

S.A. ENGINEERING COLLEGE, CHENNAI-600 077
(Autonomous -Institute Level Research Centre-
Affiliated to Anna University)

DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING (CYBER SECURITY)

B.E CSE (CYBER SECURITY)

REGULATION-2020A



CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABUS

S.A ENGINEERING COLLEGE, CHENNAI – 77
(An Autonomous Institution Affiliated to Anna University)
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PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

- Graduates will gain in-depth domain-specific knowledge and develop a robust foundation for lifelong learning, ensuring proficiency in their field throughout their careers.
- Graduates will develop, analyze, evaluate, and deploy secure cyber-physical systems that meet desired constraints adhering ethical practices, addressing professional, societal, and environmental concerns
- Graduates shall Work competently for different sectors like academia, industry, research and development, entrepreneurship, and start-up initiator in an individual or collaborative manner utilizing interpersonal skills.
- Graduates will demonstrate competence in various sectors, including academia, industry, research and development, entrepreneurship, and start-ups effectively utilizing interpersonal skills to work collaboratively.

PROGRAM OUTCOMES (POs):

- **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society

and environment as required. (WK5)

- **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PROGRAMME SPECIFIC OUTCOMES

- Analyze, and develop computer programs in areas such as cryptography, networking, web development, database management, cloud computing, IoT and data analytics leading to excellence and excitement towards research, to provide elegant solutions to complex problems.
- Develop strategies for protecting data, resources, and assets for organizations, processes, and individuals, utilizing cybersecurity-centric skills.

SEMESTER- I

SL.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	HS1101A	Technical English	HS	3	3	0	0	3
2.	MA1101 A	Calculus and its applications	BS	4	3	1	0	4
3.	PH1101A	Applied Physics	BS	3	3	0	0	3
4.	CY1101A	Engineering Chemistry	BS	3	3	0	0	3
5.	CS1101A	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	TA1101A	Tamilar Thozhil Nutpam / Tamils and Technology	HSMC	1	0	0	1	1
PRACTICALS:								
7.	BS1101A	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8.	CS1102A	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
9.	GE1201A	Engineering Practices Laboratory	ES	4	0	0	4	2
MANDATORY COURSE								
10	CI1101A	Indian Constitution	MC	2	2	0	0	0
TOTAL				31	17	1	13	23

SEMESTER-II

SL.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	HS1201A	English for Communication	HS	3	3	0	0	3
2.	MA1201A	Complex Variables and Transforms	BS	4	3	1	0	4
3.	PH1201A	Materials Science	BS	3	3	0	0	3
4.	EE1202A	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	CS1201A	Programming in C	PC	3	3	0	0	3
6.	TA1201A	Tamizhar Marabu/Heritage of Tamils	HSMC	1	0	0	1	1
7.	ME1101A	Engineering Graphics	ES	4	2	0	2	3
PRACTICALS:								
8.	CS1202A	Programming in C Laboratory	PC	4	0	0	4	2
MANDATORY COURSE								
9.	CY1201A	Environmental Science and Engineering	MC	2	2	0	0	0
TOTAL				27	19	1	7	22

SEMESTER -III

SL.NO	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	MA1303A	Discrete Mathematics	BS	4	3	1	0	4
2.	CW1301A	Digital Principles and Computer Organization	ES	3	0	0	3	3
3.	CS1301A	Data Structures	PC	3	3	0	0	3
4.	CS1302A	Software Engineering	PC	3	3	0	0	3
5.	IT1301A	Object Oriented Programming	PC	3	3	0	0	3
PRACTICALS:								
6.	IT1302A	Object Oriented Programming Laboratory	PC	4	0	0	4	2
7.	CS1303A	Data Structures Laboratory	PC	4	0	0	4	2
8.	HS1301A	Interpersonal Skills Laboratory	EEC	2	0	0	2	1
TOTAL				26	15	1	10	21

SEMESTER-IV

SL.NO	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	MA1408A	Statistics Techniques and Numerical Methods	BS	4	3	1	0	4
2.	CB1401A	Operating Systems and Security (Lab Integrated)	PC	5	3	0	2	4
3.	CB1402A	Software Security Engineering	PC	3	3	0	0	3
4.	CB1403A	Database Management Systems and Security	PC	3	3	0	0	3
5.	CB1404A	Cryptography and Information Security	PC	3	3	0	0	3
6.	HV1401A	Universal Human Values	ES	3	2	1	0	3
PRACTICALS :								
7.	CB1405A	Database Management Systems and Security Laboratory	PC	4	0	0	4	2
8.	CB1406A	Cryptography and Information Security Laboratory	PC	4	0	0	4	2
9.	HS1401A	Employability And Soft Skills Laboratory	EEC	2	0	0	2	1
TOTAL				29	19	2	10	25

SEMESTER-V

SL.NO	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	IT1501A	Computer Networks	BS	3	3	0	0	3
2.	CB1501A	Distributed Systems and Cloud Computing	PC	3	3	0	0	3
3.	CB1502A	Internet of Things(Lab Integrated)	PC	5	3	0	2	4
4.	CB1503A	Cyber Security	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS:								
7.	IT1503A	Computer Networks Laboratory	PC	4	0	0	0	2
TOTAL				27	21	0	4	21

SEMESTER -VI

SL.NO	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1601A	Cyber Forensics	PC	5	3	0	2	4
2.	CB1602A	Artificial Intelligence	PC	5	3	0	2	4
3.		Open Elective – I*	OE	3	3	0	0	3
4.		Professional Elective III	PE	3	3	0	0	3
5.		Professional Elective IV	PC	3	0	0	4	3
6.		Professional Elective V	PE	3	3	0	0	3
7.		Artificial Laboratory	PC	4	0	0	4	2
TOTAL				26	18	0	8	22

SEMESTER-VII

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	GE3791A	Professional Ethics	HSMC	2	2	0	0	2
2.		Elective Management	HS	0	3	3	0	3
3.		Machine Learning	PC	5	3	0	2	4
4.		Open Elective – II**	OE	3	3	0	0	3
5.		Professional Elective VI	PE	3	3	0	0	3
6.		Professional Elective VII	PE	3	3	0	0	3
PRACTICALS:								
7.		Summer internship	EEC	0	0	0	0	2
TOTAL				16	17	3	2	20

SEMESTER-VIII

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
PRACTICALS:								
1.	CS1801A	Project Work/Internship	PC	20	0	0	20	10
TOTAL				20	0	0	20	10

TOTAL NO. OF CREDITS: 165

HS1101A

TECHNICAL ENGLISH

L T P C

3 0 0 3

COURSE OBJECTIVES:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Nurture their ability in technical writing like to prepare professional job applications and effective reports.
- Develop their speaking skills by participating in various speaking activities.
- Strengthen their listening skill to comprehend lectures and talks in their areas of specialization.
- Improve their ability to explicit their excellence in all modes of technical communication.

