentials.	R,U,A,E,S
CO-05	Students will be able to know the different types of crystal structures and also gain basic knowledge about nano materials and biomaterials.	R,U,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
CO-01	S	S	S	S
CO-02	S	S	S	M
CO-03	S	S	S	S
CO-04	S	M	S	S
CO-05	S	S	M	M

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

Unit I: Properties of Matter

9

Elasticity – Poisson's ratio – Stress-strain diagram – factors affecting elasticity – bending of beams – cantilever depression – Young's Modulus- theory and experiment of Young's modulus determination (uniform and non-uniform bending) –Shear Modulus – twisting couple – hollow cylinder – torsion pendulum – determination of rigidity modulus - Bulk Modulus - applications of elastic behaviours of materials.

Unit II: Oscillations and Wave optics

9

Oscillations - Rectilinear motion - Oscillations or Vibrations - Simple Harmonic Motion - Damped Harmonic motion - Real oscillatory system - Forced or Driven oscillation. Wave optics -Interference of light – Photons - Young's Double Slit Experiment - Huygens's Principle - Diffraction - Diffraction Grating - Polarization.

Unit III: Thermal Physics

9

Transfer of heat energy (conduction, convection and radiation) - thermal expansion of solids and liquids – expansion joints – bimetallic strips-Thermal conductivity- Forbe's and Lee's disc methods (theory and experiment)- thermal insulation in buildings -Laws of thermodynamics- heat exchanger -solar power-applications of solar power (solar water heater, photo voltaic cell).

Unit IV: Quantum Physics

9

Matter waves- de-Broglie wavelength - Schrodinger's wave equation-time independent and time dependent equations- physical significance of wave function- uncertainty principle and its application- energy and momentum operators-particle in a one dimensional box- scanning electron microscope- transmission electron microscope-scanning tunnelling microscope.

Unit V: Material Physics**9**

Single crystalline, polycrystalline and amorphous materials- Single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, miller indices – inter planar distances. Introduction and applications of Metallic glasses, Shape Memory Alloys (SMA), Nanomaterials, Biomaterials.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Engineering Physics I by Bindhu B, Sagi Rani C, Meenadevi V N, Ganapathi Raman R, RK Publishers 2015.
2. Engineering Physics II by Bindhu B, GeethaKumari R, SugirthaSunil N Y, RK Publishers 2016.
3. Engineering Physics by R K Gaur And S L Gupta, Dhanpat Rai Publications 2011.
4. A Text Book Oscillations, Waves & Acoustics by Dr. M. Gosh, Dr. D. Battacharya, S. Chand, Revised Edition.

REFERENCES

1. Engineering Physics by Rajendran V, McGraw-Hill, New Delhi, 2013
2. Engineering Physics by Arumugam M, Anuradha Publications, 2014.
3. Principles of Physics by Halliday D, Resnick R and Walker J, Wiley 2015.
4. Physics for scientist and Engineers by Serway R A and Jewett J W, Cengage Learning 2010.
5. Engineering Physics by Bhattacharya D K and Poonam T, Oxford University Press 2015.
6. Engineering Physics by Pandey B K and Chaturvedi, Cengage Learning India 201

BS3102	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES

To make the students conversant with the principles of the following topics:

- Use of free energy in chemical equilibria
- Water chemistry
- Periodic properties
- Spectroscopic techniques and applications and
- Organic reactions and synthesis of a drug molecule.

Course Outcome		Cognitive Skill
CO-01	Students will be able to understand the estimation of free energy and entropy	U,A,An
CO-02	Students will be able to apply the different techniques in water technology	R,A
CO-03	Students will .be able to analyze the properties of periodic tables.	E,A,E
CO-04	Students will be able to describe the different types of spectroscopic techniques.	An,U
CO-05	Students will be able to predict the structure of organic molecules.	S,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
CO-01	S	M	S	L	S
CO-02	M	S	L	S	S
CO-03	S	S	S	M	S
CO-04	S	M	S	S	S
CO-05	S	L	M	S	S

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

Unit I: Use of Free Energy in Chemical Equilibria

9

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

Unit II: Water Chemistry

9

Water as a universal solvent – hard and soft water – reasons for hardness – disadvantages of hard water in washing and industrial purposes - estimation of hardness by EDTA method, problems; boiler feed water – characteristics- softening methods - external conditioning – demineralization (ion exchange) process, desalination by reverse osmosis method- internal conditioning (phosphate, calgon and carbonate conditioning methods); stages in domestic water treatment – disinfection by chlorination, ozone and UV treatments.

Unit III: Periodic Properties

9

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

Unit IV: Spectroscopic Techniques and Applications

9

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

Unit V: Organic Reactions and Synthesis of a Drug Molecule

9

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

TOTAL: 45 HOURS

TEXT BOOKS

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

CS3101	FUNDAMENTALS OF COMPUTING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

Course Outcome		Cognitive Skill
CO-01	Understanding the basics of algorithmic problem solving.	U
CO-02	Ability to analyze various techniques for read and write simple python programs.	An
CO-03	Introduce python programs with loops and conditionals.	A
CO-04	Evaluate and define python functions, call them and use python data structures, list, tuples and dictionaries.	E
CO-05	Apply input / output with files in python.	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	M	S	M	M	S	M	M	S	M
CO-02	M	S	M	M	M	S	M	S	M	S
CO-03	S	S	M	S	M	S	S	S	M	M
CO-04	S	M	M	S	S	M	S	M	S	S
CO-05	M	M	S	S	S	M	M	S	S	S

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

Unit I: Algorithmic Problem Solving

9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

Unit II: Data, Expressions, Statements**9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

Unit III: Control flow, Functions**9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

Unit IV: Lists, Tuples, Dictionaries**9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

Unit V: Files, Modules, Packages**9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/thinkpython/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.,2011.

REFERENCES

1. John V Guttag, —Introduction to Computation and Programming Using Python``, Revised and Revised and expanded Edition, MIT Press ,2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd.,2016.
3. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd.,2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem Solving Focus, Wiley India Edition, 2013.
5. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3, Second edition, Pragmatic Programmers, LLC, 2013.

BS3171	PHYSICS & CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVE

The course objective is to teach students, the importance of physics through involvement in experiments and to have knowledge of the world due to constant interplay between observations and hypothesis.

Course Outcome		Cognitive Skill
CO-01	The students will be able to analyse the physical principle involved in various instruments and also relate the principle to new applications.	R,U,A,An,E
CO-02	Various experiments in the areas of optics, properties of matter and ultrasonics will nurture the students in all branches of engineering.	R ,U,A, An,E
CO-03	The students will be able to think innovatively and also improve the creative skills that are essential for engineering.	R,U,A,An,E
CO-04	The students will be able to gain knowledge of new concept in the solution of practical oriented problems and theoretical problems.	R,U,A,An,E
CO-05	The students will be able to understand measurement technology, usage of new instruments and real time applications in engineering studies.	R,U,A,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
CO-01	S	S	S	S
CO-02	S	S	S	M
CO-03	S	S	S	S
CO-04	S	M	S	S
CO-05	S	S	M	M

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

List of experiments: Physics Laboratory (Any Five Experiments)

1. Determination of velocity of ultrasonic waves and compressibility of the given liquid by Ultrasonic interferometer.(Real and Virtual Lab)
2. Determination of rigidity modulus by Torsional pendulum. (Real and Virtual Lab)
3. Determination of coefficient of viscosity by Poiseulli's method.
4. Determination of Young's modulus by non-uniform bending method.(Real and Virtual Lab)
5. Determination of LASER parameters using LASER diode. (Real and Virtual Lab)
6. Determination of band gap of the semi-conductor.(Real and Virtual Lab)
7. Determination of wavelength of mercury spectrum by diffraction grating.(Real and virtual lab)
8. Determination of wavelength of light by Newton's rings.(Real and Virtual Lab)
9. Determination of angle of the prism using spectrometer. (Real and Virtual Lab)

CHEMISTRY LAB
(Any FIVE experiments)

Course Outcome		Cognitive Skill
CO-01	Learn and apply basic techniques used in chemistry laboratory for small/large scale water analyses/purification	U,An,
CO-02	Be able estimate the ions/metal ions present in domestic/industry waste water	R,E,
CO-03	Utilize the fundamental laboratory techniques for analyses such as titrations, separation/purification and spectroscopy.	A,An
CO-04	Able to analyze and gain experimental skill.	R,U
CO-05	To find out the water level of house	R,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
CO-01	M	S	S	S	L
CO-02	S	L	S	S	S
CO-03	S	M	M	M	S
CO-04	M	S	L	S	M
CO-05	S	M	S	M	S

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

LIST OF EXPERIMENTS

1. Determination of conductance of solutions
2. Potentiometry - determination of redox potentials and emfs
3. Synthesis of drug
4. Determination of Chloride content
5. Determination of hardness of water sample
6. Determination of Alkalinity of water sample
7. Virtual lab experiments

CS3171	FUNDAMENTALS OF COMPUTING AND PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	4	2

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, dictionaries.
- Read and write data from/to files in Python.

Course Outcome		Cognitive Skill
CO-01	Understand the basic syntax of python	U
CO-02	Understand the problem solving techniques	U
CO-03	Analyze data structure concept in python	An
CO-04	Understand all tools of python	U
CO-05	Understand Pygame	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	M	M	S	M	S	M	M	S	S
CO-02	M	S	M	S	M	S	M	S	M	M
CO-03	S	M	M	M	M	M	S	S	S	S
CO-04	M	M	S	S	S	M	M	M	M	M
CO-05	S	S	S	M	M	S	S	M	M	M

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

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

TOTAL: 45 HOURS

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3102	Communicative English	3	0	0	3
2.	MA3102	Engineering Mathematics – II	3	1	0	4
3.	BE3101	Basic Electrical and Electronics Engineering	3	0	0	3
4.	BE3102	Basic Civil and Mechanical Engineering	3	0	0	3
5.	ME3101	Engineering Graphics	3	0	2	4
PRACTICAL						
6.	BE3171	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
7.	BE3172	Basic Civil and Mechanical Engineering Laboratory	0	0	2	1
TOTAL			15	1	6	19

EG3102	COMMUNICATIVE ENGLISH	L	T	P	C
		3	0	0	3

OBJECTIVES

- To widen and expand students' knowledge of English vocabulary
- To develop skills of students in the areas of vocabulary, grammar, listening, speaking, reading, and writing
- To develop the knowledge, skills and strategies the student must possess to become proficient readers
- To make the students learn the importance and purpose of communication skills and overcome the communication barriers by gaining confidence
- To make the students understand how to apply technical information and knowledge in practical documents

Course Outcome		Cognitive Skill
CO-01	The students will be able to understand the basic vocabulary items, sentence structures and error detection and correction which, in turn, will expand their knowledge of the English language.	R
CO-02	The students will be able to grasp the LSRW Skills and gain exposure to absorb Comprehension and Note-making.	U

CO-03	The students will get real time practice in speaking through Oral Presentation, Small Talk, Role Play, Debate , Group Discussion etc.	A
CO-04	The students will be able to improve their writing skills through exposure to Report Writing and Letter Writing.	U
CO-05	The students will be able to learn the Theory of Communication , the Importance of Communication, and be introduced to the various facets of Verbal and Non verbal Communication.	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
CO-01	S	M	M	S	S	M	S	S
CO-02	M	S	M	M	S	S	M	S
CO-03	S	M	M	S	M	M	S	M
CO-04	M	S	M	M	S	M	S	M
CO-05	S	M	S	S	M	S	M	S

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

Unit I: Vocabulary and Grammar

9

Parts of Speech – Sentence Structures – Technical Vocabulary – Synonyms – Antonyms – Homonyms – Homophones – Misspelled Words – One word Substitutes – Odd Words Out – Changing words from one form to another – Common Errors in English – Correction of Errors in Sentences.

Unit II: Listening and Reading

9

Reading Comprehension – Skimming – Scanning – Predicting the Content – Comprehension Questions – Inductive Reading – Close Reading – Note Making – Précis Writing.

Unit III: Speaking

9

Introducing Oneself – Exchanging Personal Information – Small Talk: Family, Friends, Studies, Profession – Speaking: Greeting, Taking Leave – Product Description – Completing information – Gap Exercises – Presentation / Public Speaking Skills – Group Discussion – Debate – Role Play.

Unit IV: Technical Writing

9

Report Writing – Characteristics of a Report – Categories of Reports – Letter Writing (Formal Letters) : Job Application Letter with Resume – Letter Seeking Permission – Letter of Invitation – Letter Declining an Invitation – Letter of Complaint – Letter of Requisition.

Unit V: Technical Communication

9

The Theory of Communication – Definition and Scope – Nature, Importance and Types – Different Communication Models – Barriers to Communication – Effective Communication (Verbal / Non-verbal).

TOTAL: 45 HOURS

EXTENSIVE READING

CanField Jack, Chicken Soup for the Soul, Westland, Chennai, 1999.

NOTE:

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

REFERENCES

1. Communication Skills. Oxford University Press.
2. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
3. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
4. The Four Skills for Communication – Josh Sreedharan – Foundation Books
5. Communicative English – E. Sureshkumar and P. Sreehari – Orient Blackswan

MA3102	ENGINEERING MATHEMATICS – II	L	T	P	C
		3	1	0	4

OBJECTIVE

To develop basic knowledge to the students in differential equations and vector calculus. This subject is further broadened to the functions of complex variables and complex integration. A thorough knowledge about Laplace transforms is also covered to aid the students solve the differential equations.

Course Outcome		Cognitive Skill
CO-01	The Students will be able to solve ordinary differential equations	An , E , S
CO-02	The Students will be able to solve complex variables	E
CO-03	The Students will be able to synthesize complex integration	S
CO-04	The Students will be able to solve Vector Calculus	E , S
CO-05	The Students will be able to Synthesize Laplace transforms	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	PO-K	PO-L	PO-M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

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

Unit I: Ordinary Differential Equations**9**

Linear differential equations of second order with constant and variable coefficients- Cauchy's and Legendre's linear equations – Method of variation of parameters.

Unit II: Complex Variables**9**

Functions of a complex variable – Analytic function – Necessary conditions- Cauchy- Riemann equations in cartesian and polar co-ordinates - Sufficient conditions(excluding proof) –Properties of analytic function – Harmonic and its conjugate – Construction of analytic function by Milne Thomson method – Conformal mappings $w = z + c$, cz , $1/z$ and Bilinear transformation.

Unit III: Complex Integration**9**

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula –Laurent's expansion – Singular points – Residues – Cauchy's Residue theorem – Evaluation of real definite integral

using contour integration(excluding poles on the real axis) - $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{g(x)} dx$

Unit IV: Vector Calculus**9**

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

Unit V: Laplace Transforms**9**

Laplace transform –Existence condition– Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Transform of Periodic functions. Inverse Laplace transform – Convolution, Initial and Final value theorems (statement only) – Solutions of linear ordinary differential equation of second order with constant coefficients using Laplace transform techniques.

L: 45 + T: 15 = TOTAL 60 HOURS**OUTCOMES**

At the end of the course, the students will be familiar to solve differential equations using Laplace Transform method, which is easier to handle the problems that is being investigated. They'll also become acquainted with the basic ideas of complex variable theory so as to enable the students to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.

TEXT BOOK

1. Grewal B.S., "Higher Engineering Mathematics"- 40th Edition , Khanna Publishers, Delhi 2007.

REFERENCES

2. M.Immaculate Mary , K.Uma Samundesvari, Engineering Mathematics – II" First Edition, Anuradha Publications, ,2013.
3. Erwin Kreyszig, " Advanced engineering Mathematics", Seventh Edition, Wiley India, 2007.
4. Veerarajan T, " Engineering Mathematics (for first year)", Tata McGraw- Hill Publishing Company Ltd.,New Delhi,2007.
5. P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" S.Chand & Company Ltd.2002.
6. B.V. Ramana,"Higher Engineering Mathematics" Second Edition Tata McGraw- Hill, Publishing Company Ltd.,New Delhi, 2006.

BE3101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the basic solutions of AC and DC circuits.
- To study the basic principle and operation of AC and DC machines.
- To study the fundamental operations of measuring instruments.

- To study the layout of power system
- To understand the fundamental operation and characteristics of Electron devices
- To understand the implementation of Boolean expression using logic gates.
- To become familiar with basic concepts of Communication system.

Course Outcome		Cognitive Skill
CO-01	To study the basic principle and operation of AC and DC machines.	U
CO-02	To study the fundamental operations of measuring instruments.	R
CO-03	To understand the fundamental operation and characteristics of Electron devices	U,A
CO-04	To understand the implementation of Boolean expression using logic gates.	R
CO-05	To become familiar with basic concepts of Communication system.	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	M	L	L	M	S	M	S
CO-02	S	S	S	M	L	L	M	M	M	S
CO-03	S	S	M	S	S	S	M	M	M	S
CO-04	S	M	S	S	S	S	M	L	S	S
CO-05	S	S	M	M	M	M	M	L	S	M

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

Unit I: Electrical Circuits

9

Ohms Law, Kirchhoff's laws, Mesh and Nodal Analysis for DC Circuits.

Introduction to AC Circuits, Faraday's Law of Electromagnetic Induction, Lenz law, Inductor, Capacitor, Power factor, Waveforms and RMS value, Average Value, Peak factor and Form factor, Single phase circuits- Series and Parallel, Three phase balanced circuits. Fundamentals of wiring and earthing.

Unit II: Electrical Measurements, Machines and Power System

9

Operating principles of Moving coil and Moving iron instruments (Ammeter and voltmeter), Dynamometer type watt meter and Energy meter, Errors in Measurements.

Construction, Principle of operation and Applications of DC Generators, DC Motors, Single phase transformers. Structure of power system.

Unit III: Semiconductor Devices

9

Introduction to Semiconductors, PN Junction diode-Zener diode and its characteristics-Half wave and Full wave Rectifiers-Bipolar Junction transistor-CB,CE,CC Configuration and characteristics-JFET and MOSFET construction, operation, characteristics (CS only) and uses.

Unit IV: Digital Electronics**9**

Number systems-binary arithmetic--Boolean algebra-laws and theorems-Simplification of Boolean expression- logic gates –Implementation of Boolean expression using logic gates-standard forms of Boolean expression.

Unit V: Communication Systems**9**

Block diagram of basic communication system-need for modulation-Types of modulation- Principles of Amplitude and Frequency modulation – pulse analog and digital modulation-AM and FM transmitter and receiver (Block diagram description only) –Satellite Communication Radar Systems-Data transmission and MODEM.

TOTAL: 45 HOURS**REFERENCES**

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
2. V.N. Mittle “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 1990.
3. V.K.Mehta “Principles of Power System”, S.Chand & Company Ltd, New Delhi, 2001.
4. R.S.Sedha,”Applied electronics”S.Chand&Co.,2006.

BE3102	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE

To enable the students to understand the Basic Civil and Mechanical Engineering concepts.

Course Outcome		Cognitive Skill
CO-01	To gain the basic knowledge in Surveying and civil Engineering materials.	U
CO-02	Students can attain the basic knowledge in basic civil structures and building components.	U
CO-03	Can obtain the basic fundamental knowledge of Engineering Mechanics.	U
CO-04	Students can expand their knowledge in knowing about IC engines and power plants.	An
CO-05	Can increase the skill in basic manufacturing processes.	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
CO-01	M	L	M	L	L	M	L	L	M	L
CO-02	L	L	M	M	M	L	L	L	M	L

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

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

A– CIVIL ENGINEERING

Unit I: Surveying and Civil Engineering Materials

9

Surveying: Objects – types – classification – principles – measurements of distances – angles –leveling–determination of areas–illustrative examples.

Civil Engineering Materials: Bricks–stones–sand–cement–concrete–steel sections.

Unit II: Building Components and Structures

9

Foundations: Types, Bearing capacity– Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams–Basics of Interior Design and Landscaping.

B– MECHANICAL ENGINEERING

Unit III: Fundamentals of Engineering Mechanics

9

Statics –Basics Concepts, Fundamental principles & concepts: Newton’s laws, gravitation, force, couple, moment (about point and about axis), Varignon’s theorem, resultant of concurrent and non-concurrent coplanar forces, Problem formulation concept; 2-D statics, two and three force members, alternate equilibrium equations, 3-D statics.

Unit IV: Basic Concepts of Thermal Engineering

9

Introduction to IC Engines, Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles, Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants, Principle of vapour compression and absorption system.

Unit V: Basic Manufacturing Processes

9

Foundry-Investment casting, Die casting, Centrifugal casting, Continuous casting, Stir casting, Squeeze casting. Metal fusion welding processes- Oxyfuel gas welding – Arc welding processes. Additive Manufacturing-3D Printing.

TOTAL: 45 HOURS

TEXT BOOKS

1. Shanmugam G and Palanichamy MS, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi,(1996).
2. Ramamrutham S., “Basic Civil Engineering”, DhanpatRai Publishing Co.(P)Ltd. (1999).

REFERENCES

1. Seetharaman S.,“Basic Civil Engineering”, Anuradha Agencies,(2005).
2. Venugopal K. and Prahu Raja V.,“Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam,(2000).
3. Shantha KumarSRJ., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai,(2000).