UNIT I

9

Reading- Reading short texts Listening- Listening to different formal / informal conversations Writing- Instructions, Jumbled sentences Speaking- Self introduction Language development- Parts of speech, Prepositions Vocabulary development- Word formation- root words from foreign language and their use in English.

UNIT II

9

Reading-Skimming and Scanning to find specific information Listening- Listening to INK talks Writing- Job Application – cover letter, resume writing Speaking- Asking and Giving directions Language development- Conjunctions, Types of Nouns Vocabulary development- Prefixes and Suffixes.

UNIT III

9

Reading- Reading for predicting the content Listening- Listening to situational short talks Writing- Types of paragraphs- Descriptive/Analytical/ compare and contrast Speaking- Mini presentations, Expressing greeting and thanks Language development- Adjectives, Numerical Adjectives, Conditional Clauses Vocabulary development- Homophones, Homonyms.

UNIT IV

9

Reading- Practice in speed reading Listening- Listening to short texts and fill the data Writing- Interpretation of Graphics / Information, Note making Speaking-Contributing for Group Discussion Language development- Active, Passive, Impersonal passive voice Vocabulary development- Definitions, Nominal Compounds.

UNIT V

9

Reading- Reading short stories Listening- Listening for note taking Writing- Report writing, E-mail Writing Speaking- Picture descriptions, Speaking in familiar situations Language development- Tenses Vocabulary development- British and American Vocabulary.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to

- Exhibit the memory of the previously learnt grammatical concepts and apply them in technical contexts.

- Indicate the professional proficiency by preparing the formal correspondence with global standards.
- Infer information and interrelate the technical and general texts.
- Relate verbal and technical information concisely with coherence and cohesion.
- Identify and construct appropriate statements representing the global situations.

TEXT BOOKS:

1. Richards, C. Jack. Interchange Students’ Book-2 New Delhi: CUP, 2015.
2. Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.
2. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011
3. Darlene Smith-Worthington, Sue Jefferson, Technical writing for Success, South-Western Cengage Learning, USA-2011
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007
5. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014
6. Swan Michael, Practical English Usage. Oxford University Press, Eighth impression 2002.

Recommended Websites

bbc.co.uk/1learning english
 oxfordonlineenglish.com/
 cambridgeenglish.org
 inktalks.com/talks/
 manageyourwriting.com

MA1101A	CALCULUS AND ITS APPLICATIONS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To understand the concepts of limits, continuity, differentiation and use it to find maxima and minima of functions of one variable.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations of first and second order that model in various engineering problems.
- To familiarize the student with functions of several variables that is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I	DIFFERENTIAL CALCULUS	12
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Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules
Maxima and Minima of functions of one variable.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER WITH APPLICATIONS

Basic concepts- Separable differential equations - Exact differential equations - Integrating factors - Linear differential equations - Bernoulli's equation - Geometric Applications- Orthogonal trajectories - Physical Applications - Simple electronic circuits-Newton law of cooling-Heat flow-Rate of decay of radioactive materials-Chemical reaction and solutions.

UNIT III DIFFERENTIAL EQUATIONS 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES 12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT V MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar co-ordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

- Acquire the basic concepts of differentiation rules to find the maxima and minima for function of one variable.
- Attain the knowledge of basic application problems involved in first order differential equation.
- Compute the solution of second order linear differential equations with constant coefficients.
- Explore the concept of ordinary derivatives into partial derivatives and apply them to find extreme values of the functions of two variables and series approximation of the function of two variables.
- Identify the double and Triple integration techniques over a region in two dimensional and three-dimensional geometry.

TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCES:

1. Bali,N.P., Goyal,M.,Watkins,C.,Advanced Engineering Mathematics, Laxmi Publications Pvt. Limited, 2007.
2. Boyce,W.E.,andDiPrima,R.C., Elementary Differential Equations and Boundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V., "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4. T.Veerarajan, Engineering Mathematics, Mc Grawhill Publications, New Delhi 2017.

PH1101A

APPLIED PHYSICS

L T P C

3 0 0 3

COURSE OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER

9

Elasticity- plasticity – Different Types of Stress and Strain- concept of stress-strain diagram and its application - three types of modulus of elasticity- Poisson's Ratio – Bending of beams- Expression for bending moment – young's modulus uniform and Non uniform bending : Theory and Experiment – I Shape girders – Torsional oscillation Theory and Experiment- Application of Elastic Materials.

UNIT II APPLIED OPTICS

9

Laser : characteristics of laser - Principle of spontaneous emission and stimulated emission – Laser action – Einstein A & B coefficients - Population inversion - Pumping – Basic requirement of laser – Types of laser : Nd-YAG and CO₂ – Applications : Welding , Drilling & Cutting – Medical field Fiber optics: Introduction- Principle and propagation of light – Numerical aperture and acceptance angle – classification of optical fibers – Losses in optical fibers(Qualitative) – Fiber optics communication system (Block Diagram) – Advantages with fiber optic communication system.

UNIT III THERMAL PHYSICS

9

Modes of heat transfer- thermal conduction, convection and radiation – Specific heat capacity- thermal conductivity- Newton's law of cooling - Searle's and Lee's disc methods: theory and experiment - conduction through compound media (series and parallel) – thermal expansion of solids, liquids and gases - Applications: heat exchangers, refrigerators and solar water heaters.

UNIT IV WAVE AND PARTICLE PHYSICS

9

Inadequacy of Classical Mechanics - Development of quantum theory- Planck's Black body radiation and Distribution Laws(Qualitative) – Compton Effect (Derivation) - De Broglie wavelength – properties of matter waves – Experimental Verification (G.P Thomson experiment) – Heisenberg's uncertainty principle - Schrodinger's wave equation – time dependent – time independent wave equations – physical significance of Wave function – applications: particle in a one dimensional potential box.

UNIT V CRYSTALLOGRAPHY

9

Single crystalline, polycrystalline and amorphous materials Lattice - unit cell- Crystal systems-Bravais lattices- Lattice planes- Miller indices- Interplanar- d- Spacing in cubic Lattice- calculation of number of atoms per unit cell – atomic radius – packing factor for SC, BCC, FCC and HCP structures- Crystal Defects – types.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

- The students will gain knowledge on the basics of properties of matter and its applications
- Use the concepts of waves and optical devices and their applications in Laser and fiber optics
- The students will understand the properties of thermal materials and its applications
- The students will get knowledge on advanced physics concepts of quantum theory and its application in one dimensional box

- The students will understand the different types of crystals structures and different crystal growth techniques.

TEXT BOOKS:

1. Gupta S.L. and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai Publishers, 2015.
2. R. K. Gaur and S.C. Gupta, Engineering Physics, Dhanpat Rai Publication (P) Ltd, New Delhi, 2014.
3. Bhattacharya, D.K. and Poonam, T. Engineering Physics, Oxford University Press, 2015.