ME3101	ENGINEERING GRAPHICS	L	T	P	C
		3	0	2	4

OBJECTIVES

- To develop skills for communication of concepts, ideas and design of Engineering Products.
- To expose them to existing national standards related to technical drawings

Course Outcome		Cognitive Skill
CO-01	To know and understand the conventions and the methods of engineering drawing.	U
CO-02	Interpret Engineering drawings using fundamental technical mathematics.	U
CO-03	Construct basic and intermediate geometry.	A
CO-04	To improve their visualization skills so that they can apply these skills in developing new products.	A
CO-05	To improve their technical communication skill in the form of communicative drawings and comprehend the theory of projection.	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
CO-01	M	M	L	L	M	M	M	S	L	N
CO-02	M	L	M	M	N	M	M	L	L	L
CO-03	M	L	M	L	N	M	M	L	L	L
CO-04	M	L	M	L	N	M	M	L	L	L
CO-05	M	L	M	L	N	M	M	L	L	L

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

Unit I: Introduction

9

Concepts and conventions: Use of drafting instruments, BIS conventions and specifications – Size, layout and folding of drawing sheets, Lettering and dimensioning. General principles of orthographic projection, First angle projection – Layout of views. **(Not for examination)**

General Plane Curves

Conic sections including the Rectangular Hyperbola (General method); Cycloid, Epicycloid, Hypocycloid and Involute.

Unit II: Projection of Points, Lines & Planes

9

Projection of points, Projection of straight lines located in the first quadrant. Determination of true lengths and true inclinations. Projection of planes- parallel to any one reference plane, perpendicular to any one reference plane, inclined to any one reference plane and inclined to both reference planes

Unit III: Projection of Solids & Section of Solids**9**

Prisms, pyramids, cylinder and cone, axis perpendicular to any one reference plane. Axis parallel to both the planes. Axis inclined to any one reference plane.

Sectioning of solids- Prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane. Obtaining the true shape of section

Unit IV: Development of Surfaces & Isometric Projection**9**

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone, Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

Unit V: Orthographic Projection & Perspective Projection**9**

Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view. Perspective Projection of Solids (Any one Method).

L: 45+P: 15 = TOTAL: 60 HOURS**TEXT BOOKS**

1. Venugopal K and Prabhu Raja V, "Engineering Graphics", New Age International Publishers, 2007.
2. Luzadder W J, "Fundamentals of Engineering Drawing", Prentice Hall Book Co., New York, 1998
3. Bhat, N.D.& M. Panchal, Engineering Drawing, Charotar Publishing House, 2008

REFERENCES

1. Kumar M S, "Engineering Graphics", Ninth Edition, DD Publications, Chennai, 2007.
2. Bureau of Indian Standards, "Engineering Drawing Practices for Schools and Colleges SP 46-2003", BIS, New Delhi, 2003.
3. Shah, M.B. & B.C. Rana, Engineering Drawing and Computer Graphics, Pearson Education, 2008

BE3171	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To make basic electrical connection
- To measure the electrical parameters
- To obtain the characteristics of Electron devices
- To verify the operation of logic gates.

Course Outcome		Cognitive Skill
CO-01	To study the basic symbols for electrical circuits	U
CO-02	To make basic electrical connection	R
CO-03	To measure the electrical parameters	U,A
CO-04	To obtain the characteristics of Electron devices	R
CO-05	To verify the operation of logic gates.	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	M	S	S	M	L	M	L
CO-02	S	S	S	M	S	S	M	L	M	L
CO-03	S	S	S	S	M	S	S	S	M	M
CO-04	S	S	S	S	M	M	M	S	M	S
CO-05	S	S	S	M	S	S	M	S	L	M

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

I. Electrical Engineering Lab

- 1 Study of Symbols, Cables and Earthing.
- 2 Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- 3 Fluorescent lamp wiring.
- 4 Stair case wiring / Lamp control from three different places/ Doctor Room control/ Go down control
- 5 Measurement of electrical quantities – voltage, current, power & computation of power factor in RLC circuit.
- 6 Measurement of energy using single phase energy meter.
- 7 Fan Wiring.

II. Electronics Engineering Lab

1. Study of Electronic components and equipments – Resistor, colour coding, Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Characteristics of PN Junction diode
3. Characteristics of Zener diode
4. Voltage Regulator using Zener diode
5. Measurement of ripple factor of HWR and FWR.
6. Study of logic gates AND, OR, EX-OR and NOT, NAND and NOR.
7. Generation of Clock Signal.
8. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.

TOTAL: 30 HOURS

BE3172	BASIC CIVIL AND MECHANICAL ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

To provide exposure to the students with hands on experience on various basic Engineering practices in Civil & Mechanical Engineering.

Course Outcome		Cognitive Skill
CO-01	Students can gain fundamental knowledge about Buildings and pipe line works	U
CO-02	One can able to handle Carpentry and power tools.	A
CO-03	Can gain knowledge in basic welding and machining process.	An
CO-04	Can attain the practice of using gyroscope in dynamics.	An
CO-05	Can understand the fundamental knowledge in foundry, fitting, sheet metal and IC engines.	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	M	L	M	L	L	M	L	L	M	L
CO-02	L	L	M	L	M	L	M	L	M	M
CO-03	L	M	M	M	S	M	L	M	M	M
CO-04	L	M	M	M	S	M	L	M	M	M
CO-05	L	M	M	M	S	M	L	M	M	M

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

I CIVIL ENGINEERING PRACTICE

Buildings:

- Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

- Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in house hold fittings.
- Study of pipe connections requirements for pumps and turbines.
- Preparation of plumbing line sketches for water supply and sewage works.
- Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

Welding:

Preparation of arc welding of butt joints, lap joints and tee joints.

Basic Machining:

Simple Turning and Taperturning

Dynamics:

Experiment using Gyroscope/Four bar link mechanism.

Demonstration on:

(a) Demonstration on foundry, fitting and sheet metal exercises.

(b) Demonstration on the working principle of two stroke and four stroke I.C. engines.

TOTAL: 30 HOURS

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3201	Engineering Mathematics III	3	1	0	4
2.	IT3201	Computer System Architecture	3	0	0	3
3.	IT3202	Digital Principles and Design	2	1	0	3
4.	IT3203	Object Oriented Programming using C++	2	1	0	3
5.	IT3204	Principles of Communication	3	0	0	3
6.	IT3205	Data Structures	2	1	0	3
PRACTICAL						
7.	IT3271	Data Structures Laboratory	0	0	2	1
8.	IT3272	Digital Laboratory	0	0	2	1
9.	IT3273	Object Oriented Programming using C++ Laboratory	0	0	2	1
TOTAL			15	4	6	22

MA3201	ENGINEERING MATHEMATICS-III	L	T	P	C
		3	1	0	4

OBJECTIVES

- To develop the skill of the students in the areas of boundary value problems and Transform techniques.
- This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory.
- This course will also serve as a prerequisite for post graduate and specialized studies and research.

Course Outcome		Cognitive Skill
	At the end of the course students should be able to:	
CO-01	Recognize a Partial Differential Equation and formulate a Partial Differential Equation from a given equation. Solve linear Partial Differential Equation of both first and second order using various methods.	R, U, A, E
CO-02	Derive a Fourier series expansion for a given periodic function by evaluating Fourier coefficient and expand Fourier cosine and Sine series for given function. Also find the Fourier series expansion for a given set of numerical values by applying harmonic analysis..	R, U, A, E
CO-03	Classify the second order Partial Differential Equation and solve second order Partial Differential Equations such as wave equation, heat equation	R, U, A, E

	and Laplace equation with boundary and initial conditions applying Fourier series expansion.	
CO-04	Know fundamental and mathematical properties of Fourier transform. Calculate the Fourier transform of a given function and inverse Fourier transform of function. Know the applications of Parseval's and convolution theorem.	R, U, A, E
CO-05	Understand the characteristics and properties of Z-transform. Compute Z-transform of simple functions and inverse z transform of given functions and apply Z-transform for solving difference equations.	R, U, A, E

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

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

Unit I: Partial Differential Equations

9

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of Clairaut's equations – Lagrange's linear equation – Homogeneous linear partial differential equations of second order with constant coefficients.

Unit II: Fourier Series

9

Dirichlet's conditions – Fourier series – Change of interval – Odd and Even functions – Half range sine and cosine series – Parseval's identity – Harmonic Analysis.

Unit III: Boundary Value Problems

9

Classification of second order linear partial differential equations – One dimensional wave and heat equations – Assumptions – Fourier series solution – Steady state solution of two dimensional heat equation (insulated edges excluded) – Fourier series solution in Cartesian co-ordinates.

Unit IV: Fourier Transforms

9

Statement and meaning of Fourier integral theorem – Fourier transform – Properties – Inverse Fourier transform – Fourier Sine and Cosine transforms – Inverse sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

Unit V: Z-Transforms

9

Z- transform – Elementary properties – convolution theorem-Inverse Z-transform –Partial fraction Method, Inversion integral method and Convolution – Initial and Final value theorems –Formation of difference equations – Solution of difference equations using Z-transform.

TOTAL: 45 HOURS

TEXT BOOK

1. Grewal B.S., “Higher Engineering Mathematics”, 40th Edition, Khanna Publishers, Delhi, 2011.

REFERENCES

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, John Wiley & Sons, Inc., USA, 2011.
2. Kandasamy P, Thilagavathy K, and Gunavathy K., “Engineering Mathematics, Volume III”, First Edition, S.Chand& Company Ltd., New Delhi.
3. Veerarajan T., “Engineering Mathematics (for Semester III), Third Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi 2007.
4. Bali, N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Seventh Edition, Lakshmi Publications Pvt. Ltd., New Delhi, 2009.

IT3201	COMPUTER SYSTEM ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES

- To have a thorough understanding of the basic structure and operation of a digital computer, architecture of mainframe computer.
- To discuss in detail the operation of the arithmetic unit including the algorithm and implementation for integer and floating point operations.
- To study in detail the different types of control and the concept of pipelining.
- To study the hierarchical memory system including cache and virtual memories.
- To study the concepts of parallel organization including multiprocessors and multicore organization

Course Outcome		Cognitive Skill
CO-01	Understand the basic components and interconnection structures of computer	U
CO-02	Apply the concepts of fast address to perform signed operand multiplication and division	A
CO-03	To know how an instruction gets executed by the components of a processor	An
CO-04	Get familiar on the various types of memory like RAM, ROM, Virtual memory and cache memory	U
CO-05	Evaluate the design considerations of a multiple processor in handling parallel processing	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	L	M	S	S	M	M	L	M	S
CO-02	S	S	M	S	M	L	N	L	S	S
CO-03	M	S	S	S	S	M	M	S	M	S
CO-04	S	M	M	M	S	L	N	S	M	M
CO-05	S	S	S	M	M	N	S	S	S	S

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

Unit I: Basic Structure of Computers

9

Computer Components – Computer Function – Instruction Fetch and Execute – Interrupts – I/O Function – Interconnection Structures – Bus Interconnection – Bus Structure – Multiple Bus Hierarchies – Elements of Bus Design – PCI – Mainframe computers

Unit II: Arithmetic Unit

9

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers – Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

Unit III: Basic Processing Unit

9

Fundamental concepts – Components of the Processor-Execution of a complete instruction – Hardwired control – Microprogrammed control – Pipelining – Basic concepts – Data hazards – Instruction hazards – Control Hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation – Reduced Instruction Set Architecture.

Unit IV: Memory System

9

Basic concepts – Memory hierarchy and technologies- Semiconductor RAMs – ROMs – Speed, size and cost – Cache memories – Performance consideration – Virtual memory- Memory Management requirements – Secondary storage – DMA.

Unit V: Parallel Organization

9

Multiple Processor Organizations – Types of Parallel Processor Systems – Parallel Organizations – Symmetric Multiprocessors – Organization – Multiprocessor Operating System Design Considerations – A Mainframe SMP – Multicore Organization – Cache Coherence and MESI Protocol – Multithreading and Chip Multiprocessors – Clusters – Graphic Processing Unit Architecture

TOTAL: 45 HOURS

TEXT BOOKS

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 11th Edition, Pearson Education, 2019.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition “Computer Organization”, McGraw-Hill, 2002.

REFERENCES

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The hardware / software interface”, 5th Edition, Morgan Kaufmann, 2014.
2. John P. Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw-Hill, 2012.
3. B. Govindarajalu, “Computer Architecture and Organization”, 2nd Edition, Tata McGraw Hill Education, 2011.

IT3202	DIGITAL PRINCIPLES AND DESIGN	L	T	P	C
		2	1	0	3

OBJECTIVES

- Learn the various number systems.
- Learn Boolean Algebra
- Understand various logic gates.
- Be familiar with various combinational circuits.
- Be familiar with designing synchronous sequential circuits.
- Be exposed to design using PLD
- To study design of digital circuits using Verilog HDL

Course Outcome		Cognitive Skill
CO-01	Understand and examine fundamental concepts of digital logic design including number systems, code conversions and basic universal gates which are used in digital communication and computer systems.	U
CO-02	Employ techniques like karnaugh map and tabulation method to minimize logical expressions and these techniques can be used in the design and analysis of digital circuits.	A
CO-03	Ability to understand, analyze and design various combinational and sequential logic circuits.	An
CO-04	Ability to study various types of memory devices and model memory array for any Boolean function	R
CO-05	Knowledge and use of hardware description languages (HDL) for simulation and implementation of combinational and sequential circuits.	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	M	S	S	S	S
CO-02	S	S	M	M	M	L	S	M	M	M
CO-03	S	S	M	M	M	L	S	M	M	M
CO-04	S	S	M	L	L	L	S	M	M	M
CO-05	S	S	M	M	M	L	S	M	M	M

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

Unit I: Number System, Boolean Algebra and Logic Gates

9

Review of binary number systems – Binary arithmetic – Binary codes – Binary Storage and registers- Binary Logic-Boolean algebra and logic gates: Axiomatic definition of Boolean Algebra-Basic Theorems and properties of Boolean Algebra - Boolean functions – Canonical and standard forms-Logic gates-Integrated Circuits

Unit II: Boolean Function minimization**9**

Simplification of Boolean functions using Karnaugh map – Product-of-Sums Simplification-Don't Care Conditions- Simplification using Tabulation method – NAND and NOR Implementation- Exclusive-OR function

Unit III: Combinational Logic**9**

Combinational circuits – Analysis and design procedures – Binary Adder-Subtractor-Decimal Adder-Binary Multiplier-Magnitude comparator- Code conversion – Decoders and encoders – Multiplexers and demultiplexers-Introduction to Hardware Description Language (HDL) – HDL for combinational circuits.

Unit IV: Synchronous Sequential Logic**10**

Sequential circuits – Flip flops – Analysis and design procedures – State reduction and state assignment – Shift registers – Counters – HDL for sequential logic circuits, Shift registers and counters

Unit V: Memory and Programmable Logic**8**

RAM and ROM – Memory Decoding – Error Detection and Correction – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices

TOTAL 45 HOURS**TEXT BOOK**

1. M. Morris R. Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6th Edition, Pearson Education, 2017.

REFERENCES

1. Charles H. Roth Jr and Larry L Kinney, “Fundamentals of Logic Design”, Seventh Edition, Cengage Learning, 2013.
2. John F. Wakerly, “Digital Design Principles and Practices”, Fifth Edition, Pearson Education, 2017.
3. Kharate G. K., “Digital Electronics”, Oxford University Press, 2010.

IT3203	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
		2	1	0	3

OBJECTIVES

- To understand how C++ improves C with object-oriented features.
- To learn how to design C++ classes for code reuse.
- To understand the concept of data abstraction and encapsulation.
- To learn how to overload functions and operators in C++.
- To learn how containment and inheritance promote code reuse in C++.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Course Outcome		Cognitive Skill
CO-01	Understand the basic concepts of Object Oriented Programming	U
CO-02	Use classes, constructors, destructors and operator overloading and the Standard Template Library in C++	A
CO-03	Map an object-oriented program design into the class and template model of C++	A

CO-04	Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.	A
CO-05	Program low-level input and output routines and streaming input and output operators in C++	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	S	M	M	S	M	M	M	S	S	S
CO-02	S	M	M	S	M	M	S	S	S	S
CO-03	S	M	M	S	M	M	S	S	S	S
CO-04	S	S	S	S	M	M	S	S	S	S
CO-05	S	M	S	S	M	M	S	S	S	S

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

Unit I: Introduction to Object-Oriented Programming

9

Specifying a class – Defining member functions – Private member functions –Arrays within a class – Memory allocation for objects –Pointers– Static data members – Static member functions – Arrays of objects –Objects as function arguments –Friendly functions–nested classes–local classes.

Unit II: Constructors and Operator Overloading

9

Constructors –default constructor–Parameterized constructors–Constructor with dynamic allocation-copy constructor-destructors-operator overloading-overloading through friend functions–overloading the assignment operator –type conversion–explicit constructor

Unit III: Templates and Exception Handling

9

Function templates and class templates – Name spaces – Casting – Exception Handling – try-catch-throw paradigm – exception specification–terminate and Unexpected functions–Uncaught exception.

Unit IV: Inheritance

9

Inheritance–public, private, and protected derivations–multiple inheritance-virtual base class – abstract class – composite objects Runtime polymorphism – virtual functions – pure virtual functions – RTTI – typeid – dynamic casting – RTTI and templates–crosscasting –downcasting.

Unit V: Streams and Files

9

Input Output with Files –Methods of Input and Output Classes –Text mode files – State flags – get and put stream pointers – Binary files – I/O Manipulators

TOTAL: 45 HOURS

TEXTBOOKS

1. S.B.Lippman, JoseeLajoie, BarbaraE.Moo, “C++Primer”, Fifth Edition, Pearson Education, 2013.
2. Balagurusamy E., “Object oriented programming with C++”, Eighth Edition, Third Reprint, Tata McGraw–Hill Education 2020.

REFERENCES

1. B.Trivedi, “Programming with ANSIC++”, OxfordUniversity Press, Eighth Edition 2019.
2. B.Stroustrup, “The C++ Programming language”, fourth Edition, Pearson Education, 2013.

IT3204	PRINCIPLES OF COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES

- To have the understanding about amplitude and frequency modulation schemes
- To gain the knowledge about different digital modulation techniques
- To have knowledge about the digital transmission techniques and interference
- To know the spread spectrum modulation techniques and different multiple access methods
- To know the concepts of satellite and optical communication systems

Course Outcome		Cognitive Skill
CO-01	To have the understanding about amplitude and frequency modulation schemes.	R
CO-02	To gain the knowledge about different digital modulation techniques.	U
CO-03	To have knowledge about the digital transmission techniques and interference	U, An
CO-04	To know the spread spectrum modulation techniques and different multiple access methods	U, An
CO-05	To be familiar with the satellite and optical communication systems	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	L	M	M	S	S	S	S	N	N
CO-02	L	M	M	S	M	S	M	L	M	M
CO-03	S	S	S	S	S	S	S	S	S	S
CO-04	S	S	S	S	S	S	M	S	L	S
CO-05	M	S	S	S	S	S	S	S	S	S

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

Unit I: Fundamentals of Analog Communication

8

Principles of amplitude modulation – AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM voltage distribution, AM power distribution. Angle Modulation – FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of a angle modulated waves, Bandwidth requirements for angle modulated waves.

Unit II: Digital Communication**9**

Introduction, Shannon limit for information capacity, Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying- Binary Phase Shift Keying, Quadrature Phase Shift Keying, Quadrature Amplitude Modulation-Bandwidth efficiency, Carrier Recovery, Clock Recovery, Differential Phase Shift Keying.

Unit III: Digital Transmission**9**

Introduction, Pulse modulation, Pulse Code Modulation (PCM)-PCM Sampling, Signal to Quantization noise ratio, Companding– analog and digital, Delta modulation, Adaptive Delta Modulation, Differential PCM, Pulse transmission, Intersymbol interference, Eye pattern.

Unit IV: Spread Spectrum and Multiple Access Techniques**10**

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, Processing gain, FH spread spectrum, multiple access techniques-wireless communications, TDMA and CDMA in wireless communication systems, Source coding of speech for wireless communications.

Unit V: Satellite and Optical Communication**9**

Satellite communication systems: Kepler's Law, Satellite Orbits-Geosynchronous Satellites-Antenna Look Angles- Classification, Spacing and Frequency Allocation – Footprints-Link Models-Parameters-Equations. Optical Fibre communications: Optical Fibresvs Metallic Cable Facilities-Electromagnetic Spectrum-Block Diagram- Types-Configurations-Classifications-Light Sources-Optical Sources-Light Detectors.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Wayne Tomasi, "Advanced Electronic Communication Systems", Pearson Education Limited, 6thedn., 2014, ISBN 10: 1-292-02735-5.
2. Simon Haykin, "Digital Communication Systems", John Wiley & Sons, Istedn., 2010.

REFERENCES

1. Simon Haykin, "Communication Systems", John Wiley & Sons, 5thedn. 2009.
2. Taub& Schilling, "Principles of Communication Systems", TMH, 3rdedn., 2007.
3. Martin S.Roden, "Analog and Digital Communication System", PHI, 5rd edn. 2006.
4. Blake, "Electronic Communication Systems", Thomson Delman, 2ndedn., 2002.
5. B.P.Lathi,ZhiDing"Modern Analog And Digital Communication systems", 4/e,Oxford University Press,2010.
6. B.Sklar,"Digital Communication Fundamentals and Applications"2/e Pearson Education 2007.

IT3205	DATA STRUCTURES	L	T	P	C
		2	1	0	3

OBJECTIVES

- Learn how to solve computer problems
- Be familiar about Data processing
- Be exposed to the concepts of ADTs
- Learn linear data structures – List, Stack, and Queue and Nonlinear data structures –Trees
- Be exposed to sorting, searching, hashing algorithms and graph

Course Outcome		Cognitive Skill
CO-01	Students will be able to solve computer problems, analyze algorithms and select appropriate data structures for given problems	An
CO-02	Students will be able to understand and implement ADTs and use it to design algorithms for a specific problem	U
CO-03	Knowledge in non-linear data structures will help the students in designing efficient algorithms	A
CO-04	Students will be able to implement appropriate sorting and searching techniques, hash function and concepts of collision and its resolution methods.	A
CO-05	Students will be able to understand the concepts of graphs which help in solving various real time problems.	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	M	M	S	L	S	L	S	S
CO-02	S	S	M	M	S	L	S	M	S	S
CO-03	S	S	S	S	S	N	S	L	S	S
CO-04	S	S	M	M	S	L	S	L	S	S
CO-05	S	S	M	M	S	L	S	L	S	S

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

Unit I: Problem Solving Techniques

9

Introduction to Computer Problem Solving – The Problem Solving Aspect –Top-down Design-Implementation of Algorithms-Program verification-The Efficiency of Algorithms-The Analysis of Algorithms-Data and Information-Overview of Data Structures-Types of Data Structures-Primitive and Non-primitive Data Structures-Binary and Decimal Integers-Logical Information-Storage of Information-Data Types.