REFERENCES:

1. C. Kittel , Introduction to Solid State Physics 8th Edition , Wiley Eastern Ltd,2004.
2. Halliday, D., Resnick, R. and Walker, J. Principles of Physics. Wiley, 2015.
3. Tipler, P.A. and Mosca, G. Physics for Scientists and Engineers with Modern Physics, W.H.Freeman, 2007.
4. Einstein coefficient calculation, <https://youtu.be/TvfiZHXUtXg>(Video lecture)
5. Lattice structures, <https://youtu.be/Rm-i1c7zr6Q>(Video lecture)

CY1101A

ENGINEERING CHEMISTRY

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To develop an understanding of the basic concepts of phase rule and its applications to single and Two component systems and appreciate the purpose and significance of alloys.
- It enables the students to gain information about Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells
- It deals with the information about the types of fuels, calorific value calculations and manufacture of solid, liquid and gaseous fuels.
- To impart knowledge about the nano materials synthesis, properties and applications

UNIT I WATER TREATMENT AND TECHNOLOGY

9

Introduction – characteristics, Water quality parameters -hardness– types, Determination-EDTA method, Alkalinity ,boiler feed water requirements-boiler troubles – scale & sludge -Caustic Embrittlement, boiler explosion -softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (phosphate, calgon, carbonate and colloidal conditioning methods) – desalination of brackish water –reverse osmosis.

UNIT II PHASE RULE AND ALLOYS

9

Phase rule: Introduction, definition of terms with examples, One Component System- water system,Sulphur,CO₂ system, Thermal Analysis and cooling curves, Reduced phase rule - Two Component Systems- classification – lead-silver system-problems. Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel.

UNIT III ENERGY SOURCES AND STORAGE DEVICES

9

Energy – Types – Non-renewable energy - Nuclear energy -renewable energy - solar energy conversion - solar cells. Introduction to Electrochemistry, Nernst Equation-Electrochemical cells – reversible and

irreversible cells –Cell construction and representation - Batteries -types of batteries – characteristics – construction and working of primary battery (dry cell) - secondary battery(lithium-ion-battery) - fuel cells (H₂-O₂).

UNIT IV FUELS AND COMBUSTION

9

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal- analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) – petroleum- manufacture of synthetic petrol (Bergius process)- knocking- octane number – diesel oil- cetane number – natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG) producer of fuels: introduction- theoretical calculation of calorific value- ignition temperature- explosive range – flue gas analysis (ORSAT Method).

UNIT V NANOCHEMISTRY

9

Basics - distinction between nanoparticles and bulk materials; size- dependent properties, Nano cluster, Nano rod, nanotube(CNT)-Types of CNT and nanowire. Synthesis: precipitation, thermolysis, chemical vapour deposition, Properties, Characterization and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

- Explain the hardness of water, related problems and its treatment.
- Apply phase rule to construct phase diagram and predict the low melting alloys.
- Illustrate conventional and non-conventional energy sources and basics of electrochemistry, Types of batteries, their reactions and the importance.
- Explain various fuels and its applications based on its calorific value.
- Comprehend the basics, types, preparation methods and recent trends in nanomaterial.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd., New Delhi, 2010.

REFERENCES:

1. Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2010
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3. Ozin G. A. and Arsenault A. C., “Nanotechnology: A Chemical Approach to Nanomaterials”, RSC Publishing, 2005.

CS1101A

PROBLEM SOLVING AND PYTHON PROGRAMMING

L T P C

3 0 0 3

COURSE 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.

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 and 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 & TURTLE 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-Case study: Simple Graphics using Turtle: Draw a Random Pattern of Circle, Square and Rectangle; Draw a Pattern of Straight Lines, Plotting Graphs in Python: Menu Driven Program to Create Mathematical 3D Objects.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand the basic of algorithmic problem solving.
- Illustrate Python programs with data expressions and statements.
- Apply Python control flow and python functions
- Apply Python data structures like list, tuples and dictionaries.
- Implement file concepts to read and write data from/to files.

TEXT BOOKS:

1. Allen B. Downey, 'Think Python: How to Think Like a Computer Scientist', 2nd edition, Updated for Python 3.5, O'Reilly Publishers, 2016(<http://greenteapress.com/wp/thinkpython/>)
2. Reema Thareja, Problem Solving and Programming with python, 2nd edition, Oxford University press, 2019.
3. 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. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013.
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

4. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.

TA1101A TAMILAR THOZHIL NUTPAM/TAMILS AND TECHNOLOGY L T P C
0 0 1 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads Terracotta beads -Shell beads/ bone beads - Archeological evidences - Gem stone types described in Silappathikaram

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoempu of Chola Period, Animal Husbandry- Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண் பொடும் – மக.மக. பிள்மள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முமனவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – மவமக நதிக்கமரயில் ெங்ககொல நகர நொகரிகம் (ததொல்லியல் துமற தவளியீடு)
4. தபொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.

Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

BS1101A

PHYSICS AND CHEMISTRY LABORATORY

L T P C
0 0 4 2

PHYSICS LABORATORY

COURSE OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus by non-uniform bending method
3. Determination of wavelength, and particle size using Laser
4. Determination of acceptance angle in an optical fiber.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
7. Determination of wavelength of mercury spectrum – spectrometer grating
8. Determination of band gap of a semiconductor
9. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

CHEMISTRY LABORATORY

COURSE OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

LIST OF EXPERIMENTS (Any seven experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of TDS of water sample.
5. Determination of strength of acids in a mixture of acids using conductivity meter.
6. Estimation of iron content of the given solution using potentiometer.

7. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline / thiocyanate method).
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- Understand and apply fundamental concepts of mechanical properties analysis.
- Understand the fundamental principles of acoustic properties, and learn about semiconductor properties.
- Understand and learn about the fundamental principles of optical properties analysis.
- Apply hands-on knowledge in the quantitative chemical analysis of water.
- Carry out the basics of instrumental analysis-conductivity meter, and potentiometer.

	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	L	T	P	C
CS1102A		0	0	4	2

COURSE OBJECTIVES:

- To study python programs with conditionals and loops
- To use functions for python structured programs.
- Use strings for structuring Python programs.
- Represent compound data using Python lists, tuples and dictionaries.
- To read and write data from and to files in python.

LIST OF EXPERIMENTS:

1. Write a program to display the largest number among three numbers.
2. Write a program to display the Fibonacci series by using looping constructs.
3. Write a function to compute the GCD of two numbers.
4. Explore String Functions
5. With the help of strings, array or list, display a simple calendar in python program without using the calendar module.
6. With the help of list perform linear search and Binary search.
7. Write a program to perform Selection sort, Insertion sort, Merge sort
8. Create a text file using python file I/O. Read the content of the file and change them from lower to upper case characters.
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file
11. Simulate bouncing ball using Pygame

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE: Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Design simple programs using conditionals and loops.

- Implement functions to solve mathematical problems.
- Use strings for structuring Python programs.
- Summarize compound data using Python lists, tuples, and dictionaries.
- Implement file concepts to write programs to read and write datas.

GE 1201A

ENGINEERING PRACTICES LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13 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 household 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.
- Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

- Study of the joints in roofs, doors, windows and furniture.
- Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

- Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
- Gas welding practice

Basic Machining:

- Simple Turning and Taper turning
- Drilling Practice

Sheet Metal Work:

- Forming & Bending:
- Model making – Trays and funnels.
- Different type of joints.

Machine assembly practice:

- Study of centrifugal pump
- Study of air conditioner

Demonstration on:

- Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
- Foundry operations like mould preparation for gear and step cone pulley. (c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP -B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

- Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- Fluorescent lamp wiring.
- Stair case wiring
- Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
- Measurement of energy using single phase energy meter.
- Measurement of resistance to earth of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

- Study of Electronic components and equipments – Resistor, colour coding measurement of AC Signal parameter (peak-peak, rms period, frequency) using CR.
- Study of logic gates AND, OR, EX-OR and NOT.
- Generation of Clock Signal.
- Soldering practice – Components Devices and Circuits – Using general purpose PCB. 5. Measurement of ripple factor of HWR and FWR.

TOTAL PERIODS : 60

COURS OUTCOMES:

On successful completion of this course, the student will be able to

- Fabricate carpentry components and pipe connections including plumbing works.
- Use welding equipments to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings 6. Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

CI1101A

INDIAN CONSTITUTION

L	T	P	C
2	0	0	0

Prerequisites: Basic law.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India have played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

HS1201A

ENGLISH FOR COMMUNICATION

L T P C
3 0 0 3

COURSE OBJECTIVES:

- Improve their language ability to improve the four basic skills of communication (LSRW).
- Enhance the skills and methods to enrich their reading and comprehending ability.
- Strengthen their skills to listen to the lectures and talks related to their fields of studies.
- Foster their ability to write effectively in all contexts.
- Cultivate their oral presentation skills through technical presentations and contribution in group discussions.

UNIT I

9

Reading- Reading for detailed comparison Listening- Listening to interviews Writing- Developing hints, summarizing Speaking- Talk about future plans, arrangements intensions Language development- Sentence structures Vocabulary development- Synonyms, Antonyms, Adverbs

UNIT II

9

Reading-Extended reading Listening- Listening to telephonic conversations Writing- Formal Letter Writing - Letters for bona fide certificate - to the principal for permission for in plant training, industrial visit, paper presentations, inter college events, Letter to the Editor, Recommendations Speaking- Formal conversation Language development-Use of Punctuation, Modal verbs Vocabulary development- One word substitutes, Common Phrasal verbs

UNIT III

9

Reading- Identify topic sentences by reading a passage Listening- Listening to TED talks Writing- Process/product description Speaking- Formal Conversations Language development-Relative Clauses, Concord, Error correction Vocabulary development- Idioms & Phrases, Minimal pair.

UNIT IV

9

Reading- Reading newspaper articles Listening- Listening to inspirational speeches Writing- Essays, Checklist Speaking- Technical Presentations Language development- Degrees of Comparison Vocabulary development- Articles, Cause and Effect Expressions

UNIT V

9

Reading- Close reading Listening- Listening for summarizing Writing- Dialogue conversations Speaking- Movie/ Book Review Language development- Wh Questions, Yes/ no Questions Vocabulary development- Foreign Expressions and its applications, Reference words

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to:

- Sketch brief technical and general texts using appropriate diction.
- Express various styles of drafts in formal and informal contents.
- Inter relate the verbal and technical skills in the given technical contexts.
- Construct meaningful utterances to present intense technical knowledge.
- Interpret key ideas by reviewing lexicon across the language in syntactical contexts.

REFERENCES:

1. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
3. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
4. Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013
5. Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning USA: 2007.

RECCOMENDED WEBSITES:

TED.com

learningenglish.voanews.com

islcollective.com

examenglish.com

englishclass101.com

MA1201A

COMPLEX VARIABLES AND TRANSFORMS

L T P C

3 1 0 4

COURSE OBJECTIVES:

- Understand the concept of Divergence and curl and use it in evaluating Line, Surface and Volume integrals.
- Understand C-R equations and use it in the construction of Analytic Functions.
- Understand the methods of Complex Integration using Cauchy's Integral Formula and Cauchy Residue theorem, finding Taylor's and Laurent's Series expansions.
- Find the Laplace Transforms of standard Functions and to find the Inverse Laplace Transform of a function and use it in solving Differential Equations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems

UNIT I VECTOR CALCULUS

12

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral – Area of a curved surface – Volume integral – Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals-simple applications involving cubes and rectangular parallelopeds.

UNIT II ANALYTIC FUNCTIONS

12

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions ($w = z$, $w = z^2$, $w = e^z$, $w = \sinh z$, $w = \cosh z$) – Bilinear transformation.

UNIT III COMPLEX INTEGRATION.

12

Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT IV LAPLACE TRANSFORMS

12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS

12

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, the student will be able to

- Understanding the concept of divergence and curl to calculate the line, surface and volume integrals using vector integration.
- Solve the problems under analytic functions and construction of analytic function using C-R equation.
- Classify the singularities and pole, find residues and evaluate complex integrals using residue theorem.
- Understand the concepts of Laplace Transforms and its properties and to solve the differential equations.
- Using the properties of Z-transform and solve the difference equation.

TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCES:

1. Bali, N.P., Goyal, M., Watkins, C., Advanced Engineering Mathematics, Laxmi Publications Pvt. Limited, 2007.
2. Boyce, W.E., and DiPrima, R.C., Elementary Differential Equation and Boundary Value Problems, Wiley India, 2012.
3. O'Neil, P. V. "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4. T. Veerarajan, Engineering Mathematics, Tata Mcgraw Hill publications co. ltd, New Delhi, 2017.

COURSE OBJECTIVES:

- To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity –Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory –Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states –carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination –Elemental and Compound Semiconductors – N-type and P-type semiconductor (Qualitative) – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism –Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials –Ferrites and its applications. Electro static Discharge (ESD)-Superconductivity: properties – Type I and Type II superconductors–BCS theory of superconductivity (Qualitative) - High Tc superconductors – Electrical, medical, magnetic and computer application of superconductors.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarisation – Clausius mosotti relation - dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer).

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses - melt spinning process, applications - shape memory alloys: Ni-Ti alloy, applications – nano materials: preparation (bottom up and top down approaches), properties and applications- Bio materials – introduction- properties of bio materials-examples- medical applications- Ophthalmology- bio sensors- characteristics.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of the course, students would:

- Understand the fundamental principles of conducting materials and analyze their behavior under varying temperature conditions.
- Gain knowledge on semiconductor physics, including carrier concentration, and apply it to the design and analysis of semiconductor devices.
- Understand the properties of magnetic and superconducting materials, and apply their concepts in practical engineering systems
- Gain knowledge on polarization mechanisms in dielectric materials and its applications
- Understand the properties and applications of advanced nano materials and biomaterials for various engineering applications.

TEXT BOOKS:

- S.Mohan, Principles of Materials Science, MJP Publishers, 2018.
- Jasprit Singh, Semiconductor Devices, Basic Principles, Wiley 2012.
- Umesh K Mishra and Jasprit Singh, Semiconductor Device Physics and Design, Springer, 2008.