Unit II: Linear Data Structures – Lists, Stacks and Queues

9

Abstract Data Type (ADT)- Array-The List ADT-Linked List-Doubly Linked List-Circular Linked List-Applications-The Stack ADT-Applications –The Queue ADT-Types of Queue-Circular queue-Double Ended Queue(deQueue)-Applications.

Unit III: Non Linear Data Structures – Trees

9

Tree ADT-Tree Traversal –Left Child Right Sibling Data Structures for General Trees-Binary Tree ADT-Expression Tree-Applications of Trees-Binary Search Tree ADT – AVL tree – Priority Queues (Heaps) – Model-Simple Implementations-Binary Heaps-B-tree.

Unit IV: Sorting, Searching and Hash Techniques**9**

Sorting Algorithms: Insertion Sort – Selection Sort – Shell Sort – Bubble Sort – Quick Sort – Merge Sort – Radix Sort – Searching: Linear Search – Binary Search – Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

Unit V: Graph**9**

Definition-Representation of Graphs – Types of graph- Breadth First Search – Depth First Search – Topological Sort – Bi-connectivity-Articulation point-Eulers circuit-Minimum Spanning Trees – Kruskal and Prim's algorithm – Shortest Path Algorithms : Dijkstra's Algorithm – Bellman-Ford Algorithm – Floyd – Warshall Algorithm.

TOTAL: 45 HOURS**TEXT BOOKS**

1. M.A.Weiss,"Data Structures and algorithm analysis in C++", Fourth Edition, Pearson Education, 2013.
2. Reema Thareja, —Data Structures Using C++, Second Edition, Oxford University Press, 2011

REFERENCES

1. R.G.Dromey,"How to solve it by Computer", Pearson Education India, 2008.
2. S.Sridhar, "Design and Analysis of Algorithms", First Edition, Oxford University Press. 2014
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2009.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.
5. Gregory L. Heilman, Data Structures, Algorithms and Object Oriented Programming, Tata McGraw-Hill, New Delhi, 2005.
6. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley Publishers, 2011.

IT3271	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- Be familiar with C++ programming
- Be exposed to implement various data structures as Abstract Data Types
- Learn to implement linear and non-linear data structures
- Learn to implement sorting and searching algorithms

Course Outcome		Cognitive Skill
CO-01	Students will be able to identify the appropriate data structures for given problem.	A
CO-02	Students will be able to implement basic data structures like arrays, linked list, stack, queue and its applications.	A
CO-03	Students will be able to apply sorting and searching techniques, hashing and collision resolution methods in real time applications.	A

CO-04	Students will able to design advance data structures using non-linear data structures.	A
CO-05	Students will be able to solve problem involving graphs, trees and heaps.	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	M	S	L	S	M	S	S
CO-02	S	S	S	M	S	N	S	M	S	S
CO-03	S	S	S	M	S	L	S	M	S	S
CO-04	S	S	S	M	S	L	S	M	S	S
CO-05	S	S	S	M	S	L	S	M	S	S

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

LIST OF EXPERIMENTS

1. Array Implementation of List ADT, Stack ADT, Queue ADT
2. Linked list Implementation of List ADT (Singly, Doubly and Circular linked list)
3. Linked list implementation of Stack and Queue ADT.
4. Operations on a Stack: Infix to Postfix, Evaluating Postfix Expressions using Stacks, Checking Balanced Paranthesis.
5. Implementation of Circular queue
6. Binary Tree Traversals
7. Search Tree ADT- Binary Search Tree
8. AVL Tree Implementation
9. Binary Heap
10. Implementation of Sorting Algorithms
11. Implementation of Hashing Techniques
12. Graph Traversals
13. Minimum Spanning Tree –Prim’s, Kruskal’s Algorithm
14. Shortest Path Algorithm –Dijkstra’s Algorithm

TOTAL: 45 HOURS

IT3272	DIGITAL LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To understand the various basic logic gates
- To design and implement the various combinational circuits
- To design and implement combinational circuits using MSI devices.
- To design and implement sequential circuits
- To understand and code with HDL programming

Course Outcome		Cognitive Skill
CO-01	Student will be able to understand and analyze the working of basic logic gates.	U
CO-02	Student will be able to construct and design basic combinational and sequential circuits	A
CO-03	Student will be able to analyze, build, and troubleshoot counters	An
CO-04	Student will be able to analyze, build, and troubleshoot shift registers	An
CO-05	Student will be able to describe the behavior of digital circuits by using hardware description languages	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	M	M	S	S	M	M	M	M	L	M
CO-02	S	S	S	S	M	M	S	M	M	L
CO-03	M	S	S	M	M	M	S	L	L	L
CO-04	S	M	M	M	S	S	S	L	L	L
CO-05	S	S	L	S	S	M	S	M	M	M

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

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implement Half/Full Adder and Subtractor.
4. Design and implementation of 4-bit binary adder/ subtractor using basic gates and MSI devices.
5. Design and implementation of parity generator/ checker using basic gates and MSI devices.
6. Design and implementation of magnitude comparator.
7. Design and implementation of application using multiplexers.

8. Design and implementation of Shift registers.
9. Design and implementation of Synchronous and Asynchronous counters.
10. Coding combinational circuits using Hardware Description Language (HDL software required).
11. Coding sequential circuits using HDL (HDL software required).
12. HDL for Registers and counters. (HDL Software required)

TOTAL: 45 HOURS

IT3273	OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To learn object oriented programming concepts using classes and objects
- To study C++ programs using constructors and overloading concepts
- To understand a program using exception handling and templates
- To acquire fundamental knowledge on the concepts of inheritance and virtual function
- To gain knowledge on applications of I/O

Course Outcome		Cognitive Skill
CO-01	Understand the basic concepts of Object Oriented Programming	U
CO-02	Map an object oriented program design into classes and template model of C++	A
CO-03	Program low-level input and output routines and streaming input and output operators in C++	S
CO-04	Design, implement, test, debug, and document programs in various application	A
CO-05	Apply good programming style and understand the impact of style on developing and maintaining 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	M	M	S	M	M	M	S	S	S
CO-02	S	M	M	S	M	M	S	S	S	S
CO-03	S	M	S	S	M	M	S	S	S	S
CO-04	S	S	S	S	M	M	S	S	S	S
CO-05	S	S	S	S	M	M	S	S	S	S

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

LIST OF EXPERIMENTS

1. Electricity Bill Generation using classes and objects
2. Programs using constructors and destructor
3. Programs using function overloading and friend functions
4. Programs using operator overloading
5. Programs using Templates
6. User Defined Exception Handling Implementation
7. Pay slip Generation using Inheritance
8. Programs using Polymorphism and virtual function
9. Programs using File Handling
10. Program development using STL

TOTAL: 45 HOURS

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3204	Statistics and Numerical Methods	2	1	0	3
2.	BS3201	Environmental Studies	2	0	0	2
3.	IT3206	Data Communication and Computer Networks	3	0	0	3
4.	IT3207	Database System Concepts	3	0	0	3
5.	IT3208	Operating System Concepts	3	0	0	3
6.	IT3209	Software Engineering Principles	3	0	0	3
PRACTICAL						
7.	IT3274	Data Communication and Computer Networks Laboratory	0	0	2	1
8.	IT3275	Database Systems Laboratory	0	0	2	1
9.	IT3276	Operating System Concepts Laboratory	0	0	2	1
10.	IT32P1	Summer Internship-I	0	0	0	2
TOTAL			16	1	6	22

MA3204	STATISTICS AND NUMERICAL METHODS	L	T	P	C
		2	1	0	3

OBJECTIVE

To provide the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

Course Outcome		Cognitive Skill
CO-01	Understand the concept of probability, conditional probability and random variable. Find the probability density and distribution function using different distributions.	R, U, A, E
CO-02	Apply t – test , F-test, Chi square test and large sample test by the transformation of hypothesis and analyze their conclusions using various level of significance.	R, U, A, E
CO-03	Apply various principles of analyzing the variance and also apply Monte Carlo simulation method to solve simultaneous problems.	R, U, A, E

CO-04	Know about what is meant by linear and non-linear equations and solve these equations using various Methods.	R, U, A, E
CO-05	Find the interpolation values and polynomials using Lagrange's Newton's forward and backward formula.	R, U, 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	M	M	S	S	M	M	M	M	L	M
CO-02	S	S	S	S	M	M	S	M	M	L
CO-03	M	S	S	M	M	M	S	L	L	L
CO-04	S	M	M	M	S	S	S	L	L	L
CO-05	S	S	L	S	S	M	S	M	M	M

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

Unit I: Probability and Distributions

6

Axioms of probability Independent Events -Conditional Probability-Random variable -Probability mass functions Probability density functions-Distribution functions-Properties distributions (Problems only), Expectation. Binomial, Poisson, Uniform, Exponential and Normal.

Unit II: Testing of Hypothesis

6

Sampling distribution – Standard error – Sample size –Type I error and Type II error - One tailed and Two tailed tests – large sample tests- Proportions – means and difference of means – Small sample tests – t-tests : Single mean, difference of means – F test for variances – Chi square test for independence of attributes and goodness of fit.

Unit III: Analysis of Variance and Simulation

6

Analysis of Variance- Principles of design of experiments - Completely randomized design Randomized block design and Latin Square Design.
Discrete Event Simulation: Monte - Carlo Simulation Generation of Random Numbers using Congruent method (Simple Production Problems)

Unit IV: Solution of Equations

6

Fixed point iteration method - Newton-Raphson method- Gauss Elimination method - Gauss-Jordan methods Iterative methods of Gauss-Jacobi and Gauss-Seidel. Advantages and limitations of the above methods.

Unit V: Interpolation, Numerical Differentiation and Integration

6

Newton's forward and backward difference interpolation formula- Numerical differentiation using Newton's forward and backward difference interpolation formula - Numerical integration using Trapezoidal and Simpson's 1/3 rules

TOTAL: 30+15 =45 HOURS

TEXT BOOKS

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Eight Edition, Sultan Chand & Sons, 1996. Unit 1, 2, 3
2. Venkatraman M.K, "Numerical Methods" Fifth Edition, National Pub. Company, Chennai 2005 Unit 4, 5

REFERENCES

1. Veerarajan T., Probability, Statistics and Random Processes, Second Edition, Tata McGraw Hill, 2007
2. R.A. Johnson and C.B. Gupta, "Miller and Freund's Probability and Statistics for Engineers", Fifth Edition, Pearson Education, Asia, 1994 (For units 3, 4 and 5).
3. Gerald, C. F. and Wheatley, P. O., "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2006.
4. Grewal, B.S. and Grewal, J.S., "Numerical methods in Engineering and Science", Eighth Edition, Khanna Publishers, New Delhi, 2009.

BS3201	ENVIRONMENTAL STUDIES	L	T	P	C
		2	0	0	2

OBJECTIVES

- To understand the basic concepts in environmental science
- To gain the knowledge about structure and natural cycles of environment
- To get an idea about control methods of pollution
- To know the information about conservation methods of forest and wild life

Course Outcome		Cognitive Skill
CO-01	Student will be able to demonstrate a general understanding of interdisciplinary nature of environmental uses and able to characterize natural resources.	U, A, An
CO-02	Students will be able to explain the effects of air, water, soil, noise and thermal pollution environment and suggest ways to reduce them.	R, E, A
CO-03	Students will be able to explain the effects of air, water, soil, noise and thermal pollution environment and suggest ways to reduce them.	R, U, A
CO-04	Students will be able to understand the effects of human population and know about the awareness programme.	R, A, E
CO-05	Students apply systems concept and methodologies to analyse and understand interaction between social and environmental process.	R, 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
CO-01	N	N	M	N	M	N	M	L	N	L
CO-02	L	N	M	N	M	L	M	L	N	L
CO-03	M	M	M	N	M	L	M	L	N	L
CO-04	M	M	M	N	M	S	M	L	N	L
CO-05	M	M	M	M	M	M	M	M	M	M

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

Unit I: Nature of Environment Studies and Natural Resources

9

Environment studies- definition – scope and importance- need for public awareness-Methods to create environmental awareness- Natural resources- Forest resources- energy resources- food resources- water resources – land resources - mineral resources.

Unit II: Eco Systems and Bio-Diversity

9

Concept and component of eco systems- producer, consumer, decomposer- structure and function of eco system- food chain and food web- energy flow model- aquatic eco system forest eco system- desert eco system- pyramid of biomass- ocean eco system- grass land eco system- Bio diversity in India- value of bio diversity- biodiversity threatens- biodiversity protection- In-situ and Ex-situ conservation.

Unit III: Environmental Pollution

9

Meaning of environmental pollution- air pollution- acid rain – global warming- water pollution- water pollution control- soil pollution- urban waste and soil pollution- marine pollution- noise pollution- thermal pollution- solid and hazardous waste management- waste disposal methods- solid waste and India- natural disaster and disaster management.

Unit IV: Human Population and Environment

9

Population growth- distribution of population- factors affecting variation in population theories of population- future of human population- family welfare programme- HIV and AIDS- environment and human health- human rights- value education- women and child welfare.

Unit V: Social Issues and the Environment

9

Unsustainable to sustainable development- sustainable development in India- water conservation, watershed management and water harvesting- environmental ethics- role of engineer in environmental protection.

TOTAL: 45 HOURS

TEXT BOOKS

1. Cunningham & saigo: "Environmental Science: A global concern", 4th Ed. W.c. Brown Publishers. USA. 1997
2. Chauhan A.S, "Environmental studies", 2nd revised ed. 2004, Jain Brother publishers, New Delhi

REFERENCES

1. Benny Joseph: "Environmental Science and Engineering", 2006, Tata McGraw- Hill Publication.
2. Siddique K.A.: "Elements of Ecology and Environmental Pollution", 1st Ed. 2002, Kushal Publication, Varanasi. M

IT3206	DATA COMMUNICATION AND COMPUTER NETWORK	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the concepts of data communications and its components.
- To gain knowledge on IEEE standards employed in computer networking.
- To study basis of the IP addresses and the functions of routing protocols.
- To get familiarized with transport protocols and socket programming.
- To design application layer protocols for Internet applications.

Course Outcome		Cognitive Skill
CO-01	Describe the functions of OSI model and Transmission media.	R
CO-02	Gain knowledge in data link layer mechanism and IEEE standards and apply them to construct LAN network.	A
CO-03	Analyze how to assign the IP addresses for the given network and packet flow on the basis of routing protocols.	An
CO-04	To get exposed with transport protocols and use socket programming skills to communicate them.	R, A
CO-05	Understand and design application layer protocols for internet applications.	U, 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	L	M	M	M	L	M	M	M	M
CO-03	S	S	M	S	S	L	S	L	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: Data Communication

9

Data Communication: Components – Networks – Topologies – Internet – Protocols and Standards – OSI model – TCP/IP Protocol Suite – Addressing – Transmission Media : Guided and Unguided Media – Line Coding Schemes – Modems.

Unit II: Error Detection and Medium Access Control

9

Error Detection and Correction : Parity – LRC – CRC – Checksum – Hamming code – Flow and Error control - Stop and Wait – Go-Back-N ARQ – Selective Repeat ARQ – Sliding Window – HDLC – Multiple Access – Wired LAN: Ethernet – Wireless LAN – Connecting Devices: Hubs – Repeaters - Bridges.

Unit III: Routing, Data Plane and Control Plane**9**

Packet Switching and Datagram approach – IPV4 Addresses – Classful and Classless Addressing - IPV6 Addresses - Address Mapping – Routing: Distance Vector Routing – Link State Routing – Routers – Gateway – Software Defined Networks (SDN).

Unit IV: End to End Issues**9**

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

Unit V: Application Protocols and Security**9**

Domain Name Space (DNS) – FTP – SMTP – POP3-IMAP - WWW – HTTP – SNMP –Security – Cryptography.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Andrew S. Tanenbaum and Wetherall, “Computer Networks”, 5th Edition, Pearson Education, 2011.
2. Behrouz A. Forouzan, “Data Communication and Networking”, 5th Edition, TataMcGraw Hill, 2013.

REFERENCES

1. William Stallings, “Data and Computer Communication”, 10th Edition, Prentice Hall, 2013.
2. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, 6th Edition, Pearson Education, 2013.
3. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
4. Paul Goransson, Chuck Black and Timothy Culver, “Software Defined Networks: A Comprehensive Approach”, 2nd Edition, Morgan Kaufmann, 2016.

IT3207	DATABASE SYSTEM CONCEPTS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To expose the students to the fundamentals of Database Management Systems.
- To make the students understand the relational model.
- To familiarize the students with ER diagrams.
- To expose the students to SQL
- To make the students to understand the fundamentals of transaction processing.
- To enable the students to work with distributed databases.
- To expose the students to the security issues in databases.

Course Outcome		Cognitive Skill
CO-01	Students are able to understand the fundamentals of Database Management Systems.	R,U
CO-02	Students have the ability to work with relational models, Structured Query Language.	A
CO-03	Students are able to understand the fundamentals of file storage, indexing techniques, transaction processing and concurrency control.	R,U,A
CO-04	Students are able to work with distributed databases.	U
CO-05	Students are able to secure the databases	An, 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	M	M	S	S
CO-02	S	S	S	S	S	S	S	M	S	S
CO-03	S	S	S	M	L	S	M	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: Database Systems

9

Databases – Database system environment- DBMS functions – Data models – Business rules – Hierarchical model – Network model – ER model – Relational model – Object Oriented model – Database languages – Database users and administrators

Unit II: Database Design

9

Logical view of data – Keys – Integrity rules – Relational algebra – ER modeling – Normalization – Normal forms – SQL – Queries – Query Processing - NoSQL –MongoDB – SQLite

Unit III: Database Storage and Transaction Management

9

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files Index Structure for files –Different types of Indices- B-Tree - B+Tree - Transaction properties – Concurrency control – Locking methods – Two phase locking protocol – time stamping methods – Database recovery

Unit IV: Distributed Databases

9

Distributed processing and distributed databases – Characteristics of distributed database management systems – DDBMS components – Levels of data and process distribution – Distributed transparency – Distributed concurrency control

Unit V: Database Security**9**

Database security – Security Requirements of Database – Reliability and Integrity – Sensitive Data – Inference – Access Control – Mandatory Access Control – Discretionary Access Control – Database Auditing – Auditing Process – Types of Audit – Auditing Models

TOTAL: 45 HOURS**TEXT BOOKS**

1. Carlos Coronel, Steven Morris, Peter Rob, “Database Systems Design, Implementation and Management”, Ninth Edition, Cengage Learning, 2011.
2. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Sixth Edition, McGraw-Hill, 2011.

REFERENCES

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies— “Security in Computing”, Fifth Edition, Prentice Hall, 2015.
2. RamezElmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Sixth Edition, Pearson Education, 2011.
3. Raghu Ramakrishnan, “Database Management System”, Third Edition, Tata McGraw-Hill Publishing Company, 2003.
4. Ron Ben Natan, “Implementing Database Security and Auditing”, Elsevier publications, 2005.
5. Hassan A. Afyduni, “Database Security and Auditing”, Course Technology – Cengage Learning, New Delhi, 2009.
6. Grant Allen, Mike Owens, “The Definitive Guide to SQLite”, 2nd Edition, Apress, 2010.
7. Brad Dayley, “NoSQL with MongoDB in 24 Hours”, SAMS, 2015.

IT3208	OPERATING SYSTEM CONCEPTS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the structure and functions of operating system
- To learn the Processes, Threads and Scheduling algorithms
- To understand the principles of concurrency and Deadlocks
- To learn various memory management schemes.
- To be familiar with the basics of Linux system and OS security.

Course Outcome		Cognitive Skill
CO-01	Understand the role of operating system with its function, structure and services.	U
CO-02	Analyse various scheduling algorithms, and understand the different deadlock, prevention and avoidance schemes	An
CO-03	Compare and contrast various memory management schemes.	An
CO-04	Understand the functionality of file systems, directory and disk structure and analyze how the data is mounted in the file systems	R
CO-05	Perform administrative tasks on Linux Servers and also gain knowledge on OS security.	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	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

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

Unit I: Operating System Overview

9

Introduction to Operating System-Computer System Organization- Computer System Architecture-Operating System Structure- Operating System Operations-Operating System Services- System Calls, Types of System Calls-System Programs – Operating System Generation- System Boot.

Unit II: Process Management

9

Processes - Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

Unit III: Storage Management

9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

Unit IV: File Systems and I/O Systems

9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Types of File systems Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

Unit V: Os Security and Case Study

9

Linux System: Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Interprocess Communication; Operating System Security: Introduction, System Security Planning, Operating System Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security.

TOTAL: 45 HOURS

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, —Operating System Concepts, 10th Edition, John Wiley and Sons Inc., 2018.
2. Andrew S. Tanenbaum, —Modern Operating Systems, Second Edition, Pearson Education, 2004

REFERENCES

1. RamazElmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approach, Tata McGraw Hill Edition, 2010.
2. AchyutS.Godbole, AtulKahate, — Operating Systems, McGraw Hill Education, 2016.
3. Gary Nutt, —Operating Systems, Third Edition, Pearson Education, 2004.
4. Lawrie Brown , William Stallings, Computer Security: Principles and Practice, Third Edition, Pearson Education, 2015

IT3209	SOFTWARE ENGINEERING PRINCIPLES	L	T	P	C
		3	0	0	3

OBJECTIVES

- To introduce the methodologies involved in the development, maintenance and management of software, over its entire life cycle.
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies.
- To learn various testing and maintenance measures.
- To manage project scheduling and risk.