REFERENCES:

1. Wahab, M.A. Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009.
2. William D. Callister Jr, David G. Rethwisch, Materials Science and Engineering, An Introduction, Wiley India (P) Ltd., 8th Edition, 2009.
3. Pillai S.O., Solid State Physics, New Age International (P) Ltd., Publishers, 2009.
4. Semiconductor Introduction, <https://youtu.be/k6ZxP9Yr02E>(Video lecture)
5. Superconductivity, <https://youtu.be/D-9M3GWOBw>(Video lecture)

EE1202A	BASIC ELECTRICAL, ELECTRONICS & MEASUREMENT ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them
- To study the basic principles of electrical machines and their performance
- To study the different energy sources, protective devices and their field applications
- To understand the fundamentals of electronic circuit constructions
- To understand the principles and operation of measuring instruments and transducers

UNIT I ELECTRICAL CIRCUITS ANALYSIS 9

Ohms Law, Kirchhoff's Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems –Thevenin's theorem, Norton theorem and superposition theorem, three phase supply-Instantaneous, Reactive and apparent power-star delta conversion.

UNIT II ELECTRICAL MACHINES 9

DC and AC rotating machines: Types, Construction, principle, Emf and torque equation, application - Speed Control- Basics of Stepper Motor – Brushless DC motors- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation

UNIT III UTILIZATION OF ELECTRICAL POWER 9

Overview of "Renewable Energy Sources". (Wind and Solar). Illumination by lamps- Energy Saving lamps (Compact Fluorescent Lamp, Cold Cathode Tube, LED bulbs). Domestic refrigerator and air conditioner-Electric circuit, construction and working principle. Li-Ion Battery's Operation & Maintenance. Protection-need for earthing, fuses and circuit breakers – MCB, RCB and ELCB. Energy Tariff calculation for domestic loads.

UNIT IV ELECTRONIC CIRCUITS 9

Introduction to Electron Devices – PN Junction diode, Zener Diode, Transistor)-. Op-amps- Amplifiers, differentiator, integrator, ADC, DAC. Multi vibrator using 555 Timer IC. Voltage regulator IC using LM 723, LM 317.

UNIT V ELECTRICAL MEASUREMENT 9

Characteristics of measurement-errors in measurement, torque in indicating instruments- moving coil and moving iron meters, Energy meter and watt meter. Transducers- classification- RTD, Strain gauge, LVDT, LDR and piezoelectric. Functional Block diagram of DSO

TOTAL: 45 PERIODS**COURSE OUTCOMES:****At the end of the course, students would:**

- Understand and analyse the fundamental laws & electrical network theorems
- Gain knowledge on DC & AC static and rotating machines
- Gain knowledge on renewable energy sources, various electrical protective devices
- To understand the fundamentals of electronic circuits
- To gain knowledge on the working principle & operation of measuring instruments and transducers

TEXT BOOKS:

1. D.P. Kothari and I.J Nagrath, Basic Electrical and Electronics Engineering, McGraw Hill, 2016, Third Edition.
2. M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronic Engineering, Oxford, 2016.

REFERENCES:

1. S.B. LalSeksena and Kaustuv Dasgupta, fundamentals of Electrical Engineering, Cambridge,2016.
2. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, Chand & Co, 2008.
3. S.K.Sahdev, Basic of Electrical Engineering, Pearson 2015.
4. John Bird,-Electrical and electronic principles and Technology, Fourth Edition, Elsevier, 2010.
5. Mittle, Mittal, Basic Electrical Engineering, 2nd edition, Tata McGraw-Hill Edition, 2016.
6. C.L.Wadhwa, “Generation, Distribution and utilization of Electrical Energy”, New Age international pvt ltd .2003.

CS1201A

PROGRAMMING IN C

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To develop C Programs using basic programming constructs.
- To develop C programs using arrays and strings.
- To develop applications in C using functions and pointers.
- To develop applications in C using structures.
- To do input/output and file handling in C.

UNIT I BASICS OF C PROGRAMMING

9

Introduction to programming paradigms - Structure of C program - C programming: Identifiers-Keywords-Data Types - Variables - Constants. Operators: Precedence and Associativity - Expressions-Input/ Output statements - Decision making statements - Switch statement - Looping statements - Pre-processor directives - Compilation process

UNIT II ARRAYS AND STRINGS

9

Introduction to Arrays: Declaration, Initialization - One dimensional array - Example Program: Computing Mean, Median and Mode - Two dimensional arrays - Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String- String operations – String Arrays.

UNIT III FUNCTIONS AND POINTERS

9

Introduction to functions: Function prototype,-function definition,- function call,- Built-in functions (string functions, math functions) - Recursion-Types of Recursion - Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions-Storage Classes - Pointers - Pointer operators - Null Pointers-Pointer arithmetic - Arrays and pointers - Array of pointers - Example Program: Sorting of names - Parameter passing: Pass by value, Pass by reference- Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES**9**

Structures-Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures – Union - Programs using structures and Unions, Enumerated data type-Dynamic Memory Allocation.

UNIT V FILEPROCESSING**9**

Files-Types of file processing: Sequential access, Random access- Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Payroll System and Transaction processing using random access files - Command line arguments

TOTAL: 45 PERIODS**COURSE OUTCOMES:****At the end of the course, students would:**

- "Understand the basic syntax and semantics of the programming language constructs"
- "Develop derived data types like arrays in solving problem"
- Solve a problem into modules and reconstruct it using various ways of user-defined functions
- Develop user-defined data types like structures and unions and its applications to solve problems.
- Design applications using sequential and random-access file processing.

TEXTBOOKS:

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2006

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh editin, Pearson Publication
2. Juneja, B.L and Anita Seth, "Programming in C", CENGAGE Learning India Pvt.Ltd., 2011
3. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996. C", McGraw-Hill Education, 1996.

TA1101A**TAMILAR MARABU/HERITAGE OF TAMILS****L T P C****0 0 1 1****UNIT I LANGUAGE AND LITERATURE****3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS**3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

UNIT IV THINAI CONCEPT OF TAMILS

3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature
- Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE

3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண் பொடும் – மக.மக. பிள்மள (தவளியீடு):
தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முமனவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – மவமக நதிக்கமரயில் ஁ங்ககொல நகர நொகரிகம் (ததொல்லியல் துமற தவளியீடு)
4. தபொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu)
(Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi)
(Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

- Importance of graphics in engineering applications –Use of drafting instruments – BIS conventions and specifications – Size and layout of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND ORTHOGRAPHIC PROJECTIONS**6+6**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization principles – Layout of views- Orthographic projection of multiple views(Free Hand Sketching) from pictorial views of objects Principal planes-Projection of points-Demo using CAD software for above topics.

UNIT II PROJECTION OF POINTS STRAIGHT LINES AND PLANE SURFACES 6+6

Orthographic projections-principles-Principal planes-First angle projection-Projection of points- Projection of straight lines (only First angle projections) inclined to one of the principal planes - Determination of true lengths and true inclinations - Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes - Demo using CAD software for above topics.

UNIT III PROJECTION OF SOLIDS**6+6**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method-Demo using CAD software for above topics.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+6

Sectioning of above solids in simple vertical position - the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones-Demo using CAD software for above topics.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+6 Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical

positions –Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method-Demo using CAD software for above topics.

TOTAL PERIODS:61

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

- Familiarize with the fundamentals and standards of Engineering graphics.
- Perform freehand sketching of basic geometrical constructions and multiple views of objects.
- Project orthographic projections of lines and plane surfaces.
- Draw projections of solids and development of surfaces. Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

- Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
- Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

● **REFERENCES:**

- Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
- Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
- Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
- Luzzader, Warren J. and Duff, John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
- N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University Press, New Delhi, 2015.
- Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

Publication of Bureau of Indian Standards:

- IS 10711 – 2001: Technical products Documentation – Size and layout of drawing sheets.
- IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering. 3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings. 4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings. 5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

- There will be five questions, each of either-or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100. 3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size. The examination will be conducted in appropriate sessions on the same day

CS1203A

PROGRAMMING IN C LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To develop programs in C using basic constructs.
- To develop programs in C using control statements.
- To develop applications in C using arrays, strings, pointers.
- To develop applications in C using functions, structures.
- To develop applications in C using file processing

LIST OF EXPERIMENTS

1. Input and Output statements.

2. Control statements – Branching & Looping.

- Write a C program to generate Pascal's triangle.
- Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
- Write a C program to find the sum of individual digits of a positive integer.
- A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
- Write a C program to generate the first n terms of the sequence.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- Write a C program to swap Numbers Using Temporary Variables.

3. Arrays

- Write a C program to search an array element using linear search.
- Write a C program to find both the largest and smallest number in a list of integers.
- Write a C program that uses functions to perform the following:
 - Addition of Two Matrices
 - Multiplication of Two Matrices
- Write a C program to implement Bubble Sort.

4. Strings

- Write a C program that uses functions to perform following operations
 - (i) To insert a sub-string in to given main string from a given position.
 - (ii) To delete n Characters from a given position in a given string.
- Write a C program to determine if the given string is a palindrome or not

5.Functions &Pointers:

- Write C programs that use recursive functions
 - (i) To find factorial of given number
 - (ii)To solve Towers of Hanoi Problem.
 - (iii)To swap the variables using call by value and call by reference.

6. Generate mark sheet of students using structures.

7. Compute Salary Slip for five employees using structures and functions Insert, Update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE:C compiler

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

- Develop C programs for simple applications making use of basic constructs
- Develop C programs for control statements.
- Develop C programs involving arrays, strings and pointers.
- Develop C programs involving functions, and structures.
- Design applications using sequential and random access file processing.

CY1201A	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- To understand nature and the facts about the environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of major ecosystem – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity – Biodiversity at global, national and local levels – India as a mega- diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

UNIT III NATURAL RESOURCES

10

Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water – Mineral resources: environmental effects of extracting and using mineral resources, case studies – Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – 12 Principles of Green chemistry, role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – central and state pollution control boards.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. Students will be able to understand the functions of ecosystems and appreciate the bio diversity.
2. Students will be able to know the measures to control environmental pollution.
3. Students will be able to understand the usage as well as the effects of over exploitation of natural resources.
4. Students will have knowledge about finding technological, economic and political solutions to environmental problems with various Environmental Protection Act in mind.
5. Students will be able to understand the interrelationship between population explosion and the environment and also role of IT in environment and human health.
6. Students will be able to understand that Environmental problems can only be solved by Public participation in all aspects and cannot be solved by mere laws.

TEXT BOOKS:

1. Environmental Science and Engineering by AnubhaKaushik and C.P.Kaushik-New Age International Publishers. New Delhi, 2017.

REFERENCES:

1. Benny Joseph, Environmental Studies, Tata mcgraw-Hill Publishing Company, Ltd., New Delhi, 2006.
2. Dr.B.S.Chauhan,. Environmental Studies, University Science Press, New Delhi, 2011.

MA1303A

DISCRETE MATHEMATICS

L T P C
3 1 0 4

(Common to second semester AIDS and third semester CSE/IT)

COURSE OBJECTIVES:

- To extend student's logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of Ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.

UNIT I LOGIC AND PROOFS

12

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT II SET THEORY

12

Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices and their properties – Sub lattices – Boolean algebra – Homomorphism.

UNIT III COMBINATORICS

12

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications

UNIT IV GRAPHS

12

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT V ALGEBRAIC STRUCTURES

12

Algebraic systems – Definitions-Examples-Properties-Semi groups and monoids–Homomorphism's-Groups – Subgroups – Normal subgroup and cosets – Lagrange's theorem – Codes and group codes – Basic notions of error correction-Error recovery in group codes.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

- Have knowledge of the concepts needed to test the logic of a program.
- Be aware of the counting principles.
- Learn the concepts of Graph Theory that would help them to define new levels of networks which are implemented in AI and ANN.
- Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.
- Be Expose the concepts and properties of Lattices and Boolean algebra used in Coding and Decoding theory of Cryptography.

TEXTBOOKS:

1. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw
2. Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.

TOTAL: 45 PERIODS

TEXTBOOKS

1. M. Morris Mano, Michael D. Ciletti, “Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog”, Sixth Edition, Pearson Education, 2018.
2. David A. Patterson, John L. Hennessy, “Computer Organization and Design, The Hardware/Software Interface”, Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

REFERENCES

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw-Hill, 2012.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, “Digital Logic and Computer Design”, Pearson Education, 2016.

IT1301A

OBJECT ORIENTED PROGRAMMING

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS

9

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java –Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays, Packages.

UNIT II INHERITANCE AND INTERFACES

9

Inheritance–Superclasses-subclasses–Protectedmembers–constructors in subclasses-the Object class–abstract classes and methods –final methods and classes–Interfaces–defining an interface, implementing interface, differences between classes and interfaces and extending interfaces-Object cloning-inner classes, Array Lists-Strings

UNIT III EXCEPTION HANDLING AND I/O

9

Exceptions-exception hierarchy-throwing and catching exceptions –built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics–Streams–Byte streams and Character streams–Reading and Writing Console–Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING

9

Understanding Threads, Thread Priorities, Synchronizing Threads, Thread lifecycle, Inter-thread communication. Generic Programming–Generic classes–generic methods–Bounded Types–Restrictions and Limitations-Introduction to JDBC, JDBC Drivers and Architecture, Accessing Database with JDBC.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes -actions - mouse events - Introduction to Swing –Swing GUI Components – Text Fields , Text Areas – Buttons- Check Boxes –Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes. Swing packages-Swing Control classes and Methods.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Develop Java programs using OOP principles.
- Develop Java programs using inheritance, interfaces.
- Build Java applications using Exceptions and I/O streams.
- Develop Java applications with Threads, generics classes and JDBC
- Develop interactive Desktop application using Swing and JDBC.