Course Outcome		Cognitive Skill
CO-01	Acquire strong fundamental knowledge in the life cycle models and in system engineering concepts.	U
CO-02	Understands the software requirements and prototyping techniques.	U
CO-03	Analyze the design concepts and design mapping techniques, real time systems and software configuration management processes.	An
CO-04	Have clear knowledge on the types, levels and strategies of software testing and maintenance	U
CO-05	Manage project schedule, estimate project cost and effort required	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	M	S	M	S	L	S	S	S	S
CO-02	S	S	L	N	S	M	S	S	S	M
CO-03	S	M	M	M	S	M	M	S	S	S
CO-04	S	S	S	S	L	S	S	S	S	S
CO-05	S	M	S	S	M	N	M	S	L	S

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

Unit I: Software Process and Agile Development**9**

Introduction - S/W Engineering Paradigm - Life cycle models (Water fall, Incremental, Spiral, WINWIN spiral, Evolutionary, Prototyping, Object oriented) - Verification - Validation - Life cycle process - Agile development – Agility - Agile process – Extreme Programming – Agile Process Models.

Unit II: Software Requirements**9**

Functional and non-functional - User - System - Requirement engineering process - Feasibility studies – Requirements elicitation - Validation - Management - Software prototyping - Prototyping in the software process - Rapid prototyping techniques - User interface prototyping - S/W document - Analysis and modeling - Data, functional and behavioral models - Structured analysis and data dictionary.

Unit III: Design and Implementation**9**

Design process and concepts - Modular design - Design heuristic - Design model and document - Software architecture - Data design - Architectural design - Transform mapping - Transaction mapping - User interface design - Real time systems - Real time software design - System design - Real time executives - Data acquisition system - Monitoring and control system - SCM process

Unit IV: Testing and Maintenance**9**

Taxonomy of software testing - Levels - Test activities - Types of s/w test - Black box testing - Testing boundary conditions - Structural testing - Regression testing - Testing in the large - Unit testing - Integration testing - Validation testing - System testing - Debugging – Software Maintenance - Software Reengineering

Unit V: Project Management**9**

Software Project Management: Estimation – LOC, FP Based Estimation, COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis - Risk Management – Identification, Projection - RMMM Plan - CASE Tools

TOTAL: 45 HOURS**TEXT BOOKS**

1. Roger S. Pressman, Bruce R. Maxim, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 8th edition, 2015.
2. Ian Sommerville, Software engineering, Pearson education Asia, 10th edition, 2016.

REFERENCES

1. Rajib Mall," Fundamentals of Software Engineering, PHI Learning private Ltd., Fourth Edition, 2014.
2. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
3. Julia H. Allen, Sean Barnum, Robert J. Ellison, "Software Security engineering: A Guide for Project Managers", Pearson Education, 2009.

IT3274	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- Learn Socket programming
- Be familiar with various networking concepts
- Develop applications using networking protocols
- Gain hands-on experience in network simulation tool

Course Outcome		Cognitive Skill
CO-01	Implement the concepts of error detection and flow control	A
CO-02	Understand the basics of socket programming	A
CO-03	Design and develop applications using networking protocols	A
CO-04	Apply cryptographic techniques to enhance security	A
CO-05	Gain hands-on experience in network simulation tool	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	M	M	M	S	S
CO-02	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	M	S	S	S	M	M	S	M
CO-04	S	S	M	S	S	M	S	M	S	S
CO-05	S	S	S	M	S	S	S	S	S	S

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

LIST OF EXPERIMENTS

1. Write a program to implement the data link layer framing methods such as bit stuffing.
2. Write a program that takes a binary file as input and implement CRC Computation.
3. Write a program that takes a binary file as input and performs hamming code generation.
4. Implementation of Stop and Wait Protocol.
5. Write a code for simulating Sliding-Window Protocol.
6. Study of Socket Programming and Client – Server model.
7. Write a code for simulating ARP/RARP.
8. Write a code for simulating PING and TRACEROUTE commands.
9. Implementation of Subnetting.
10. Develop a TCP Client – Server application to transfer file.
11. Design a Client – Server application for chat using UDP.
12. Develop a Client that contacts a given DNS Server to resolve a given host name.
13. Write a program to encrypt and decrypt the text data using RSA algorithm.
14. Study of Network Simulator (NS3) and Simulation of Congestion Control Algorithm using NS3.
15. Study of Cisco Packet Tracer and Design a topology using Cisco Packet Tracer.

TOTAL: 45 HOURS

IT3275	DATABASE SYSTEMS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To work in SQL plus with data definition and data manipulation languages in RDBMS
- To work with PL/SQL programs
- To work with embedded SQL
- To design and implement various systems

Course Outcome		Cognitive Skill
CO-01	Students are able to work with DDL and DML commands in SQL	A
CO-02	Students are able to create high level language extensions using cursors, triggers	A
CO-03	Students are able to work with PL/SQL procedures and functions and embedded SQL	A
CO-04	Students are able to work with MongoDB and SQLite	A
CO-05	Students are able to design and implement applications using Databases	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	M	M	S	S	M	S	S
CO-02	S	S	S	L	M	S	S	M	S	S
CO-03	S	S	S	L	M	S	S	M	S	S
CO-04	S	S	S	L	M	S	S	M	S	S
CO-05	S	S	S	M	M	S	S	M	S	S

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

LIST OF EXPERIMENTS

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. Integrity Constraints
4. High-level language extension with Cursors.
5. High level language extension with Triggers
6. Procedures and Functions.
7. Embedded SQL.
8. Programs using MongoDB
9. Programs using SQLite
10. Design using ER modeling for Student Enrollment System
11. Design and implementation of Payroll Processing System.
12. Design and implementation of Banking System.
13. Design and implementation of Library Information System.

TOTAL: 45 HOURS

IT3276	OPERATING SYSTEM CONCEPTS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To learn Unix commands and shell programming
- To implement process creation, interprocess communication and various CPU Scheduling Algorithms
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms
- To implement File Organization and File Allocation Strategies

	Course Outcome	Cognitive Skill
CO-01	Enable students to acquire knowledge about the UNIX/LINUX commands and shell programming which helps them to meet the current IT technological and industrial needs.	U
CO-02	Students should be made to be exposed to create a process and the inter-process communication and enables them to offer secure systems.	A
CO-03	Mould students to implement shared memory and paging concepts which is highly useful for engineering practice.	E
CO-04	Make students to be familiar about the various algorithms such as CPU scheduling algorithms, page replacement algorithms, deadlock avoidance algorithms and apply in various multidisciplinary environments.	E
CO-05	Implement File Organization and File Allocation Strategies	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	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	N	N	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

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

LIST OF EXPERIMENTS

1. Study of Basic commands to understand the system and working of Linux.
2. Write a script to reverse a number and string given by user.
3. Write a script to find the smallest of three numbers as well as largest among three numbers.
4. Implement the various CPU Scheduling Algorithms
5. Implement Semaphores
6. Implement Shared memory and IPC
7. Implement Bankers Algorithm for Deadlock Avoidance

8. Develop an application using Threads
9. Implement the following Memory Allocation Methods for variable sized partition: a) First Fit b) Worst Fit c) Best Fit
10. Implement Paging Technique of Memory Management
11. Implement the following Page Replacement Algorithms a) FIFO b) LRU c) LFU
12. Implement the following File Allocation Strategies a) Sequential b) Indexed c) Linked

TOTAL: 45 HOURS

SEMESTER V

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	MS3201	Professional and Business Ethics	2	0	0	2
2.	IT3210	Information Security Basics	3	0	0	3
3.	IT3211	Embedded Systems and IOT	3	0	0	3
4.	IT3212	Object Oriented Analysis and Design	2	1	0	3
5.	IT3213	Fundamentals of Java Programming	2	1	0	3
6.	*****	Elective - I	3	0	0	3
PRACTICAL						
7.	IT3277	Embedded Systems and IOT Laboratory	0	0	2	1
8.	IT3278	Object Oriented Analysis and Design Laboratory	0	0	2	1
9.	IT3279	Java Programming Laboratory	0	0	2	1
TOTAL			15	2	6	20

MS3201	PROFESSIONAL AND BUSINESS ETHICS	L	T	P	C
		2	0	0	2

COURSE DESCRIPTION

The course on Professional and Business Ethics is designed to cultivate ethical awareness and moral and social values in BE students. It aims to help students recognize legal and ethical issues in business decision-making, enhance analytical problem-solving skills, and foster ethical decision-making abilities.

OBJECTIVES

1. To recognize legal and ethical issues in business decision-making.
2. To understand and apply ethical rules and constraints.
3. To enhance analytical problem-solving skills and ethical decision-making abilities.

Course Outcome		Cognitive Skill
CO-01	Explain the connection between ethics, morals, and values in the workplace	R,U
CO-02	Assess the ethical implications of business activities and competing demands on businesses.	An
CO-03	Critically analyze real-world contexts and conduct research projects on topics related to business ethics.	An
CO-04	Create awareness about safety, risk & risk benefit analysis and provide knowledge on Intellectual Property Rights.	U,A
CO-05	Develop knowledge about global issues and Create awareness on computer and environmental ethics	U,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	M	S	S	M	S	S	S	L	L
CO-02	M	M	S	S	M	S	S	S	L	L
CO-03	S	S	S	S	M	S	S	S	L	L
CO-04	S	S	S	S	M	S	S	S	L	L
CO-05	S	S	S	S	M	S	S	S	L	L

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

Unit I: Human Values

6

Morals, Values, and Ethics - Integrity and Work Ethic - Caring, Sharing, and Honesty -Commitment, Empathy, and Self-Confidence.

Unit II: Engineering Ethics

6

Senses of 'Engineering Ethics' and Moral Issues -Moral Autonomy and Ethical Theories - Models of Professional Roles.

Unit III: Engineering as Social Experimentation

6

Engineering as Experimentation - Engineers as Responsible Experimenters - Codes of Ethics and Legal Perspectives.

Unit IV: Safety, Responsibilities, and Rights

6

Safety, Risk, and Risk Assessment - Collegiality, Loyalty, and Respect for Authority - Professional and Employee Rights.

Unit V: Global Issues

6

Multinational Corporations and Environmental Ethics - Engineers as Managers, Consultants, and Expert Witnesses.

TOTAL: 30 HOURS

TEXTBOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering," McGraw-Hill, New York, Latest edition: 4th edition (2022).
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics," Prentice Hall of India, New Delhi, Latest edition: 2nd edition (2021).

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics," Pearson Education/Prentice Hall, New Jersey, Latest edition: 4th edition (2022).
2. Charles E Harris, Michael S. Protchard, and Michael J Rabins, "Engineering Ethics - Concepts and Cases," Wadsworth Thompson Learning, United States, Latest edition: 2nd edition (2023).
3. John R Boatright, "Ethics and the Conduct of Business," Pearson Education, New Delhi, Latest edition: 8th edition (2021).
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers," Oxford University Press, Oxford, Latest edition: 2nd edition (2022).

IT3210	INFORMATION SECURITY BASICS	L 3	T 0	P 0	C 3
--------	-----------------------------	--------	--------	--------	--------

OBJECTIVES

- To understand the basics and fundamentals of Information Security.
- To understand the need of security.
- To understand laws and ethics in information security.

	Course Outcome	Cognitive Skill
CO-01	Students will able to analyze, implement, and manage information system security measures effectively	U, A, E, R
CO-02	Students will able to analyze, detect, prevent, and mitigate security threats and attacks	U, A, E, An
CO-03	Students will acquire the knowledge and skills necessary to effectively analyze and manage risks in information security	U, A, E, R
CO-04	Students will gain the knowledge and skills to effectively implement access control mechanisms	U, A, An, E
CO-05	Students can effectively analyze, deploy, and manage intrusion detection and prevention systems	U, A, 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	M	L	M	L	S	L	M	M	L
CO-02	S	M	L	M	L	S	L	M	M	L
CO-03	S	M	L	M	L	S	L	L	M	L
CO-04	S	M	L	L	L	S	L	M	M	L
CO-05	S	S	L	M	L	S	L	M	M	L

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

Unit I: Security Basics**9**

Introduction to Information System Security- Historical Aspects- Basic Components of Security- CNSS security Model, Components of an Information system- Securing the Components- Balancing Security and Access. Foundations of Cryptology- Cipher Methods- Substitution Cipher, Transposition Cipher, Exclusive OR, Vernam Cipher, Book-Based Ciphers, Hash Functions- Cryptographic Algorithms- Protocols for Secure Communications- Attacks on Cryptosystems.

Unit II: Need for Security**9**

The need for security- Threats-Compromises to individual property, Deliberate software attacks, Deviations in quality of service, Espionage, Sabotage, Theft, Attacks-Malicious code, Hoaxes, Back doors, Password crack, Brute force, Dictionary, Denial of service and Distributed denial of service, Spoofing, Man-in-the-middle, Spam, Mail bombing, Sniffers. Social Engineering, Pharming, Timing attack, Secure software development-Cyber security for Critical Infrastructure Protection

Unit III: Risk Management**9**

An overview of risk management, Risk identification, Risk assessment, Risk control strategies, Selecting a risk control strategy, Quantitative versus qualitative risk control practices, Risk appetite, Residual risks, Documenting results - Information security planning and governance - Planning levels, Planning and the CISO, Information security governance, Information security policy, standards and practices, Policy management, Designing of security architecture, Security education training and awareness program, Continuity strategies.

Unit IV: Security Technology**9**

Access Control-Identification, Authentication, Authorization, Accountability, Firewalls- Firewall processing modes, Firewalls categorized by generation, Firewalls categorized by structure, Firewall architectures. Configuring and managing firewalls, Content filters, Protecting remote connections -Remote access, VPNs-SIEM Technology Basics

Unit V: IDS and IPS**9**

Intrusion detection and prevention Systems-Terminology, Uses, Types, detection models, response behavior, strengths and limitations, deployment and implementation, measuring the effectiveness - Honeypots, Honeynets and padded cell systems – Trap and Trace Systems, Active intrusion prevention- Scanning and Analysis tools.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Principles of Information Security- Michael E. Whitman, Herbert J. Mattord, Cengage Learning, Fifth edition, 2014
2. James Graham, Richard Howard and Ryan Olson, “Cyber Security Essentials”, CRC Press, Auerbach Publications, Taylor & Francis Group, First Edition, 2011
3. <https://www.ibm.com/topics/siem>
4. Computer Security basics- Rick Lehtinen, O'Reilly, 2nd edition, 2006.

REFERENCES

1. Information Security Management Principles- Andy Taylor, David Alexander, Amanda Finch, David Sutton, BCS publishers, 2008
2. Guide to Computer forensics and Investigations- B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Cengage Learning, 4th edition, 2010

IT3211	EMBEDDED SYSTEMS AND IoT	L	T	P	C
		3	0	0	3

OBJECTIVES

- To get a thorough idea on embedded systems.
- To learn the internal architecture and programming of an embedded processor.
- To introduce the evolution of the Internet of Things (IoT).
- To build IoT systems using Arduino/Raspberry Pi/ open platform.
- To apply the concept of Internet of Things in real world scenario.

Course Outcome		Cognitive Skill
CO-01	Understand the core concepts of embedded systems	U
CO-02	Gain a good idea about the embedded processors, and programming in Embedded C	U, R
CO-03	Get to know about Internet of Things along with edge, fog and cloud computing.	U
CO-04	Able to work with Arduino and Raspberry Pi	A
CO-05	Design IoT applications using Arduino/Raspberry Pi /open platform	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	M	S	M	S	M	S	S	S	S
CO-02	S	S	M	S	S	S	S	S	S	S
CO-03	S	L	M	M	M	M	M	M	M	M
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: Introduction to Embedded Systems

9

Embedded systems – Embedded hardware and software – Embedded System on Chip (SoC) and use of VLSI circuit design technology - Complex systems design and processors – Design process in embedded system – Classification of embedded system – Challenges of embedded systems.

Unit II: Embedded Processor

9

8051 Architecture – Real world Interfacing – Advanced Architecture – Processor and memory organization – Instruction level parallelism – performance metrics – Memory types – memory maps and addresses – processor selection – memory selection – RTOS – Programming in Embedded C.

Unit III: Introducing IoT**9**

Introduction to IoT – Simplified IoT architecture – IoT data management and compute stack – Fog computing – Edge computing – Hierarchy of edge, fog and cloud – Smart objects – Sensors, Actuators- Sensor Networks – Connecting smart objects.

Unit IV: Arduino Programming and Open PlatforMS**9**

Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output from Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino – Raspberry Pi – Interfacing with GPIO pins

Unit V: Applications Development**9**

Smart city IoT architecture – Security architecture – Connected Street lighting – smart parking – Smart traffic control – Connected environment – Smart Agriculture.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Raj Kamal, “Embedded Systems: Architecture, Programming and Design”, Second Edition, Tata McGraw Hill, 2008.
2. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017.
3. Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015

REFERENCES

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, Second Edition, 2014
2. Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”, Elsevier, 2006.
3. Andrew N Sloss, D. Symes, C. Wright, “Arm System Developer's Guide”, Morgan Kauffman/ Elsevier, 2006.
4. Michael J. Pont, “Embedded C”, Pearson Education, 2007.
5. Marco Schwartz, “Internet of Things with Arduino Cookbook”, Packt Publishing Ltd., 2016
6. <https://projects.raspberrypi.org/en/projects/physical-computing/2>
7. <https://www.makerspaces.com/wp-content/uploads/2017/02/Arduino-For-Beginners-REV2.pdf>
8. T Gareth Halfacree, “THE OFFICIAL Raspberry Pi Beginner’s Guide How to use your new computer”, 4th Edition, Raspberry Pi Trading Ltd., 2020.

IT3212	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
		2	1	0	3

OBJECTIVES

- To understand the fundamentals of Object-Oriented System Development and the different object-oriented methodologies.
- To use UML in requirements elicitation and designing.
- To understand concepts of relationships and aggregations.
- To test the software against its requirements specification

Course Outcome		Cognitive Skill
CO-01	Understand object-oriented software development life cycle and different types of object-oriented methodologies.	U
CO-02	Able to identify classes, their relationships and also describe the static structure of the system being modeled.	U, A
CO-03	Able to describe the components of the system having dynamic behavior by different UML diagrams.	U, A
CO-04	Understand the different design patterns and how to apply them.	U
CO-05	Implement the project and do object-oriented testing.	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	S	S	M	L	M	S	S	S	S
CO-02	M	S	S	M	L	M	S	S	S	S
CO-03	M	S	S	M	L	M	S	S	S	S
CO-04	M	S	S	M	L	M	S	S	S	S
CO-05	M	S	S	M	L	M	S	S	S	S

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

Unit I: Introduction to Object Oriented Methodologies

9

Object basics-Object oriented SDLC-Object Oriented Methodology:Rumbaugh,Booch, Jacobson, Shaler/Mellor, Coad/Yardon, Agile-The Unified Approach

Unit II: Static Modeling

9

Classes and objects: Nature of object, Relationships among objects, Nature of class, Relationships among classes – Classification: Noun Phrase Approach, Common Class Pattern Approach, CRC Approach-UML- Use Case diagram – Class diagram

Unit III: Dynamic Modeling

9

Interaction and Package Diagram- Activity Diagrams and Modeling- State Machine Diagram and Modeling- UML Component Diagram- UML Deployment Diagram

Unit IV: GoF Design Patterns

9

Logical architecture-Object Design-Patterns-Framework- Applying GoF Design Patterns- Design Persistence Framework

Unit V: Coding and Testing

9

Mapping design to code - Testing: Issues in Object Oriented Testing – Object Oriented Unit Testing – Object Oriented Integration Testing- Object Oriented System Testing-Case Study: Vacation Tracking System.

TOTAL: 45 HOURS

TEXT BOOKS

1. Craig Larman, “Applying UML and Patterns: An Introduction to Object- Oriented Analysis and Design and Iterative Development”, Third Edition, Pearson Education,2012.
2. Alibahrami,” Object oriented system development”, Mc-Graw Hill Education,2008.

REFERENCES

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle,” Object-Oriented Analysis and Design with Applications”, Addison-Wesley Professional; 3 Edition,2007.
2. Paul C. Jorgensen,” Software Testing: A Craftsman. S Approach”, Fourth Edition, Auerbach Publications, Taylor and Francis Group,2018.
3. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides,” Design patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley,1994.
4. Jeyamala. D,” Object Oriented Analysis and Design Using UML”, Mc-Graw Hill Education, 2013.

IT3213	FUNDAMENTALS OF JAVA PROGRAMMING	L	T	P	C
		2	1	0	3

OBJECTIVES

- To learn how to implement object-oriented designs with Java.
- To learn how to use exception handling in Java applications.
- To understand the concepts of event driven, and concurrent programming paradigms and to develop skills using these paradigms in Java.
- To understand how to design GUI components with the Java Swing API.

Course Outcome		Cognitive Skill
CO-01	Learn the fundamentals of object oriented programming with a modern programming language, java.	U, R
CO-02	Understand the usage of inheritance, packages, interface and file handling mechanisms in java.	U, A
CO-03	Able to produce robust programs in java using generic programming and multi-threading.	A
CO-04	Understand the process of graphical user interface design and implementation using AWT.	U
CO-05	Design and develop stand –alone applications with java swing	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	M	L	M	S	M	S	S
CO-02	S	S	M	M	L	M	S	M	S	S
CO-03	S	S	M	M	S	M	S	M	S	S
CO-04	S	S	M	M	S	M	S	M	S	S
CO-05	S	S	M	M	S	M	S	M	S	S

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

Unit I: Object-Oriented Programming – Fundamentals**9**

An overview of Java- Constants, Variables and Datatypes- Operators and Expressions- Control Statements- Decision Making and Looping-Classes, Objects, Methods – Arrays, Strings and Vectors – Constructors - Packages

Unit II: Inheritance, Exceptions and Files**9**

Inheritance-Interfaces- Polymorphism - Exceptions – Exception hierarchy – Throwing and catching exceptions – Stack Trace Elements-Managing Input/Output Files in Java.

Unit III: Generic Programming and Multi-THREADING**9**

Motivation for generic programming – Generic classes – Generic methods – Generic code and virtual machine- - multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – thread-safe Collections

Unit IV: Event-Driven Programming**9**

Graphics programming – Frame – Components – working with 2D shapes – Using color, fonts, and images – Applets - Basics of event handling – Event handlers – Adapter classes – actions – Mouse events – Text Events - AWT event hierarchy

Unit V: GUI Programming with Swing**9**

Introducing Swing– Origins of Swing– Swing Is Built on the AWT– Two Key Swing Features–The MVC Connection–Components and Containers– A Simple Swing Application– Event Handling–Create a Swing Applet– Painting in Swing– Exploring Swing–JLabel and ImageIcon– JTextField– The Swing Buttons– JScrollPane – JList, JComboBox– Trees–JTable, Introducing Swing Menus.

TOTAL: 45 HOURS**TEXT BOOKS**

1. E. Balagurusamy, "Programming with Java, A primer", Fourth Edition, Tata McGraw Hill, 2010
2. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", Tenth Edition, Prentice Hall, 2015.

REFERENCES

1. Herbert Schildt, "Java The Complete Reference" ,Ninth Edition,2014,Oracle press, Tata McGraw-Hill Edition.
2. K. Arnold , J. Gosling, David Holmes, PrakashGoteti, "The JAVA™ programming language", Third edition, Pearson Education, 2008.
3. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2009
4. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 2006.

IT3277	EMBEDDED SYSTEMS AND IoT LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE

To enable the students to work with ARM microcontroller, and with Arduino and Rasberry chip

Course Outcome		Cognitive Skill
CO-01	Able to work with 8051 microcontrollers	A
CO-02	Able to perform tasks with embedded C	A
CO-03	Able to interface ARM processor with devices	A
CO-04	Able to work with Arduino	A
CO-05	Design applications using Raspberry Pi	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	M	S	M	S	S	S	S
CO-02	S	S	M	S	S	S	S	S	S	S
CO-03	S	L	M	M	M	M	M	M	M	S
CO-04	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	S	M	S	S	S	S

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

LIST OF EXPERIMENTS

1. Arithmetic and Logic operations using 8051
2. Finding one's and two's complement using 8051
3. Simple programs using Embedded C
4. Interfacing ADC and DAC with ARM in C code
5. Accessing LED with ARM in C code
6. Accessing keyboard and LCD in C code
7. Interfacing stepper motor with ARM in C code
8. Interfacing temperature sensor with ARM in C code
9. Simple programs with Arduino platform
10. Interfacing sensors with Raspberry Pi

TOTAL: 45 HOURS

IT3278	OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

To capture the requirements specification for an intended software system

- To draw the UML diagrams for the given specification
- To map the design properly to code
- To test the software system thoroughly for all scenarios

Course Outcome		Cognitive Skill
CO-01	Able to capture the requirements specification for the software system to be developed and represent in use case diagram.	U
CO-02	Design the software by different UML diagrams such as class diagram, interaction diagram, activity diagram, state chart diagram etc.	A
CO-03	Able to generate skeleton code for the class diagram.	A
CO-04	Develop code for the software using some programming languages.	S
CO-05	Able to develop test cases and test plan for the implemented software to scrutinize whether all requirements are met.	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	S	S	S	S	S	S	M	M	M	M
CO-02	S	M	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	M	S	S	S	S
CO-04	S	S	M	S	S	S	M	M	M	M
CO-05	S	M	S	S	S	S	S	S	S	S

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

LIST OF EXPERIMENTS

1. Identify a software system that needs to be developed. and document the Software Requirements Specification (SRS) for the identified system.
2. Implementation of use case diagram
3. Implementation of class diagram
4. Implementation of interaction diagrams
5. Implementation of state machine diagram
6. Implementation of Activity diagram
7. Implementation of component diagram

- 8.Implementation of deployment diagram
- 9.Generate and implement the code using any programming language
- 10.Perform test case and test plan for implemented mini project

TOTAL: 45 HOURS

SUGGESTED DOMAINS FOR MINI-PROJECT:

1. Passport Automation System.
2. Book Bank
3. Exam Registration
4. Stock Maintenance System.
5. Online Course Reservation System
6. Airline/Railway Reservation System
7. Software Personnel Management System
8. Credit Card Processing
9. E-Book Management System
10. Recruitment System
11. Foreign Trading System
12. Conference Management System
13. BPO Management System
14. Library Management System
15. Student Information System

IT3279	JAVA PROGRAMMING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To be familiar with the basic concepts of Java Programming.
- To work on inheritance, interfaces and arrays.
- To get exposed to work with threads, packages.

Course Outcome		Cognitive Skill
CO-01	Students are able to implement object-oriented programming concepts using basic syntaxes.	A
CO-02	Students are able to identify classes, objects, members of class and the relationships among them needed for finding the solution to specific problem	A
CO-03	Students are able to demonstrate how to achieve reusability using inheritance, interfaces and packages and describe faster application development	An

CO-04	Students are able to demonstrate the use of exception handling mechanisms and the concept of multi threading.	An
CO-05	Students are able to identify and describe common abstract user interface components to design GUI in Java using Applets and AWT along with response to events	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	M	M	M	M
CO-02	S	M	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	M	S	S	S	S
CO-04	S	S	M	S	S	S	M	M	M	M
CO-05	S	M	S	S	S	S	S	S	S	S

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

LIST OF EXPERIMENTS

1. Programs using Java Classes and Objects
2. Programs using inheritance
3. Program to implement interfaces
4. Program Using arrays in Java
5. Programs implementing exception handling mechanism
6. Threads (Synchronization, communication, critical section)
7. Using package
8. Using I/O package (files and streams)
9. Programs using generic classes and methods
10. Programs using Event Handling
11. Programs to demonstrate Applets
12. Develop applications using JavaFX controls, Layouts and Menus.

TOTAL: 45 HOURS

SEMESTER VI

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	AI32D1	Fundamentals of Artificial Intelligence	3	0	0	3
2.	IT3214	Cyber Forensics Basics	3	0	0	3
3.	IT3215	Web Programming	3	0	0	3
4.	IT3216	Full Stack Web Development	2	1	0	3
5.	*****	Elective-II	3	0	0	3
6.	*****	Elective-III	3	0	0	3
PRACTICAL						
7.	IT3280	Cyber Security Laboratory	0	0	2	1
8.	IT3281	Web Programming Laboratory	0	0	2	1
9.	IT3282	Full Stack Web Development Laboratory	0	0	2	1
10.	IT32P2	Summer Internship-II	0	0	0	2
TOTAL			17	1	6	23

AI32D1	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES

- Understand the basic concepts of intelligent agents.
- Develop general-purpose problem-solving agents, logical reasoning agents, and agents that reason under uncertainty.
- Employ AI techniques to solve some of today's real world problems.

Course Outcome		Cognitive Skill
CO-01	Explain autonomous agents that make effective decisions in fully informed, partially observable, and adversarial settings.	U
CO-02	Choose appropriate algorithms for solving given AI problems	A
CO-03	Design and implement logical reasoning agents	R, A

CO-04	Design and implement agents that can reason under uncertainty	R, A
CO-05	Understand the basic areas of artificial intelligence including problem solving, knowledge representation, reasoning, decision making, planning, perception and action.	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	M	M	M	S	M	S	M	M	S	S
CO-02	M	S	S	S	M	S	M	M	S	S
CO-03	M	S	S	S	M	S	M	M	S	S
CO-04	S	S	S	S	M	S	S	M	S	S
CO-05	M	S	S	S	M	S	S	M	S	S

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

Unit I: AI Agents

9

Introduction to AI – Agents and Environments – Concept of rationality – Nature of environments – Structure of agents – Problem solving agents–Search algorithms–Uninformed search strategies.

Unit II: Problem Solving

9

Heuristic search strategies–heuristic functions - Local search and optimization problems – Local search in continuous space – Search with non-deterministic actions – Search in partially observable environments – Online search agents and unknown environments.

Unit III: Theory of Game Playing

9

Game theory – Optimal decisions in games – Alpha-beta search – Monte-Carlo tree search –Stochastic games– Partially observable games.

Constraint Satisfaction Problems – Constraint propagation – Backtracking search for CSP – Local search for CSP– Structure of CSP.

Unit IV: Knowledge Based Logical Agents

9

Knowledge-based agents – Propositional logic – Propositional theorem proving – Propositional model checking– Agents based on propositional logic.

First-order logic – Syntax and semantics – Knowledge representation and engineering – Inferences in first-order logic–Forward chaining– Backward chaining–Resolution.

Unit V: Knowledge Representation

9

Ontological engineering–Objects and categories–Events–Mental objects and Modal logic– Reasoning systems for categories – Reasoning with default information.

Classicalplanning–Algorithmsforclassicalplanning–Heuristicsforplanning–Hierarchicalplanning–Non-deterministic domains–Time, Schedule, and Resources–Analysis.

TOTAL: 45 HOURS

TEXT BOOK

1. Stuart Russel and Peter Norvig, “Artificial Intelligence: A Modern Approach”, Fourth Edition, Pearson Education, 2020.

REFERENCES

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008.
3. Patrick H. Winston, "Artificial Intelligence", Third edition, Pearson Edition, 2006.
4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013.
5. Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligence use cases - by Dennis Rothman, 2018.

IT3214	CYBER FORENSICS BASICS	L 3	T 0	P 0	C 3
--------	------------------------	--------	--------	--------	--------

OBJECTIVES

- Gain a comprehensive understanding of the field of computer forensics, including its history, legal aspects, and professional conduct, as well as the process of conducting computer investigations and establishing a forensic lab.
- Develop skills in data acquisition
- Acquire knowledge and proficiency in working with Windows and DOS systems

	Course Outcome	Cognitive Skill
CO-01	Students will be able to effectively conduct computer investigations by applying a systematic approach	U, A
CO-02	Students will be able to process crime and incident scenes by identifying and collecting digital evidence	U, An
CO-03	Students will be able to effectively acquire and process digital evidence by applying appropriate storage formats, selecting and utilizing acquisition methods and tools	R, A
CO-04	Students will be able to effectively work with Windows and Linux systems	U, An
CO-05	Students will be able to effectively analyse and validate forensic data by generating report.	U, 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	L	L	M	L	L	L	M	M	S
CO-02	S	M	M	M	M	M	M	M	S	S
CO-03	M	M	L	M	M	L	M	M	S	S
CO-04	L	N	N	M	L	M	L	L	S	S
CO-05	S	M	S	S	M	M	S	S	S	S

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

Unit I: Introduction to Cyber Forensics

10

Computer Forensics: history of computer forensics, understanding case law, developing computer forensics resources, preparing for computer investigations, understanding law enforcement agency investigations and corporate investigations, maintaining professional conduct. Understanding Computer Investigations - Preparing a computer investigation, taking a systematic approach, procedures for corporate high-tech investigations, understanding data recovery workstations and software, conducting an investigation,

determining the physical requirements for a CF lab, selecting a basic forensic workstation, building a business case for developing a forensic lab

Unit II: Processing Crime and Incident Scene

8

Processing Crime and Incident Scene-Identifying digital evidence, collecting evidence in private sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene. Seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash.

Unit III: Data Acquisition

8

Data Acquisition - storage formats for digital evidence, determining the best acquisition method, contingency planning for image acquisitions, using acquisition tools, validating data acquisitions, performing RAID data acquisitions, using remote network acquisition tools, using other forensic acquisition tools.

Unit IV: Windows and Linux Systems

9

Understanding file systems- exploring Microsoft file structures- Disk Partitions- Examining FAT Disks - examining NTFS disks, whole disk encryption, - the windows registry, Microsoft start up tasks, virtual machines- Examining Linux File Structures- Understanding Macintosh File Structures- Using Linux Forensics Tools

Unit V: Analysis and Reporting

10

Analysis and validation -determining what data to collect and analyse, validating forensic data, addressing data -hiding techniques. Report Writing for High-Tech Investigations - Understanding the Importance of Reports- Limiting a Report to Specifics, Types of Reports- Guidelines for Writing Reports- What to Include in Written Preliminary Reports, Report Structure, Writing Reports Clearly, Designing the Layout and Presentation of Reports- Generating Report Findings with Forensics Software Tools

TOTAL: 45 HOURS

TEXT BOOKS

1. Guide to Computer Forensics and Investigations- Bill Nelson, Amelia Phillips, Chris Steuart, Sixth edition, 2018
2. Computer Security basics- Rick Lehtinen, O'Reilly, 2nd edition, 2006
3. Absolute beginner's guide to Security, Spam, Spyware & Viruses- Andy Walker, Que publishers, 2005

REFERENCES

1. Information Security Management Principles- Andy Taylor, David Alexander, Amanda Finch, David Sutton, BCS publishers, 2008
2. Guide to Computer forensics and Investigations- B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Cengage Learning, 4th edition, 2010
3. Applied Information security: A Hands-On guide to Information security- R. Boyle, Prentice Hall, 2010

IT3215	WEB PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To comprehend and analyze the basic concepts of web programming and internet protocols.
- To describe how the client-server model of Internet programming works.
- To demonstrate the uses of scripting languages
- To write simple scripts for the creation of web sites

Course Outcome		Cognitive Skill
CO-01	Ability to create interactive and dynamic websites using Script, HTML and CSS effectively.	U,A
CO-02	Ability to perform styling and formatting of Web pages.	U,A
CO-03	Ability to perform a client side processing and scripting	U,A
CO-04	Ability to perform a server side processing and scripting	U,A
CO-05	Ability to learn server side programming using servlets and also to connect a Java program to a database to perform all database operations.	U,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	L	S	S	S	M	S	S
CO-02	S	S	S	L	S	S	S	M	S	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: Website Basics

9

Internet Overview - Fundamental computer network concepts - Web Protocols - URL – Domain Name- Web Browsers and Web Servers- Working principle of a Website –Creating a Website -Client-side and server-side scripting

Unit II: Web Designing

9

HTML – Form Elements - Input types and Media elements - CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.

Unit III: Client-Side Processing and Scripting

9

JavaScript Introduction – Variables and Data Types-Statements – Operators - Literals-Functions - Objects- Arrays-Built-in Objects- Regular Expression, Exceptions, Event handling, Validation - JavaScript Debuggers.

Unit IV: Server Side Processing and Scripting – PHP

9

PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - File Uploading – Email Basics - Email with attachments - PHP and HTML - Simple PHP scripts - Databases with PHP

Unit V: Servlets and Database Connectivity

9

Servlets: Java Servlet Architecture – Servlet Life cycle- Form GET and POST actions -Sessions – Cookies – Database connectivity - JDBC Creation of simple interactive applications - Simple database applications

TOTAL: 45 HOURS

TEXT BOOKS

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'Reilly publishers, 2014.
2. Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web - How to Program", 5th edition, Pearson Education, 2012.

REFERENCES

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2. James F. Kurose, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson Education, 2012
3. Steven Holzener, "PHP – The Complete Reference", 1st Edition, Mc-Graw Hill, 2017
4. Fritz Schneider, Thomas Powell, "JavaScript – The Complete Reference", 3rd Edition, McGraw Hill Publishers, 2017
5. Bates, "Developing Web Applications", Wiley Publishers, 2006

IT3216	FULL STACK WEB DEVELOPMENT	L	T	P	C
		2	1	0	3

OBJECTIVES

- To understand the various components of full stack development
- To learn Node.js features and applications
- To develop applications with MongoDB
- To understand the role of Angular and Express in web applications
- To develop simple web applications with React

Course Outcome		Cognitive Skill
CO-01	Understand the various stacks available for web application development	U, A
CO-02	Use Node.js for application development	U, An, E
CO-03	Develop applications with MongoDB	U, A, An, E
CO-04	Use the features of Angular and Express	U, A, An, E
CO-05	Develop React applications	U, A, 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	M	M	M	M	M	L	M	S	M
CO-02	S	S	S	S	M	M	M	S	M	M
CO-03	S	S	S	S	M	S	M	S	M	M
CO-04	S	S	S	M	S	M	M	M	L	M
CO-05	S	S	S	S	S	M	S	S	S	S

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

Unit I: Basics of Full Stack**9**

Understanding the Basic Web Development Framework - User - Browser – Webserver - Backend Services – MVC Architecture - Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React

Unit II: Node JS**9**

Basics of Node JS – Installation – Working with Node packages – Using Node package manager –Creating a simple Node.js application – Using Events – Listeners –Timers - Callbacks – Handling Data I/O – Implementing HTTP services in Node.js

Unit III: Mongo DB**9**

Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications

Unit IV: Express and Angular**9**

Implementing Express in Node.js - Configuring routes - Using Request and Response objects - Angular - Typescript - Angular Components - Expressions - Data binding - Built-in directives

Unit V: React**9**

MERN STACK – Basic React applications – React Components – React State – Express REST APIs - Modularization and Webpack - Routing with React Router – Server-side rendering

TOTAL: 45 HOURS**TEXT BOOKS**

1. Brad Dayley, Brendan Dayley, Caleb Dayley, ‘Node.js, MongoDB and Angular Web Development’, Addison-Wesley, Second Edition, 2018
2. Vasan Subramanian, ‘Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node’, Second Edition, A press, 2019.

REFERENCES

1. Chris Northwood, ‘The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer’, Apress; 1st edition, 2018
2. Kirupa Chinnathambi, ‘Learning React: A Hands-On Guide to Building Web Applications Using React and Redux’, Addison-Wesley Professional, 2nd edition, 2018
3. https://www.tutorialspoint.com/the_full_stack_web_development/index.asp
4. <https://www.coursera.org/specializations/full-stack-react>
5. <https://www.udemy.com/course/the-full-stack-web-development/>

IT3280	CYBER SECURITY LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- Learn to implement the basic cryptographic algorithms.
- Learn to use network security tools.

Course Outcome		Cognitive Skill
CO-01	Implement the cipher techniques.	U, A
CO-02	Develop the basic cryptographic algorithms.	R, An
CO-03	Implement the various security algorithm	A
CO-04	Learn the various network security tools	E

CO-05	Build a secure networking system using the open source tool like Wireshark.	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	S	S	S	M	M	L	M	L	L	M
CO-02	S	S	M	M	M	L	M	L	L	M
CO-03	S	S	M	M	S	L	M	L	L	M
CO-04	S	S	M	M	M	L	M	L	L	M
CO-05	S	S	S	M	M	L	S	L	L	M

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

LIST OF EXPERIMENTS

- Implement the following substitution and transposition techniques:
 - Caesar Cipher
 - Playfair Cipher
 - Rail fence Cipher
 - Row & Column Transformation
- A reputed organization has two branches in Tamilnadu. In one of the branch office a new manager has been appointed. The Senior Manager from the main office has to send the important data to the branch office. Implement symmetric key algorithm to accomplish this secure data transfer.
- The finance office of NICHE wishes to make the transactions more secured. If you are a programmer how you will implement asymmetric cryptosystem to secure the data between authorized users.
- Implement Diffie-Hellman key exchange algorithm
- Implement Hash algorithms
- Implement digital signature schemes
- Installation of rootkits and study about the variety of options
- Demonstrate intrusion detection system using any tool (snort or any other s/w).
- Using Packet sniffer like Wireshark perform the following:
 - Analyze network problems and test network communication.
 - Debug client/server communications and other network protocol communications
 - Monitor network usage and bandwidth (including internal and external users and systems)
 - Detect network misuse by internal and external users
 - Detect network intrusion attempts (like port scanning).
 - Filter suspect content from network traffic
- Experiment Eavesdropping, Dictionary attacks, Brute force attacks, MITM attacks
- Experiment with Sniff Traffic using ARP Poisoning
- Explore network monitoring tools
- Study to configure Firewall, VPN

TOTAL: 45 HOURS

IT3281	WEB PROGRAMMING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- To design interactive web pages using Scripting languages.
- To learn server side programming using servlets
- To develop web pages using PHP script

Course Outcome		Cognitive Skill
CO-01	Ability to create web pages using HTML	A
CO-02	Ability to make web pages interactive using JavaScript	A
CO-03	Ability to work with servlets	A
CO-04	Ability to work with PHP Scripts	A
CO-05	Ability to connect databases to web pages	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	L	S	S	S	M	S	S
CO-02	S	S	S	L	S	S	S	M	S	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

LIST OF EXPERIMENTS

1. Creation of static web pages
2. Create a web page with the following using HTML
 - ✓ To embed an image map in a web page
 - ✓ To fix the hotspots
 - ✓ Show all the related information when the hot spots are clicked
3. Creation of interactive web sites - Design using HTML and authoring tools
4. Develop and demonstrate the usage of inline, internal and external style sheet using CSS
5. Form validation using JavaScript
6. Creation of simple PHP scripts
7. Handling multimedia content in web sites
8. Write programs using Servlets:
 - i.To invoke servlets from HTML forms
 - ii. Session tracking using hidden form fields and Session tracking for a hit count
9. Creation of information retrieval system using web, PHP and MySQL
10. Creation of personal Information System

TOTAL: 45 HOURS

IT3282	FULL STACK WEB DEVELOPMENT LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES

- Learn, understand and implement the full stack applications.
- Learn to use interface, web components and database for creating applications.