TEXT BOOKS:

1. Herbert Schildt, Java The complete reference, 8th Edition, McGraw Hill Education, 2011.
2. CayS.Horstmann, Gary Cornell, Core Java Volume–I Fundamentals, 9th Edition, Prentice Hall, 2013.

REFERENCES:

1. Paul Deitel, Harvey Deitel, Java SE8 for programmers, 3rd Edition, Pearson, 2015.
2. Steven Holzner, Java2Blackbook, Dream tech press, 2011.
3. Timothy Budd, Understanding Object-oriented programming with Java Updated Edition, Pearson Education, 2000.

CS1301A	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Study the concepts of ADTs
- To Acquire linear data structures – lists, stacks, and queues
- To learn non-linear data structures and apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms

UNIT I LINEAR DATA STRUCTURES – LIST 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists-doubly-linked lists – circularly-linked list-applications of lists –Polynomial Manipulation.

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 9

Stack ADT – Operations – Evaluating arithmetic expressions- Other Applications-Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue –Double Ended Queues – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES 9

Introduction to Tree ADT – Implementations of trees- Binary Tree ADT -tree traversals -expression trees — binary search tree ADT –Threaded Binary Trees- AVL Trees –Multi-way Search Trees-B-Tree – B+ Tree- Heap-Priority Queue.

UNIT IV GRAPHS AND HASHING**9**

Graph and their representations-Graph Traversal Techniques: Breadth First Search (BFS) and Depth First Search (DFS)-Topological Sort- Hashing- Hash Functions – Collision in hashing-Separate Chaining – Open Addressing-Rehashing-Applications of Hashing.

UNIT V SEARCHING AND SORTING**9**

Searching- Linear Search – Binary Search. Sorting – Bubble Sort – Selection Sort – Insertion Sort – Quick Sort-Merge Sort-Shell Sort – Radix Sort-Heap Sort.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of the course, the students should be able to:

- Apply the concept and operations of List ADT.
- Understand and apply the concept and operations of Stack and Queue ADT
- Demonstrate the various Tree ADT and its Applications
- Apply Graph data structures and hashing concept in real-world scenarios
- Interpret the implementation of sorting and searching

TEXT BOOKS:-

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 1997.
2. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2011

REFERENCES:-

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

CS1302A**SOFTWARE ENGINEERING****L T P C****3 0 0 3****COURSE OBJECTIVES:**

- To understand the basic concepts of software engineering applied in developing various software development life cycle models and agile process models.
- Understand the software requirements and the SRS documents for software projects.
- Understand the software design engineering, user-interface design and component level design.
- Learn various testing approaches applied in software development.
- Learn the methods of software project management: estimation, scheduling, planning and software risk management.

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT**9**

Introduction: The Nature of Software, Software Engineering, The Software Process, Software Engineering practice, Software Myths, Process models: Prescriptive Process Perspective and Specialized

Process Models, Agile development: Introduction to Agility - Agile Process Models: Scrum, Dynamic system development and Agile unified process-Tool Set for the Agile Process- Extreme programming-XP Process

UNIT II REQUIREMENT ENGINEERING PROCESS AND MODELING 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management. Requirements Modeling: Behavior, patterns, and web/mobile apps, Case Study: SRS-Library Management, Student Fee Registration Details.

UNIT III SOFTWARE DESIGN 9

Design engineering: Design Process, Design Concepts, Design Model. Architectural design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Architectural Mapping using Data Flow. User-Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps. Component level Design: Designing Class based components-Component-Level Design for WebApps and Mobile Apps.

UNIT IV TESTING STRATEGIES 9

Software testing strategies: A Strategic Approach to Software Testing, Test Strategies for Conventional Software and Object Oriented Software, Validation Testing, White- Box Testing, Basis Path Testing, Black-Box Testing, System Testing. Software Implementation Techniques: Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

UNIT V PROJECT AND RISK MANAGEMENT 9

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, Risk management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, RMMM, RMMM Plan-Case Study: Risk Management-Manufacturing Company, Banks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- Develop the project by adopting suitable lifecycle models.
- Determine an appropriate process model depending on the user requirements
- Identify the suitable software design with appropriate user and component level design.
- Apply a suitable testing strategy for the designed software product.
- Apply appropriate project estimation techniques and manage the risk.

TEXT BOOKS:

1. Roger S. Pressman, “Software Engineering - A Practitioner’s Approach”, 6th Edition, TMH, 2010.
2. Sommerville, “Software Engineering”, 9th Edition, Pearson Education, 2011.

REFERENCES:

1. K.K.Agarwal & Yogesh Singh, “Software Engineering”, 3rd Edition, New Age International Publishers, 2008.
2. Shely Cashman Rosenblatt, “System Analysis and Design”, 2nd Edition, Thomson Publications, 2011.
3. Pankaj Jalote, “An Integrated Approach to Software Engineering”, 3rd Edition, Narosa Publishing House, 2011.

IT1302A

OBJECT ORIENTED PROGRAMMING LABORATORY

L T P C
0 0 4 2

COURSE OBJECTIVES:

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, array list, exception handling and file processing.
- To develop applications using generic programming and event handling

LIST OF EXPERIMENTS

1. Develop a java application using classes & objects
2. Develop a java application using packages.
3. Develop a java application using Inheritance.
4. Design a Java interface for ADT Stack. Provide necessary exception handling.
5. Write a program to perform string operations using Array List. Write functions for the following
 - a. Append-add at end
 - b. Insert-add at particular index
 - c. Search
 - d. List all string starts with given letter.
6. Write a Java Program to create an abstract class named and demonstrate polymorphism.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a filename from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implement multi-threading.
10. Write a java program to create generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.
 - a) Decimal manipulations
 - b) Scientific manipulations
12. Develop a simple student database management system using event-driven and concurrent programming paradigms of Java. Use JDBC to connect a back-end database.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE:Java

TOTAL: 60 PERIODS

COURSE OUTCOMES:

- Develop and implement Java programs for simple applications that make use of classes, packages, inheritance and interfaces.
- Develop and implement Java programs with array list and exception handling
- Develop and implement Java programs using the concept of Multithreading.
- Design and develop the applications using file processing, generic programming.
- Design and develop the applications using event handling mechanism.

L T P C

CS1303A

DATA STRUCTURES LABORATORY

0 0 4 2

COURSE OBJECTIVES:

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph algorithms
- To get familiarized to sorting, searching and hashing algorithms

LIST OF EXPERIMENTS

1. Array implementation of List ADT
2. Implement the following data structures
Singly Linked List & Doubly Linked List
3. Array implementation of Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Search Trees
6. Implementation of AVL Trees
7. Implementation of heaps using priority queues.
8. Programs for implementation of graph traversals
BFS & DFS
9. Implementation of searching algorithms
10. Implementation of Insertion Sort, Merge Sort, Quick Sort and Heap Sort algorithms
11. Programs to implement hashing
Separate Chaining & Open Addressing

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE:C compiler

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Demonstrate appropriate operations and applications of Linear datastructures(List, Stack and Queue) using array
- Examine functions to implement operations of Linear datastructures(List, Stack and Queue) using Linked List
- Determine the different operations of various Trees
- Apply graph traversal algorithms and techniques
- Examine various sorting, searching and hashing algorithms

HS1301A

INTERPERSONAL SKILLS LABORATORY

L T P C

0 0 2 1

OBJECTIVES: The Course will enable learners to:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills.