Course Outcome		Cognitive Skill
CO-01	To develop full stack applications with clear understanding of user interface, business logic and data storage.	U, A
CO-02	To design and develop user interface screens for a given scenario.	U, A
CO-03	To develop the functionalities as web components as per the requirements.	U, A
CO-04	To implement the database according to the functional requirements.	U, A, An
CO-05	To integrate the user interface with the functionalities and data storage.	U, A, 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	M	M	M	M	M	L	M	S	M
CO-02	S	S	S	S	M	M	M	S	M	M
CO-03	S	S	S	S	M	S	M	S	M	M
CO-04	S	S	S	M	S	M	M	M	L	M
CO-05	S	S	S	S	S	M	S	S	S	S

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

LIST OF EXPERIMENTS

The instructor can choose the technology stack to develop the following full stack experiments – based on the Full Stack Web Development Theory Course.

1. Develop a portfolio website for yourself which gives details about yourself for a potential recruiter.
2. Create a web application to manage the TO-DO list of users, where users can login and manage their to-do items.
3. Create a simple micro blogging application (like twitter) that allows people to post their content which can be viewed by people who follow them.
4. Create a food delivery website where users can order food from a particular restaurant listed in the website.
5. Develop a classifieds web application to buy and sell used products.
6. Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view the available number of days.
7. Develop a simple dashboard for project management where the statuses of various tasks are available. New tasks can be added and the status of existing tasks can be changed among Pending, In Progress or Completed.
8. Develop an online survey application where a collection of questions is available and users are asked to answer any random 5 questions.

TOTAL: 45 HOURS

PROFESSIONAL ELECTIVE COURSES

SI. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT32A1	Cyber Forensics and Incident Response	3	0	0	3
2	IT32A2	Cyber Law and Cyber Crime Investigation	3	0	0	3
3	IT32A3	Ethical Hacking	3	0	0	3
4	IT32A4	Intrusion Detection and Prevention System	3	0	0	3
5	IT32A5	Machine Learning	3	0	0	3
6	IT32A6	Risk Assessment and Security Audit	3	0	0	3
7	IT32A7	Biometric Image Processing	3	0	0	3
8	IT32A8	OS Forensics	3	0	0	3
9	IT32A9	File System Forensics Analysis	3	0	0	3
10	IT32B1	Cryptography and Network Security	3	0	0	3
11	IT32B2	Software Testing Principles	3	0	0	3
12	IT32B3	Data Warehousing and Data Mining	3	0	0	3
13	IT32B4	C# and .NET Programming	3	0	0	3
14	IT32B5	Free and Open Source Software	3	0	0	3

IT32A1	CYBER FORENSICS AND INCIDENT RESPONSE	L	T	P	C
		3	0	0	3

OBJECTIVES

- To know the real world incidents
- To make a pre incident preparation
- To understand about incident detection and characterization

Course Outcome		Cognitive Skill
CO-01	Students will gain knowledge about the cyber security threats and the emerging threat landscape.	U
CO-02	Students will learn about the different types of cyber security threats, and also about the vulnerabilities in the cyber resources that are exploited by the adversaries.	U
CO-03	Students will learn about the network threats, causes thereof and attacks which affect the working of the networks.	U
CO-04	Students will learn about the security requirements and security infrastructure to be put in place to secure a cyber-system.	U
CO-05	Students will learn about the procedure in identifying the risks/vulnerabilities in the cyber resources and the nature and extent of the impact of attacks, to enable them study proper threat identification; will also learn about the critical infrastructure protection.	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	M	M	L	L	S
CO-02	S	S	S	S	M	M	M	L	L	S
CO-03	S	S	S	S	M	M	M	L	M	L
CO-04	S	S	S	S	M	M	M	L	L	M
CO-05	S	S	S	S	M	M	M	L	L	L

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

Unit I: Real-World Incidents

6

Incident Response, Importance and Care of Incident Response, Concept of the Attack Lifecycle, Incident Response Team - Constitution and Responsibilities. IR Management Handbook: Computer Security Incident - The Goals of Incident Response, The Incident Response Process: Initial Response, Investigation, Remediation, Tracking of Significant Investigative Information, Reporting, Roles and Responsibilities of CERT-In

Unit II: Pre-Incident Preparation and Incident Response

15

Preparing the Organization for Incident Response, Identifying Risk, Working with Outsourced IT, Thoughts on Global Infrastructure Issues, Educating User son Host-Based Security, Preparing the IR Team, Preparing the Infrastructure for Incident Response, Computing Device Configuration, Network Configuration, Collecting Initial Facts, Checklists, Maintenance of Case Notes, Building an Attack Timeline, Understanding Investigative Priorities, Elements of Proof, Setting Expectations with Management, Initial Development of Leads, Defining Leads of Value, Acting on Leads, Turning Leads into Indicators, The Life cycle of Indicator Generation, Resolving Internal Leads, Resolving External Leads.

Unit III: Cyber Forensics and Data Duplication

9

Cellular Crimes, Evidences, Forensic Procedures, Files Present in SIM Card, Device Data, External Memory Dump, Evidences in Memory Card, Operators Systems- Android Forensics: Procedures for Handling an Android Device, Imaging Android USB Mass Storage Devices, Logical and Physical Techniques. Forensic Image Formats, Complete Disk Image, Partition Image, Logical Image, Image Integrity, Traditional Duplication, Hardware Write Blockers, Image Creation Tools, Live System Duplication, Duplication of Enterprise Assets, Duplication of Virtual Machines

Unit IV: Data Collection

9

Selecting a Live Response Tool, Live Data Collection on Windows Systems, Unix Systems, Forensic Duplication-Collecting Network based Evidence-Authentication procedures- Evidence Handling procedures.

Unit V: Data Analysis and Reporting

6

Forensics of Windows Systems- Linux Systems- Android- IoT -Memory Forensics-Investigation of Routers - EMail Investigation Analysis of Network traffic- Preparation of Computer Forensics Reports.

TOTAL: 45 HOURS

TEXT BOOK

1. Kevin Mandia, Mathew Pepe, Jason Luttgens,” Incident Response and Computer Forensics”, 3rd Edition, McGraw-Hill Osborne Media,2014.

REFERENCES

1. Eoghan Casey,” Handbook Computer Crime Investigation’s Forensic Tools and Technology”, Academic Press, 1st Edition,2011

2. Skoudis. E., Perlman. R. Counter Hack: A Step-by-Step Guide to Computer Attacks and Effective Defenses, Prentice Hall Professional Technical Reference.2012
3. Norbert Zaenglein,” Disk Detective: Secret You Must Know to Recover Information from a Computer”, Paladin Press,2010.
4. Bill Nelson, Amelia Philips and Christopher Steuart,” Guide to computer forensics Investigation” Course technology, 4th edition,2011.
5. Iosifl. Androulidakis,” Mobile phone security and forensics: A practical approach”, Springer publications,2012.
6. Andrew Hoog, ” Android Forensics: Investigation, Analysis and Mobile Security for Google Android”, Elsevier publications,2011.

IT32A2	CYBER LAW AND CYBER CRIME INVESTIGATION	L	T	P	C
		3	0	0	3

OBJECTIVES

- To provide depth knowledge in computer, information, organizational and human security to recover the important evidence for identifying various computer crimes
- To enable learner to understand, explore, and acquire a critical understanding Cyber Law
- To understand laws and policies pertaining to cyber security and privacy.
- To develop competencies for dealing with frauds and deceptions and other cyber crimes for example, child pornography etc. that are taking place via the Internet

Course Outcome		Cognitive Skill
CO-01	Students should able to learn about the various provisions under the Information Technology Act, 2000 and the amended Act of 2008	U
CO-02	Students should able to understand laws and policies pertaining to cyber security and privacy.	An
CO-03	Students should able to learn about the different cyber-crimes.	An
CO-04	Students should able to do cyber-crime investigation	E
CO-05	Students should able to practice preparation and authentication of evidence.	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	M	S	S	S	M	L	S	M	M	M
CO-02	M	S	S	S	M	L	S	M	S	S
CO-03	M	S	S	S	M	L	S	S	S	S
CO-04	M	S	S	S	M	L	S	M	S	S
CO-05	S	S	S	S	S	M	S	S	S	S

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

Unit I: Cyber Crime and Emerging Trends

9

Cybercrime, Web defacement, Web hacking and Investigation, Phishing, Financial crimes, Fraud Investigation, Global scenario

Unit II: Cyber Law**9**

Introduction to Cyber Laws, IT Act, 2000 (Indian Cyber Law), IT Act (Amendment), 2008, Audit and Compliance, Documentation Issues, Case Studies.

Unit III: Emerging Issues in Cyber Laws**9**

National and International Initiatives Against Cyber Crime: Laws in Respect of Australia, Canada, Japan, Malaysia, Nepal, Indian Cyber Security Policy 2013, Data Privacy, Data Protection Acts, Shortcomings of the Indian Cyber security Policy, 2013 and the countermeasures.

Unit IV: Cyber Crime Investigation**9**

Introduction to Cyber Crime Investigation, Cyber Forensic, Dark Web, Browser Forensics, Investigating Server Logs, Google Ecosystem and Forensic, Password Forensics E-Mail Related Investigation, Router Investigation Browser Related Investigation, Investigation Tools, Case Studies. CCTV Footage and Social Crime Analysis, Crypto Currencies and related Issues

Unit V: Authentication of Evidence**9**

Digital Forensics-Tools, Analysis, Evidence Handling Procedure, Legal Protocols for Collecting and Protecting Digital Evidence, Case Studies.

TOTAL 45 HOURS**TEXT BOOKS**

1. P.K.Duggal, "Textbook on Cyber law", Prentice hall Ltd., 2014
2. Aparna Viswanathan, "Cyber law Indian and International Perspective, Data security, E- Commerce, Cloud computing and Cybercrimes", 2012.

REFERENCES

1. Pankaj Sharma, "Information security and Cyber law", 2013.
2. Prakash Pranad, "An introduction to cyber crime cases under IT act - details and analysis Cyber Law cases in Indian context", 2017
3. Karnika Seth, "Computers, Internet and new Technology Laws -A comprehensive reference work with special focus on developments in India", 2016
4. Incident Response and Computer Forensics", Kevin Mandia, Mathew Pepe, Jason Luttgens, 3rd Edition, McGraw-Hill Osborne Media, 2014

IT32A3	ETHICAL HACKING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To know the basics of ethical hacking along with the hacking process and plan.
- To learn about foot printing and social engineering concepts.
- To understand service scanning techniques.
- To know hacking of web servers and wireless sensor networks.
- To acquire knowledge about hacking different operating systems.

Course Outcome		Cognitive Skill
CO-01	Students will be able to understand the basics of ethical hacking and the different hacking methodologies.	U, R

CO-02	Students gain knowledge about the different hacking tools such as foot printing, social engineering and to be aware with the social engineering attacks and its countermeasures.	U, An
CO-03	Students will be able to understand and analyze the port scanning techniques, its types and enumeration concepts and apply these techniques to enumerate windows and NetWare operating systems.	U, An, A
CO-04	Students will get exposed to hacking the wired and wireless networks, its vulnerabilities, the tools and the methods of protecting the networks with security devices.	An, A
CO-05	Students will be able to understand the techniques in hacking the operating system.	U, 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	N	M	S	S	N	M	S	S
CO-02	M	M	M	L	N	L	N	N	M	N
CO-03	L	S	L	M	L	M	N	M	N	M
CO-04	M	L	N	S	S	S	M	L	L	S
CO-05	S	N	L	M	L	N	S	S	M	S

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

Unit I: Ethical Hacking Overview

9

Introduction-Hacking Concepts, Types and Phases - Ethical Hacking Concepts and Scope-Certified Ethical Hackers-Network and Computer Attacks-Ethical Hacking Plan Hacking Methodology-Vulnerability testing-Developing Security Testing Plan

Unit II: Footprinting and Social Engineering

9

Footprinting Concepts - Footprinting Methodology- Conducting Competitive Intelligence - DNS Zone Transfers - Introduction to Social Engineering - Performing Social Engineering Attacks - Social Engineering Counter measures.

Unit III: Service Scanning

9

Introduction to Port Scanning - Types of Port Scan - Port Scanning Tools - Conducting Ping Sweeps - Shell Scripting. Enumeration: Introduction - Enumerating Windows, Symbian, Java OS, Android and NetWare Operating Systems-Penetration testing.

Unit IV: Hacking Networks

9

Hacking Web Servers: Web Application - Web Application Vulnerabilities - Tools for Web Attackers and Security Testers. Hacking Wireless Network: Wireless Technology – Wireless Network Standards- Authentication-Wardriving-Wireless Hacking-Protecting Networks with Security Devices.

Unit V: Hacking Operating Systems**9**

Hacking Windows- Overview- Unauthenticated Attacks- Authenticated Attacks- Windows Security Features- Hacking UNIX- The Quest for Root- Remote Access- Local Access- Rootkit Recovery

TOTAL: 45 HOURS**TEXT BOOKS**

1. Michael T. Simpson,” Ethical Hacking and Network Défense”, Cengage Learning, New Delhi,2010.
2. Stuart McClure, Joel Scambray, George Kurtz, “Hacking Exposed 7: Network Security Secrets & Solutions”, McGraw-Hill publishing, 7th Edition, July 2012
3. The Certified Ethical Hacker CEH V10, Complete Hacking Guide

REFERENCES

1. Kevin Beaver,” Hacking for Dummies”, Wiley Publication, India, 5th Edition, 2016.
2. Ankit Fadia,” Unofficial Guide to Ethical Hacking”, Macmillan Company, New Delhi, 2006.

IT32A4	INTRUSION DETECTION AND PREVENTION SYSTEM	L	T	P	C
		3	0	0	3

OBJECTIVES

- To provide a solid foundation to the students in network security and intrusion detection and prevention.
- To enable the students to master the knowledge about intrusion detection and prevention in the context of real-life applications.

Course Outcome		Cognitive Skill
CO-01	Understand the physical location, the operational characteristics and the various functions performed by the intrusion detection and prevention system	U
CO-02	Understand and apply the different detection techniques for detecting intrusions in the real world.	U, A
CO-03	Learn the different types of intrusion detection system and their prevention capabilities.	U, R
CO-04	Understand the current and effective architecture to deal with network security threats	U
CO-05	Apply intrusion detection alerts and logs to distinguish attack by using SNORT tool.	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	L	M	N	S	M	S	S
CO-02	S	S	M	L	L	N	S	M	S	S
CO-03	S	S	M	L	M	N	S	S	S	S
CO-04	S	S	M	L	L	N	S	S	S	S
CO-05	S	S	M	L	M	N	S	S	S	S

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

Unit I: Introduction**9**

Concept and definition -History of Intrusion detection -Audit- Internal and external threats to data-Attacks- Need and types of IDS- Information sources: Host based information sources, Network based information sources- Key functions of IDPS Technologies

Unit II: Intrusion Detection and Prevention Techniques**9**

Intrusion Detection Approaches: Misuse Detection: Pattern Matching, Rule-Based and State-based- Anomaly Detection: Statistical based, Rule based, Learning Models-Hybrid Detection- Intrusion Response: Response Type, Response Approach

Unit III: IDPS Types**9**

Host based IDS/IPS-Network based IDS/IPS- Data Collection for Host Based IDSs- Data Collection for Network –Based IDSs

Unit IV: IDS and IPS Architecture**9**

Components of IDS- Tiered architectures: Single-Tiered, Multi-Tiered, Peer-to-Peer - Sensor: Sensor Functions, Sensor Deployment and Security - Agents: Agent Functions, Agent Deployment and Security- Manager component: Manager Functions, Manager Deployment and Security- Information flow in IDS and IPS- Defending IDS/IPS

Unit V: IDS Tools**9**

Integrating different IDPS technologies - Direct and Indirect IDPS integration - SIEM, other technologies with IDPS capabilities - Network Forensic Analysis Tool, Anti-malware technologies, Firewalls and Routers, Honeypots- Introduction to Snort, Components of Snort, Working with Snort Rules-Snort Modes -Snort Alert Modes.

TOTAL: 45 HOURS**TEXT BOOKS**

1. Ali A. Ghorbani, Wei Lu, “Network Intrusion Detection and Prevention: Concepts and Techniques”, Springer, 2012.
2. Carl Enrolf, Eugene Schultz, Jim Mellander, “Intrusion detection and Prevention”, McGraw Hill, 2006
3. Earl Carter, Jonathan Hogue, “Intrusion Prevention Fundamentals”, Pearson Education, 2006.

REFERENCES

1. Paul E. Proctor, “The Practical Intrusion Detection Handbook “, Prentice Hall, 2001.
2. Ankit Fadia and Mnu Zacharia, “Intrusion Alert”, Vikas Publishing house Pvt., Ltd, 2007.
3. Rafeeq Rehman: Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID, 1st Edition, Prentice Hall, 2003.
4. Karen Scarfone, Peter Mell, “Guide to Intrusion Detection and Prevention Systems (IDPS)”, NIST special publication, 2007.

IT32A5	MACHINE LEARNING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To introduce students to the basic concepts and techniques of machine Learning.
- To have a thorough understanding of the neural networks, support vector machine and regression based learning techniques
- To study the tree based learning techniques
- To study the probabilistic models for machine learning
- To understand evolutionary models, reinforcement learning of machine learning and machine learning applications

Course Outcome		Cognitive Skill
CO-01	Learn the basics of Machine Learning	U
CO-02	Student will have deep insight into neural networks, support vector machine and regression based learning techniques.	A
CO-03	Student will understand tree based learning techniques	An
CO-04	Student will learn probabilistic models and unsupervised learning	E
CO-05	Student will gain knowledge on evolutionary models, reinforcement learning and various machine learning applications	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	S	S	S	S	S	M	S	M	S	M
CO-02	S	M	S	S	S	M	S	M	S	S
CO-03	S	M	S	S	S	M	S	S	S	S
CO-04	S	S	S	S	S	M	S	S	S	S
CO-05	S	S	S	S	S	M	S	S	M	S

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

Unit I: Introduction

9

Intelligent Machines-Well posed Machine Learning Problems-Applications-Data Representation- Need for Domain Knowledge-Forms of learning-Supervised Learning basics-Learning from Observation-Bias and Variance- Overfitting Avoidance-Heuristic Search in Inductive Learning-Combining Multiple Models-Estimating Generalization Errors- Metrics for Assessing Regression Errors-Metrics for Assessing Classification Accuracy- Classification Problems with imbalanced datasets-Cost Sensitive Classification Metrics

Unit II: Neural Networks and Support Vector Machines

9

Neuron Models-Network Architecture-weights Learning for a Linear Processing Unit-Error Correction Delta Rule-Multi-layer Perceptron- Heuristic Aspects of the Error Propagation Algorithm-Binary /Multiclass Discrimination with MLP Networks- Radial Basis Networks- Introduction to Deep Learning - Support Vector Machines- Linear Regression

Unit III: Tree Based Learning

9

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Random Forests-Different ways to Combine Classifiers

Unit IV: Probabilistic Models and Unsupervised Learning

9

Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map – Bayesian Networks

Unit V: Evolutionary Models, Reinforcement Learning, Applications**9**

Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Machine Learning Applications-Prediction of Coronary Heart Disease-Credit card fraud detection-Email Spam Detection

TOTAL: 45 HOURS**TEXT BOOKS**

1. M. Gopal, “Applied Machine Learning”, McGraw Hill, 2018
2. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCES

1. Anuradha Srinivasaraghavan and Vincy Joseph- Machine Learning, Wiley, 2019
2. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
3. Jason Bell, —Machine learning – Hands on for Developers and Technical Professional, First Edition, Wiley, 2014
4. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.
5. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning From Theory to Algorithms, Cambridge University Press, 2014.
6. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, O'Reilly Media, 2019

IT32A6	RISK ASSESSMENT AND SECURITY AUDIT	L	T	P	C
		3	0	0	3

OBJECTIVES

- To gain knowledge about risk and cyber risk.
- To discover knowledge in risk assessment and evaluation techniques.
- To know about various risk analysis and evaluation measures in cyberspace.
- To learn in detail on the auditing process and security governance.
- To understand monitoring and improvement strategies involved in security.

Course Outcome		Cognitive Skill
CO-01	Understand the risks, its impact, and assessment and management	U
CO-02	Have a fundamental knowledge on the methodology of cyber risk assessment and evaluation criteria	U
CO-03	Able to analyze the threat, vulnerability analysis and projection of Threat modeling.	An
CO-04	Evaluate the security audit-scope and the methodology of auditing with reference to security frameworks of E-Governance	E
CO-05	Analyze security monitoring and improvement strategies.	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	M	S	N	L	M	S	S
CO-02	S	S	S	N	S	L	S	M	S	S
CO-03	M	S	M	S	N	L	S	L	M	M
CO-04	S	S	S	M	M	M	S	S	S	S
CO-05	M	S	S	M	M	N	M	M	N	S

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

Unit I: Introduction

9

Risk - Risk Management - Communication and Consultation - Risk Assessment - Monitoring and Review - Cyber Systems - Cyber Security - Cyber Risk - Cyber Risk Management - Cyber Risk Communication and Consultation - Cyber Risk Assessment - Cyber Risk Monitoring and Review

Unit II: Cyber Risk Assessment

9

Context Establishment - Context, Goals and Objectives, Target of Assessment, Interface to Cyberspace and Attack Surface - Scope and Assumptions - Risk Evaluation Criteria - Risk Identification - Techniques - Malicious Risks - Non-Malicious Risks.

Unit III: Cyber Risk Analysis

9

Risk Analysis - Threat Analysis - Vulnerability Analysis - Threat Modeling Techniques - Likelihood and Consequence of Incidents - Risk Evaluation - Risk Treatment Identification - Risk Acceptance - Measures of Risk Level - Scales of Cyber Risk - Dealing with Uncertainty - High Consequence Risk in Cyberspace.

Unit IV: Security Audit

9

Security and Control - Information Audit and Control - Reasons for Conducting an Audit - Conducting an Audit - Overview of Auditing Process - Audit Management - Auditing Process Steps - Information Security Governance - IT Governance Frameworks- IT Security Controls.

Unit V: Security Monitoring and Improvement

9

Security Incident management Framework – Security Incident Management Process - Security Audit – Data to Collect for Auditing – Internal and External Audit – Security Audit Controls –Security Performance Measurement – Security Monitoring and Reporting – Information Risk Reporting – Information Security Compliance Monitoring – Security Monitoring and Improvement.

TOTAL: 45 HOURS

TEXT BOOKS

1. Atle Refsdal, Bjornar Solhaug, Ketil Stolen, “Cyber Risk Management”, Springer Briefs in Computer Science, 2015.
2. Anne Kohnke, Dan Shoemaker, Ken E. Sigler, “The Complete Guide to cybersecurity Risks and Controls”, CRC Press, Taylor and Francis Group,2016.
3. William Stallings, “Effective Cybersecurity: Understanding and using Standards and Best Practices”, Pearson Education, 2019.

REFERENCES

1. Domenic Antonucci, “The Cyber Risk Handbook: Creating and Measuring Effective Cybersecurity Capabilities”, John Wiley and Sons, New Jersey,2017.
2. Douglas W. Hubbard, Richard Seiersen, “How to Measure Anything in Cybersecurity Risk”, John Wiley and Sons,2016.
3. Chun Yu (CY) Cheung, “Threat Modeling Techniques”, Delft University of Technology, The Netherlands, November2016.

IT32A7	BIOMETRIC IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES

The student should be made to:

- Learn the basic concepts of image processing
- Learn the basics of biometrics
- Be familiar with fingerprint biometrics.
- Be exposed to iris recognition techniques
- Be familiar with fusion in biometrics

Course Outcome		Cognitive Skill
CO-01	Learn the fundamental concepts of image processing	U
CO-02	Identify the various Biometric technologies and the various performance measures in biometrics	R, U
CO-03	Understand the aspects of fingerprint biometrics	U, A
CO-04	Explain the different features of iris recognition	U, A
CO-05	Be exposed to the fusion in biometric techniques	U, 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	M	S	M	S	S
CO-03	S	S	S	S	L	M	S	S	S	S
CO-04	S	S	S	S	S	L	S	S	S	S
CO-05	S	S	S	S	M	S	S	S	M	L

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

Unit I: Image Processing Fundamentals

9

Introduction- Images-Sampling and frequency –Domain Processing-Basic image processing operations-Point operators –Group operations –Other statistical operators –Mathematical morphology- Feature Extraction.

Unit II: Introduction to Biometric

9

Biometric Fundamentals, Physiological and Biological biometrics, Biometric Technologies, Biometrics Vs Traditional Techniques, Characteristics of a Good Biometric System, Benefits of Biometrics, Key Biometric Processes: Verification, Identification and Biometric Matching, Performance Measures in Biometric Systems: FAR, FRR, FTE Rate, EER and ATV Rate.

Unit III: Fingerprint Biometrics

9

Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges. Fingerprint Image Processing - Minutiae Determination, Fingerprint Matching: Fingerprint Classification, Matching policies.

Unit IV: Iris Biometrics**9**

Iris System Architecture, Definitions and Notations, Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison, Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature.

Unit V: Fusion in Biometrics**9**

Introduction to Multibiometrics, Information Fusion in Biometrics, Issues in Designing a Multibiometric System, Sources of Multiple Evidence, Levels of Fusion in Biometrics, Sensor level, Feature level, Rank level, Decision level fusion, Score level Fusion.

TOTAL: 45 HOURS**TEXT BOOK**

1. Anil K Jain, Arun A Ross, Karthik Nandakumar," Introduction to Biometrics", Springer, 2011.

REFERENCES

1. Amine Nail -Ali and Regis Fournier "Signal and Image Processing for Biometrics" John Wiley and sons, 2012.
2. David D. Zhang," Automated Biometrics: Technologies and Systems", Kluwer Academic Publishers, New Delhi,2000.
3. Anil K Jain, Patrick Flynn, Arun A Ross," Handbook of Biometrics", Springer,2008.
4. Samir Nanavati, Michael Thieme, Raj Nanavati," Biometrics - Identity Verification in a Networked World", Wiley-dream tech India Pvt Ltd, New Delhi,2003
5. Arun A. Ross, Karthik Nandakumar, A.K. Jain," Hand book of Multibiometrics", Springer, NewDelhi,2006.
6. Scott E Baugh "Digital Image Processing and analysis" 2nd Edition CRC Press 2010.

IT32A8	OS FORENSICS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand how data acquisition is done from a Windows and Linux System
 - To understand what is inside a windows registry
 - To analyze windows memory and files including executable files
- To have an overview on concepts implemented in modern operating systems.

	Course Outcome	Cognitive Skill
CO-01	Students will acquire the necessary skills to perform live response investigations in Windows environments	U, A
CO-02	Students will gain proficiency in conducting in-depth analysis of Windows systems.	R, A
CO-03	Students will able to perform Linux forensic analysis, including live response data collection, data analysis techniques	U, An
CO-04	Students will acquire advanced skills in Linux file analysis	U, A
CO-05	Students will acquire advanced skills in iOS Forensics Analysis.	U, 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	M	M	M	M	L	S
CO-02	S	S	S	M	M	L	M	M	L	S
CO-03	S	S	S	S	M	L	M	M	L	S
CO-04	S	M	S	S	M	L	M	M	L	S
CO-05	S	S	M	M	M	M	M	M	L	S

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

Unit I: Windows Forensic Analysis

9

Windows Forensic Analysis- Live Response: Data Collection- Introduction, Locard's Exchange Principle, Order of Volatility, When to Perform Live Response, What Data to Collect- System Time, Logged-on Users, Open Files, Network Information, Network Connections, Process Information, Process-to-Port Mapping, Process Memory, Network Status, Nonvolatile Informations- Live-Response Methodologies: Data Analysis- Data Analysis, Agile Analysis.

Unit II: Windows File Analysis

12

Windows Memory Analysis-Collecting Process Memory, Dumping Physical Memory, Alternative Approaches for Dumping Physical Memory, Analyzing a Physical Memory Dump. Registry Analysis, RegRipper, System Information, USB Removable Storage Devices, Mounted Devices, Portable Devices, Deleted Registry Keys. Windows File Analysis-Log Files, Event Logs, Recycle Bin, XP System Restore Points, Vista Volume Shadow Copy Service, Prefetch and Shortcut files, File Metadata, File Signature Analysis, NTFS Alternate Data Streams, Executable File Analysis.

Unit III: Linux Forensic Analysis

9

Linux Forensic Analysis- Live Response Data Collection- Prepare the Target Media, Format the Drive, Gather Volatile Information, Acquiring the Image, Initial Triage and Live Response: Data Analysis- Log Analysis, Keyword Searches, User Activity, Network Connections, Running Processes, Open File Handlers, The Hacking Top Ten, Reconnaissance Tools

Unit IV: Linux File Analysis

9

The Proc File System- Introduction, Process IDs, File Analysis- The Linux Boot Process, System and Security Configuration Files- Users, Groups, and Privileges, Cron Jobs, Log Files, Identifying Other Files of Interest- . SUID and SGID Root Files, Recently Modified/Accessed/Created Files, Modified System Files, Out -of-Place inodes, Hidden Files and Hiding Places.

Unit V: iOS Forensic Analysis

6

History of Apple Mobile Devices, iOS Operating and File System Analysis - The iOS File System, HFS+ File System, HFSX, iPhone Partition and Volume Information, OS Partition, iOS System Partition, iOS Data Partition, SQLite Databases - iPhone Logical Acquisition, Logical Data Analysis

TOTAL: 45 HOURS

TEXT BOOKS

1. Unix and Linux Forensic Analysis DVD ToolKit - Chris Pogue, Cory Altheide, Todd Haverkos, Syngress Inc., 2008
2. Windows Forensic Analysis DVD Toolkit- Harlan Carvey, Edition 2, Syngres Inc., 2009
3. Windows Registry Forensics: Advanced Digital Forensic Analysis of the Windows Registry - Harlan Carvey, Syngress Inc, Feb 2011
4. "iOS Forensic Analysis: for iPhone, iPad, and iPod Touch" - Sean Morrissey, 2010

REFERENCES

1. File System Forensic Analysis- Brian Carrier, Addison Wesley, Edition 1, 2005
2. Handbook of Digital Forensics and Investigation- Eoghan Casey, Academic Press, 2009
3. Digital Forensics with Open-Source Tools- Cory Altheide, Harlan Carvey, Syngress Inc, Edition 1, April 2011
4. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=6766b849a7a0c71accc8f5e02bc7106d2a88ebcc>

IT32A9	FILE SYSTEM FORENSICS ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand foundation of digital investigation and methods of data analysis
- To understand the file system and how to analyze a file system

Course Outcome		Cognitive Skill
CO-01	Students will be able to conduct digital investigations, handle digital evidence, analyze data	A, U
CO-02	Students will be able to perform volume analysis, including analyzing various types of partitions	A, R, S
CO-03	Students will develop the skills and knowledge required to perform file system analysis	U, S, A
CO-04	Students will be able to perform effective NTFS analysis,	R, U, E
CO-05	Students will be able to analyze Ext x file systems	An, E, 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	M	M	S	M	L	M	L	S
CO-02	M	S	M	S	S	M	M	M	L	S
CO-03	S	M	S	S	S	L	M	M	L	S
CO-04	S	M	M	S	S	L	M	M	L	S
CO-05	S	M	M	M	S	M	M	M	M	S

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

Unit I: Digital Investigation Foundations

9

Digital investigation foundation- Digital investigations and evidence, Digital crime scene investigation process, Data analysis, overview of toolkits, Computer foundations- Data organizations, booting process,

Hard disk technology, Hard disk data acquisition- introduction, reading the source data, writing the output data, a case study.

Unit II: Volume Analysis

9

Volume Analysis- introduction, background, analysis basics, PC based partitions- DOS partitions, Analysis considerations, Apple partitions, removable media, Server based partitions- BSD partitions, Sun Solaris slices, GPT partitions, Multiple disk volumes- RAID, Disk Spanning

Unit III: File System Analysis

9

File system analysis- What is a file system, File system category, Content category, Metadata category, File name category, Application category, Application-level search techniques, Specific file systems, FAT concepts and analysis- Introduction, File system category, Content category, Metadata category, File name category, The big picture, File recovery, determining type, Consistency check. FAT data structure-Boot sector, FAT 32 FS info, directory entries, Long file name directory entries

Unit IV: NTFS File System

9

NTFS concepts- Introduction, Everything is a file, MFT concepts, MFT entry attribute concepts, Other attribute concepts, Indexes, Analysis tools, NTFS Analysis- File system category, Content category, Metadata category, File name category, The big picture, File recovery, determining the type, Consistency check. NTFS data structure- Basic concepts, Standard file attributes, Index attributes and data structures, File system metadata files

Unit V: EXT X File System

9

Ext2 & Ext3 concepts- File system category, Content, Metadata category, File name category, File recovery, determining the type, Consistency check. Ext2 and Ext3 data Structures, Ext4 Data structures, file recovery possibility in Ext2, Ext3, Ext4.

TOTAL: 45 HOURS

TEXT BOOKS

1. File System Forensic Analysis – Brian Carrier, Addison Wesley, 2005
2. Digital Evidence and Computer Crime- Casey, Eoghan, edition 2, Academic Press, 2004.
3. Computer Forensics- Kruse, Warren and Jay Heiser, Addison Wesley, 2002.

REFERENCES

1. Guide to Computer Forensics and Investigations- Bill Nelson, Amelia Phillips, Frank Enfinger, Chris Steuart, Thomson Course Technology, 2004
2. Forensic Discovery – Dan Farmer &WietseVenema, Addison Wesley, 2005
3. Incident Response and Computer Forensics- Mandia, Kevin, Chris Proise, Matt Pepe, McGraw Hill/Osborne, 2003.
4. A Fast File System for UNIX-McKusick, William N. Joy, Samuel J. Leffler, Robert S.
5. Fabry , ACM Transactions on Computer Systems, August 1984, pp 181-197.
<http://docs.freebsd.org/44doc/smm/05.fastfs/paper.pdf>
6. The Common Vulnerabilities and Exposures database, entry CVE-2000-0666.
<http://cve.mitre.org/>

IT32B1	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand OSI security architecture and classical encryption techniques.
- To acquire fundamental knowledge on the concepts of finite fields and number theory.
- To study various block cipher and stream cipher models.
- To describe the principles of public key cryptosystems, hash functions and digital signature.
- To gain fundamental knowledge on applications of digital signature in payments etc.

Course Outcome		Cognitive Skill
CO-01	Understand the basic concepts of network security and number theory.	U
CO-02	Interpret the fundamental knowledge on symmetric key cryptographic algorithms.	U
CO-03	Apply the different cryptographic operations of public key cryptographic algorithms.	A
CO-04	Employ the various Authentication schemes to simulate different applications.	A
CO-05	Apply cryptographic techniques to enhance network security.	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	M	L	L	S	S	S	S
CO-02	S	S	S	M	L	L	S	S	S	S
CO-03	S	S	S	M	L	L	S	S	S	S
CO-04	S	S	S	M	L	L	S	S	S	S
CO-05	S	S	S	M	L	L	S	S	S	S

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

Unit I: Introduction and Mathematical Foundation

9

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security -Number Theory concepts – Divisibility, Division Algorithm, Modular Arithmetic, Euclidean Algorithm, Prime Numbers, Fermat's and Euler's Theorem, Chinese Remainder Theorem, Primitive roots, Discrete Logarithms.

Unit II: Symmetric Ciphers

9

Classical encryption techniques - Symmetric Cipher Model - Substitution techniques, Transposition techniques - Block Cipher Structure – Simplified DES - Data Encryption Standard - Block cipher modes of operation - AES - Stream Ciphers – RC4

Unit III: Asymmetric Ciphers

9

Principles of Public Key Cryptosystem - RSA cryptosystem - Finite Fields - Elliptic curve arithmetic –

Elliptic curve cryptography - Diffie Hellman Key Exchange - Random Number Generation – Key Management.

Unit IV: Integrity and Authentication Algorithms

9

Authentication requirement - Authentication function - MAC – Key wrapping - Cryptographic Hash Functions – Applications of Cryptographic Hash Functions – Secure Hash Algorithm - Digital signature - Schnorr Digital Signature Scheme - User Authentication - Authentication applications -Kerberos.

Unit V: Network and Internet Security

9

Network Access Control - Cloud Security - Web Security Considerations - Transport Layer Security - Wireless Network Security - Electronic Mail Security- PGP, IP Security, Secure Electronic Transaction, Cryptocurrency.

TOTAL: 45 HOURS

TEXT BOOKS

1. William Stallings, Cryptography and Network Security, Seventh Edition, Pearson Education, 2017.
2. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.

REFERENCES

1. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security, Prentice Hall of India, 2002.
3. Neils Ferguson and Bruce Schneier, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
4. Douglas R Simson, Cryptography - Theory and practice, First Edition, CRC Press, 1995.
5. Atul Kahate, "Cryptography and Network Security", Second Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.
6. A.Menezes, P.VanOorschot and S.Vanstone, "Hand book of Applied Cryptography" CRC Press, Fifth Printing, 2001.

IT32B2	SOFTWARE TESTING PRINCIPLES	L	T	P	C
		3	0	0	3

OBJECTIVES

- To explain the basics of software testing
- To highlight the strategies for software testing
- To stress the need and conduct of testing levels
- To identify the issues in testing management
- To bring out the ways and means of controlling and monitoring testing activity

Course Outcome		Cognitive Skill
CO-01	Students should able to understand the core concepts of software testing	U
CO-02	Students should able to design test cases for different types of testing	An
CO-03	Students should able to do different test automation	An
CO-04	Students should able to automate the testing processes using various testing tools.	E
CO-05	Students should able to manage the software 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	M	S	L	M	S	L	S	M	S	S
CO-02	M	S	L	M	S	L	S	M	S	S
CO-03	M	S	L	L	S	L	S	S	S	S
CO-04	M	S	L	L	S	L	S	S	S	M
CO-05	M	S	L	L	S	M	S	S	M	M

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

Unit I: Introduction

9

Software Testing – Need for testing – testing principles – fundamental test process – the psychology of testing – test levels – test types – test cases – issues in testing

Unit II: Test Design Techniques

9

Identifying test conditions – Designing test cases – categories of test case design techniques –black box techniques – white box techniques – experience-based techniques – choosing a test technique

Unit III: Software Test Automation

9

Software Test Automation - Skills needed for automation - Scope of Automation - Design and architecture for automation - Process Model for Automation - Challenges in Automation.

Unit IV: Testing Tools

9

Testing Tools - Taxonomy of Testing Tools - Test Design Tools - Load and Performance Testing Tools-Test implementation Tools-Test Evaluation Tools-Functional/Regression Testing Tools- Performance Testing Tools-Testing Management Tools-Source Code Testing Tools-Selection of Testing Tools - Cost Effectiveness of Testing Tools.

Unit V: Test Management

9

Test organization – Test plans, estimates and strategies-Test progress monitoring and control – configuration management – risk and testing-incident management

TOTAL: 45 HOURS

TEXT BOOKS

1. Rex Black, Erik Van Vennendaal, Dorothy Graham,” Foundations of Software Testing ISTQB Certification, Cengage Learning,2015.
2. Software Testing: Principles and Practices by Srinivasan D and Gopalswamy R, PearsonEducation,2014.
3. Ilene Burnstein,” Practical Software Testing”, Springer International Edition, Chennai, 2003.
4. Jeff Tian, Software Quality Engineering, testing, Quality assurance and quantifiable improvement, Wiley India,2006.

REFERENCES

1. Software Testing Foundations, Andreas Spillner, Tilo Linz, Hans Schaefer, Shoff Publishers and Distributors,2014.
2. Foundations of Software Testing by Aditya P. Mathur - Pearson Education custom edition 2011.
3. Testing Object Oriented Systems: models, patterns and tools, Robert V Binder, Addison Wesley,1999.
4. Software Engineering - A practitioner’s approach by Roger S. Pressman, 7th Edition, McGraw Hill,2010.
5. The art of software testing by GJ Myers, III Edition, Wiley,2012.

IT32B3	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To introduce the concept of data warehousing with special emphasis on architecture and design.
- To introduce the concept of data mining with in detail coverage of basic techniques and applications. Core topics like classification, clustering and association rules are exhaustively dealt with.

Course Outcome		Cognitive Skill
CO-01	Student will be able to clearly understand the architecture and the function of data warehouse systems.	U
CO-02	Student will get knowledge on the architecture, and the functionalities of data mining systems and will be able to assess raw input data, and process it to provide suitable input for a range of data mining algorithms.	U, An
CO-03	Student will gain knowledge on association rule mining, its applications and various algorithms used for mining association rules.	U
CO-04	The candidate will get knowledge of various algorithms for data mining and will be able to analyze their features.	An
CO-05	Student will be able to design and implement data-mining applications and gain knowledge in advances in data mining.	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	L	S	S	N	M	S	S	S
CO-02	S	S	L	S	S	N	M	S	S	S
CO-03	S	S	L	M	S	L	M	S	S	S
CO-04	S	S	L	M	S	M	M	S	S	S
CO-05	S	S	M	M	S	M	M	S	S	S

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

Unit I: Introduction to Data Warehousing

8

Data Warehouse - Differences between OLTP and OLAP - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Tools and Utilities- Metadata Repository -Data Warehouse Implementation.

Unit II: Introduction to Data Mining, Data Preprocessing and Data Mining Primitives

9

Introduction to Datamining- Data- Types of Data- Classification of Data Mining Systems - Data Mining Functionalities-Integration of a Data Mining System with a Data Warehouse- Need for Preprocessing - Cleaning - Integration - Transformation - Reduction - Data Mining Primitives - Interestingness of Patterns - Relation to Statistics.

Unit III: Association Rules and Correlation Analysis

8

Association Rule Mining - Mining Single Dimensional Boolean Association Rules from Transactional Databases - Mining various kinds of Association Rules - Correlation Analysis.

Unit IV: Classification and Clustering**12**

Classification and Prediction - Issues - Decision Tree Induction - Bayesian Classification - Artificial Neural Networks - Model of an Artificial Neuron - Architectures of Artificial Neural Networks - Learning Process - Learning Tasks Using Anns - Multilayer Perceptrons - Performance Measures- Prediction - Cluster Analysis - Types of data - Categorization of major clustering methods - Partitioning methods - Outlier Analysis.

Unit V: Advances and Applications**8**

Data mining applications- Data mining trends- Advances in Data Mining- Distributed Data Mining- Privacy, Security, and Legal Aspects of Data Mining- Cloud Computing Based on Hadoop and Map/Reduce

TOTAL: 45 HOURS**TEXT BOOKS**

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
2. Mehmed Kantardzic, "Data mining Concepts, Models, Methods, and Algorithms" Wiley 2011.

REFERENCES

1. Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining and OLAP, Tata McGraw-Hill, 2017.
2. G. K. Gupta," Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, Third Edition, 2014.
3. Daniel T.Larose, "Data Mining Methods and Models", Wiley-Interscience,2006.
4. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2006.
5. Sam Anahory, Dennis Murray," Data Warehousing in the real world", Pearson Education 2004.

IT32B4	C# AND .NET PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn basic programming in C# and the object oriented programming concepts.
- To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET.
- To study the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET4.5.
- To implement mobile applications using .Net compact framework
- To understand the working of base class libraries, their operations and manipulation of data using XML.

Course Outcome		Cognitive Skill
CO-01	Understand the concept of .Net Framework and C# language fundamentals.	U
CO-02	Understand the C# advanced features and Exceptions	A
CO-03	Implement programs using base class libraries and data manipulation	S
CO-04	Implementing window based applications, WCF AND WWF	A
CO-05	Working of XML with web application.	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	M	S	M	M	S	S	L
CO-02	S	S	M	M	S	S	M	S	S	M
CO-03	S	S	M	M	S	S	M	S	S	M
CO-04	S	S	S	M	S	S	M	S	S	S
CO-05	S	S	S	M	S	S	S	S	S	S

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

Unit I: C# Language Basics

9

.Net Architecture - Core C# - Variables - Data Types - Flow control - Objects and Types- Classes and Structs - Inheritance- Generics – Arrays and Tuples - Operators and Casts - Indexers.

Unit II: C# Advanced Features

9

Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection

Unit III: Base Class Libraries and Data Manipulation

9

Diagnostics -Tasks, Threads and Synchronization - .Net Security - Localization - Manipulating XML- SAX and DOM - Manipulating files and the Registry- Transactions - ADO.NET- Peer-to-Peer Networking - PNRP - Building P2P Applications - Windows Presentation Foundation (WPF).

Unit IV: Window Based Applications, WCF and WWF

9

Window based applications - Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities – Workflows

Unit V: .NET Framework and Compact Framework

9

Assemblies - Shared assemblies - Custom Hosting with CLR Objects - Appdomains - Core XAML - Bubbling and Tunneling Events- Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices

TOTAL: 45 HOURS

TEXT BOOKS

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner. —Professional C# 2012 and .NET 4.5, Wiley, 2012
2. Harsh Bhasin, —Programming in C#, Oxford University Press, 2014.

REFERENCES

1. Ian Gariffiths, Mathew Adams, Jesse Liberty, —Programming C# 4.0l, O_Reilly, Fourth Edition, 2010.
2. Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, A press publication, 2012.
Andy Wigley, Daniel Moth, Peter Foot, —Mobile Development Handbookl, Microsoft Press, 2011.

IT32B5	FREE AND OPEN SOURCE SOFTWARE	L	T	P	C
		3	0	0	3

OBJECTIVES

- Provide the concepts of open source software
- Enable the students to learn Linux and Android environment
- Implement the basics of Shell Programming
- Understand the policies, licensing procedures and ethics of FOSS.

Course Outcome		Cognitive Skill
CO-01	Define the development model of OS and let know about the open-source licensing.	U
CO-02	Demonstrate the installation of Linux by hard disk partitioning and basics of Android structure.	A
CO-03	Apply Networking Commands and set up Networking and cryptographic services.	A
CO-04	Understand the policies, licensing procedures and ethics of FOSS.	An
CO-05	Understand open-source philosophy, methodology and ecosystem.	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	S	M	M	M	M	M	L	M	S	M
CO-02	S	S	S	S	M	M	M	S	M	M
CO-03	S	S	S	S	M	S	M	S	M	M
CO-04	S	S	S	M	S	M	M	M	L	M
CO-05	S	S	S	S	S	M	S	S	S	S

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

Unit I: Software Overview

9

Introduction – Need and Advantage of Open-Source Software – Foss- Free Software Movement –Open Source Movement- Open Source Licensing- Certification-OSS Development Model-Run a Free Software Project-Comparing OSS with other Software-OSS Licenses.

Unit II: Operating System

9

Installation of Linux (Red hat-CentOS): Hard disk Partitioning, Swap space, LVM, and Boot loader. Command Line: Basic File System Management Task, working with files, Piping and Redirection, working with VI editor, use of sed and understanding FHS of Linux. Android- History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

Unit III: Network Security Administration**9**

Networking Commands, Configuration of Apache Web Servers, DNS servers, DHCP servers, mail servers, NFS, FTP Servers. Securing servers with IP tables. Setting up Network and cryptographic services: SSL, Managing Certificate with Open SSL, working with the GNU Privacy guard.

Unit IV: Open-Source Ethics and Social Impact**9**

Open source vs. closed source, Open-source Government, Ethics of Open-source, Social and Financial impacts of open-source technology, Shared software, Shared source, Open Source as a Business Strategy

Unit V: Understanding Open-Source Ecosystem**9**

Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies

TOTAL: 45 HOURS**TEXTBOOKS**

1. Prof. Dayanand Ambawade, Deven Shah, "Linux Labs and Open Source Technologies" Dream Tech Press, 2014
2. Pradeep Kothari, Android Application Development: Black book, Dream tech Press, April 2014.
3. Kailash Vadera & Bhavyesh Gandhi "Open-Source Technology", University Science Press, Laxmi Publications, 2009

REFERENCES

1. Peterson, "The Complete Reference Linux", Tata McGraw HILL, 2010
2. Fadi P. Deek and James A. M. McHugh, "Open-Source Technology and Policy", Cambridge University Press, 2008.

OPEN ELECTIVE COURSES

SI. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	IT32D1	Fundamentals of Cyber Security	3	0	0	3
2	IT32D2	Foundations of Data Science	3	0	0	3

IT32D1	FUNDAMENTALS OF CYBER SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES

- The course also gives an exposure to the different types of mechanisms to sanitize the cyber space by adopting standardized operating procedures while transacting business/commerce online, and also to ensure security of information handled over the net.
- Introduction to the Cyber Laws and the IPC/Cr.PC equips the students with sufficient legal knowledge about deterrence in preventing cyber crimes.

Course Outcome		Cognitive Skill
CO-01	Remember and understand the principles of computer organization and communicate effectively to discuss about the OS and architectures.	R, U
CO-02	Understand and identify the information security fundamentals and apply them in E-commerce.	U, A
CO-03	Remember and understand the security threats and test the programming bugs in computing systems.	R, U
CO-04	Understand the security principles and apply the skills and tools for the computing system.	U, A
CO-05	Apply the cyber laws, ethics and cyber forensic tools in computing systems and social networks.	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	S	L	S	L	S	S	M	L
CO-02	N	N	M	M	L	N	M	L	L	M
CO-03	L	S	M	N	M	S	N	M	M	S
CO-04	S	M	N	L	N	M	L	N	N	M
CO-05	N	L	L	S	N	N	N	M	S	N

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

Unit I: Computer Organization & Architecture and Operating systems 9

Computer Organization, Architecture, Operating Systems, Process Management, CPU Scheduling, I/O Memory Management, file systems and deadlocks. LAN, MAN, WAN, ISO/OSI seven layer architecture.

Unit II: Information Security Fundamentals 9

Background, Importance, statistics, national and international scenarios. Identification and authentication, confidentiality, privacy, integrity, non-repudiation. Goals of security: prevention, detection and recovery. E-commerce security. Critical Infrastructure Protection.

Unit III: Security Threats and Vulnerabilities 9

Overview of security threats, various kinds of threats; Authentication-weak passwords. Insecure internet connection- internet cookies, viruses and other infections. Security of hard drives, security of laptops; sniffers, backdoors and Trojans. Buffer overflow and other programming bugs. Common attacks- DoS, man-in-the-middle, brute force attacks.

Unit IV: Overview of Security Principles 9

Security policies and procedures, International standards, Security consideration of OS- OS hardening - Internet protocols and security: SSL/TLS, IP Security, Application layer security- Access Control: Physical, Logical and Biometric - Tools and Techniques: Firewalls, Antivirus, IDS, Log analysis, Cryptography, steganography - Security Infrastructure: PKI, VPN, Digital signature - Network scanners, vulnerability scanners - Device Security - Cloud computing security, Database security.

Unit V: Cyber Crimes 9

Cyber crimes, Cyber crime Investigation, and Cyber forensic tools. Cyber Laws. Information Technology Act, Cyber laws and cyber crime investigation. Social networks and analysis.

TOTAL: 45 HOURS

TEXT BOOKS

1. Thomas Calabres and Tom Calabrese, "Information Security Intelligence: Cryptographic Principles & Application", Thomson Delmar Learning, 2004.
2. Bernadette H Schell, Clemens Martin, "Cyber Crime", ABC-CLIO Inc, California, 2004.
3. Swiderski, Frank and Syndex, "Threat Modeling", Microsoft Press, 2004.
4. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", Prentice Hall, 2008.

REFERENCES

1. Silberschatz A, Galvin P, Gagne G, "Operating Systems Concepts", John Wiley & Sons, Singapore, 2006.
2. Principles and Practices of Information Security by Michael.E. Whiteman and Herbert .J. Mattord.
3. Cyber Laws by Aparna Viswanathan.
4. Joseph M Kizza, "Computer Network Security", Springer Verlag, 2005.

IT32D2	FOUNDATIONS OF DATA SCIENCE	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the data science fundamentals and process.
- To learn to describe the data for the data science process.
- To learn to describe the relationship between data.
- To utilize the Python libraries for Data Wrangling.
- To present and interpret data using visualization libraries in Python

Course Outcome		Cognitive Skill
CO-01	Define the data science process	U
CO-02	Understand different types of data description for data science process	U
CO-03	Gain knowledge on relationships between data	A
CO-04	Use the Python Libraries for Data Wrangling	A
CO-05	Apply visualization Libraries in Python to interpret and explore data	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	M	M	S	M	M	M	S	S	S
CO-02	S	M	M	S	M	M	S	S	S	S
CO-03	S	M	M	S	M	M	S	S	S	S
CO-04	S	S	S	S	M	M	S	S	S	S
CO-05	S	M	S	S	M	M	S	S	S	S

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

Unit I: Introduction**9**

Data Science: Benefits and uses – facets of data - Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – build the model– presenting findings and building applications - Data Mining - Data Warehousing – Basic Statistical descriptions of Data

Unit II: Describing Data**9**

Types of Data - Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores

Unit III: Describing Relationships**9**

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient - Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r^2 –multiple regression equations –regression towards the mean

Unit IV: Python LIBR**9**

Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables

Unit V: Data Visualization**9**

Importing Matplotlib – Line plots – Scatter plots - visualizing errors - density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn.

TOTAL: 45 HOURS**TEXTBOOKS**

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017.(Units II and III)
3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Units IV and V)

REFERENCE

1. Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014.

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MS3202	Principles of Management	2	0	0	2
2.	IT3217	Cloud Computing Essentials	3	0	0	3
3.	*****	Elective-IV	3	0	0	3
4.	*****	Elective-V	3	0	0	3

5.	*****	Open Elective - II	3	0	0	3
PRACTICAL						
6.	IT3283	Cyber Forensics Lab	0	0	2	1
7.	IT3284	Cloud Computing Essentials Lab	0	0	2	1
8.	IT32P3	Project -I (Machine Learning)	0	0	6	3
TOTAL			14	0	10	19

MS3202	PRINCIPLES OF MANAGEMENT	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To introduce students to the basic concepts and functions of management.
- To understand the role and responsibilities of managers in various organizational settings.
- To develop an understanding of the planning, organizing, leading, and controlling functions of management.
- To examine the impact of management theories and practices on organizational performance.
- To equip students with the skills necessary to manage people and processes effectively in a technical environment.

Course Outcome – Cos		Cognitive Skill
CO-01	Define and explain the key concepts and functions of management.	U, R
CO-02	Analyse the roles and responsibilities of managers in different organizational contexts.	An
CO-03	Apply planning, organizing, leading, and controlling principles to real-world scenarios.	A
CO-04	Evaluate the effectiveness of different management theories and practices.	E
CO-05	Demonstrate management skills necessary for leading teams and projects in a technical environment.	A

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

Unit I: Introduction to Management

7

Definition, nature, and importance of management - Functions of management: Planning, Organizing, Leading, Controlling - Roles and skills of managers - Evolution of management thought: Classical, Behavioural, and Modern theories - Scientific Management (Taylor) - Administrative Theory (Fayol) - Human Relations Movement (Mayo) - Contemporary approaches (Systems Theory, Contingency Theory)

Unit II: Planning

5

Nature and purpose of planning - Types of plans: Strategic, Tactical, Operational - Planning process and techniques - SWOT Analysis, SMART Goals, Scenario Planning - Decision making: Process, types, and tools- Rational Decision-Making Model - Bounded Rationality - Group Decision-Making Techniques (Brainstorming, Delphi Technique)

Unit III: Organizing**5**

Organizational structure and design - Types of organizational structures: Functional, Divisional, Matrix, Network - Authority, responsibility, and delegation - Coordination and communication within organizations - Formal and Informal Communication Channels - Role of Technology in Organizational Communication (Emails, Video Conferencing, Collaborative Tools)

Unit IV: Leading**7**

Leadership theories and styles - Trait Theory - Behavioural Theories (Ohio State Studies, Michigan Studies) - Contingency Theories (Fiedler's Model, Path-Goal Theory) - Transformational vs. Transactional Leadership - Motivation theories and practices, Maslow's Hierarchy of Needs, Herzberg's Two-Factor Theory, McClelland's Theory of Needs, Modern Approaches (Self-Determination Theory) - Group dynamics and team management - Stages of Team Development (Forming, Storming, Norming, Performing) - Managing Virtual Teams

Unit V: Controlling**6**

Nature and purpose of control - Control process and techniques, Establishing Standards, Measuring Performance, Correcting Deviations - Types of control: Feed forward, Concurrent, Feedback - Quality control and management, Total Quality Management (TQM), Six Sigma, Lean Management, Use of Data Analytics in Quality Control.

TOTAL: 30 PERIODS**TEXTBOOKS :**

1. Robbins, S. P., Coulter, M., & DeCenzo, D. A. (2020). *Fundamentals of Management* (11th ed.). Pearson.
2. Griffin, R. W. (2022). *Management: Principles and Practices* (12th ed.). Cengage Learning.
3. Jones, G. R., & George, J. M. (2021). *Essentials of Contemporary Management* (9th ed.). McGraw-Hill Education.

REFERENCES:

1. Daft, R. L. (2021). *Management* (14th ed.). Cengage Learning.
2. Bateman, T. S., & Snell, S. A. (2020). *Management: Leading & Collaborating in a Competitive World* (14th ed.). McGraw-Hill Education.
3. Schermerhorn, J. R. (2021). *Management* (14th ed.). Wiley.
4. Hill, C. W. L., Schilling, M. A., & Jones, G. R. (2020). *Strategic Management: Theory & Cases* (13th ed.). Cengage Learning.
5. Kinicki, A., & Williams, B. K. (2021). *Management: A Practical Introduction* (10th ed.). McGraw-Hill Education.

IT3217	CLOUD COMPUTING ESSENTIALS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To learn about the basic concepts of cloud computing.
- To study about virtualization and different cloud platforms.
- To learn the basics of cloud infrastructures.
- To study about the security issues in cloud.
- To be aware of various cloud services.

Course Outcome		Cognitive Skill
CO-01	Understand the fundamentals of Cloud Computing.	U
CO-02	Understand the importance of virtualization in cloud and about the usage of cloud platforms.	U
CO-03	Analyze the strategies involved in managing the cloud and the storage provided by cloud.	An
CO-04	Analyze the core issues of securing the cloud.	An
CO-05	Evaluate the appropriate technologies and frameworks provided by various cloud services.	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	M	S	S	S
CO-02	S	S	S	S	M	S	M	M	S	M
CO-03	S	S	M	M	L	N	S	L	M	S
CO-04	S	M	S	S	L	M	M	S	L	S
CO-05	M	S	M	M	S	N	M	S	M	M

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

Unit I: Cloud Computing Basics

9

Introduction to Cloud Computing – Evolution of Cloud Computing – Essential Characteristics of cloud computing –NIST Cloud Computing Reference Architecture – Cloud Deployment Models: Public cloud – Private cloud - Community Cloud - Hybrid cloud - Cloud Service Models: IaaS - PaaS - SaaS – Benefits of Cloud Computing.

Unit II: Virtualization And Cloud Platforms

9

Virtualization : Characteristics of Virtualized Environments – Taxonomy of virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Hadoop – Map Reduce – Docker – CloudSim.

Unit III: Exploring Cloud Infrastructures

9

Managing the Cloud: Administrating the Clouds – Emerging Cloud Management Standards – Migrating Applications to Cloud - Securing the Cloud Data – Establishing Identity and Presence - Provisioning Cloud Storage - Exploring Cloud Backup Solutions – Cloud Storage Interoperability – Cloud Federation – Multicloud.

Unit IV: Securing the Cloud**9**

Challenges with Cloud Data – Challenges with Data Security – Data Confidentiality and Encryption – Data Availability and Data Integrity – Cloud Storage Gateways (CSGs) - CSA Cloud Security Architecture – Authentication – Data Security.

Unit V: Cloud Services**9**

Compute Services – Storage Services – Database Services – Application Services – Content Delivery Services – Analytics Services – Deployment and Management Services – Identity and Access Management Services.

TOTAL: 45 HOURS**TEXTBOOKS**

1. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, “Mastering Cloud Computing-Foundations and Applications Programming, Elsevier, 2013.
2. K. Chandrasekaran, “Essentials of Cloud Computing”, CRC Press, 2015.
3. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, “Cloud Computing – A Practical Approach”, The McGraw Hill Companies, 2010.
4. Barrie Sosinsky, “Cloud Computing Bible”, Wiley Publishing Inc., 2011.

REFERENCES

1. Douglas E. Comer, “The Cloud Computing Book: The Future of Computing Explained”, CRC Press, Taylor and Francis, 2021.
2. Thomas Erl, “Cloud Computing: Concepts, Technology & Architecture”, Pearson Education, 2014.
3. Buyya R., Broberg J., Goscinski A., “Cloud Computing: Principles and Paradigm”, John Wiley, 2011.
4. John W. Rittinghouse, James F. Ransome, “Cloud Computing: Implementation “Management and Security”, CRC Press, 2010.

IT3283	CYBER FORENSICS LAB	L	T	P	C
		0	0	2	1

OBJECTIVES

- Develop practical skills in conducting live forensic investigations on various digital devices and operating systems.
- Gain hands-on experience in password cracking and forensic imaging of mobile devices, enabling proficiency in mobile device forensics and data recovery.
- Master analysis of forensic images, recovering deleted mobile data, and honing digital forensics skills for evidence extraction and analysis.
- Empower students with comprehensive cybercrime investigation skills covering network analysis, file recovery and social engineering to combat digital threats effectively.

Course Outcome		Cognitive Skill
CO-01	Enable students to acquire knowledge about the different cyber forensics tools.	U, An
CO-02	Enable students to be familiar with the forensics tools to collect evidence from devices such as hard drives and smartphones.	U,A

CO-03	Facilitate students to be aware of the advanced scanning techniques and identify malicious activity if any.	An
CO-04	Students should be made to be knowledgeable in the file hiding techniques.	An
CO-05	Students should be able to set up a virtual environment and explore its functionality.	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	M	M	S	S	N	L	S	M	S
CO-02	S	S	S	M	M	N	M	S	S	S
CO-03	M	S	S	S	M	M	L	M	S	S
CO-04	S	S	S	S	S	N	L	M	S	S
CO-05	M	S	S	M	M	L	M	S	S	S

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

List of Experiments

1. Live Forensics case investigation using Autopsy.
2. Break the password of the mobile phone and Create its forensic image using Mobile check.
3. Analyze forensic images using Mobile Check and recover the deleted data.
4. Show how evidence can be collected from live windows machine using Win-Lift.
5. Live Analysis using Win-LiFT Analyzer
6. Create a forensic image using FTK.
7. Analyse the forensic image using FTK.
8. Familiarize Cryptool.
9. Familiarize Social Engineering Tool Kit.
10. Perform advanced scanning using the Nmap tool.
11. Capture and analyse network traffic using Wireshark.
12. Concealing a text file within an image file/Audio file using Command prompt / Camouflage.
13. Collect email evidences form Victim's PC.
14. To create a Virtual Machine and Install Kali Linux OS.

TOTAL: 30 HOURS

IT3284	CLOUD COMPUTING ESSENTIALS LAB	L	T	P	C
		0	0	2	1

OBJECTIVES

- To apply the concept of virtualization and its types.
- To familiarize the concepts of cloud computing and services
- To get practiced on cloudsim.
- To learn to implement and use parallel programming using Hadoop.
- To understand about Docker container.

Course Outcome		Cognitive Skill
CO-01	Create virtual machines and virtual templates.	A
CO-02	Design and deploy a web application in a PaaS environment.	A
CO-03	Simulate a cloud environment using Cloudsim.	An
CO-04	Install Hadoop and run applications in it.	A
CO-05	Create Container using Docker.	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	M	S	S	M	S	S	S
CO-02	S	S	S	S	M	S	S	S	S	M
CO-03	M	S	M	M	L	N	S	M	M	S
CO-04	S	M	S	S	L	M	S	S	S	S
CO-05	M	S	M	L	S	N	M	S	M	M

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

List of Experiments

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
3. Find a procedure to transfer the files from one virtual machine to another virtual machine.
4. Connect the Virtual Machine to a cloud service using a popular cloud platform.
5. Launch Virtual Machines using Trystack (Online OpenStack Demo Version).
6. Install Google App Engine. Create hello world app and other simple web applications using python/java.

7. Use GAE launcher to launch the web applications.
8. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
9. Install Hadoop single node cluster and run simple applications like wordcount.
10. Create an application in Salesforce.com using Apex programming.
11. Creating and Executing Your First Container using Docker.
12. Run a Container from Docker Hub.

TOTAL: 30 HOURS

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	*****	Elective-IV	3	0	0	3
2.	*****	Elective-V	3	0	0	3
PRACTICAL						
3.	IT35P1	Project Work - II	0	0	20	10
TOTAL			6	0	20	16