- Make effective presentation.

UNIT I COMMUNICATION 6

Listening As A Key Skill- Its Importance- Speaking- Give Personal Information- Ask For Personal Information- Improving Pronunciation- Pronunciation Basics- Taking Lecture Notes- Preparing To Listen To A Lecture- Listen to TED/INK Talks - Articulate A Complete Idea.

UNIT II INTERPERSONAL SKILLS 6

Interpersonal Skills- Nurturing- Empathetic- Self-Control- Patient- Sociability- Warmth- Social Skills- Team Work-Work Ethic- Willing To Work- Initiative- Self-Motivated – Integrity.

UNIT III SPEAKING NUANCES 6

Factors Influence Fluency- Deliver A Five-Minute Informal Talk- Greet- Respond To Greetings-Describe Health And Symptoms-Invite And Offer- Accept- Decline- Take Leave- Listen For And Follow The Gist- Listen For Detail – Book/ Movie/Newspaper Articles Review

UNIT IV GROUP DISCUSSION 6

Being An Active Listener: Giving Verbal And Non-Verbal Feedback- Participating In A Group Discussion- Asking And Getting Clarifications-Summarizing Academic Readings And Lectures- Conversational Speech- Listening To And Participating In Conversations- Persuade.

UNIT V PRESENTATIONS 6

Formal And Informal Talk- Listen To Follow And Respond To Explanations, Directions And Instructions In Academic And Business Contexts- Strategies For Formal Presentations And Interactive Communication- Group/Pair Presentations.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- Illustrate the communication skills in articulating a complete idea with a clarity in pronunciation
- Demonstrate Interpersonal skills with a willingness to work in team following the social work ethics
- Relate the speaking ability to respond in any informal talk detailing the content of the information in any form
- Participate in group discussions expressing active listening and reading skills to persuade the group to the desired target
- Make effective formal presentations and interactive communication in any academic and business contexts

TEXT BOOKS:

1. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
2. Richards, C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES:

1. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
5. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013

WEBSITES:

<https://learnenglish.britishcouncil.org/skills/listening>
<https://agendaweb.org/listening-exercises.html>
<https://www.bbc.com/>
<https://placement.freshersworld.com>
<https://ielts-up.com>
www.learnenglishteens.britishcouncil.org

MA1408A	Statistics Techniques and Numerical Methods	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals in real life situations.
- To introduce the numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS 12

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS 12

ANOVA One way and two way classifications - Completely randomized design – Randomized block design- Latin square design - 2²factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi’s method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 12

Lagrange’s and Newton’s divided difference interpolations – Newton’s forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson’s 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods: Taylor’s series method - Euler’s method - Modified Euler’s method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne’s and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.

- Understand the knowledge of numerical techniques of interpolation and error approximation in various intervals in real life situation
- Apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012. 6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.
6. Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.
7. SankaraRao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi, 2007.
8. Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

CB1401A	OPERATING SYSTEMS AND SECURITY (Lab Integrated)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To understand the basic concepts of Operating Systems.
- To explore the process management concepts including scheduling, synchronization, threads and deadlock.
- To understand the memory, file and I/O management activities of OS.
- To understand the requirements of a trust model.
- To learn how security is implemented in various operating systems.

UNIT I OPERATING SYSTEM OVERVIEW 9

Computer-System Organization – Architecture – Operating-System Operations – Resource Management – Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services – System Calls – System Services – Why Applications Are Operating System Specific – Operating-System Design and Implementation - Operating-System Structure – Building and Booting an Operating System .

UNIT II PROCESS MANAGEMENT 9

Process Concept – Process Scheduling – Operation on Processes, Inter-process Communication – Threads – Overview – Multithreading models – Threading issues; CPU Scheduling – Scheduling criteria,

Scheduling algorithms; Process Synchronization – critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT III MEMORY MANAGEMENT AND FILE SYSTEMS 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation – Virtual Memory – Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management

UNIT IV SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS 9

Security Goals – Trust and Threat Model – Access Control Fundamentals – Protection System – Reference Monitor – Secure Operating System Definition – Assessment Criteria – Information Flow – Information Flow Secrecy Models – Denning’s Lattice Model – Bell LaPadula Model – Information Flow Integrity Models – Biba Integrity Model – Low-Water Mark Integrity – Clark Wilson Integrity

UNIT V WINDOWS vs LINUX SECURITY 9

Introduction to Operating System Security, Access Control Models, Unix-Authentication and Authorization, Operating System Security Mechanisms, Malware and Threat Analysis, Secure Software Development, Network Security and OS, File System Security

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS:

- 1) a) Basics of UNIX commands and shell programs Understand and practice Linux permissions, special permissions and authentication (various options of chmod, setuid, setgid) b) Simple Shell Programs
2. Write programs using the following system calls of UNIX operating system a. fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to implement the various CPU Scheduling Algorithms 4. Implementation of Semaphores
5. Implementation of Shared memory
6. Bankers Algorithm for Deadlock Detection & Avoidance
7. Implementation of the following Memory Allocation Methods for fixed partition a) First Fit b) Worst Fit c) Best Fit
8. Implementation of the following Page Replacement Algorithms
a) FIFO b) LRU c) LFU
9. Program to demonstrate the working of Bell LaPadula Model and Biba Integrity Model 10. Setting up access control lists of files and directories and testing the lists in Linux 11. Learn to enable and disable address space layout randomization
12. Develop a lab exercise that involves configuring access control lists (ACLs) on a file system. What challenges might students face in ensuring proper access rights, and how can these be addressed?
13. Set up a firewall and configure rules to protect a network. How do the rules affect inbound and outbound traffic?

TOTAL 30 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE: C / C++ / Java

COURSE OUTCOMES:

At the end of this course, the students will be able:

CO1: Gain understanding on the concepts of Operating Systems.

CB1402A

SOFTWARE SECURITY ENGINEERING

L T P C
3 0 0 3

COURSE OBJECTIVES:

- Know the importance and need for software security.
- Know about various attacks.
- Learn about secure software design.
- Understand risk management in secure software development.
- Know the working of tools related to software security

UNIT I NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS 9

Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – Memory Based Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attacks .

UNIT II SECURE SOFTWARE DESIGN 9

Requirements Engineering for secure software - SQUARE process Model - Requirements elicitation and prioritization- Isolating The Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles.

UNIT III SECURITY RISK MANAGEMENT 9

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management

UNIT IV SECURITY TESTING 9

Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing – Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation - Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing .

UNIT V SECURE PROJECT MANAGEMENT 9

Governance and security - Adopting an enterprise software security framework - Security and project management - Maturity of Practice.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- At the end of the course, the students should be able to:
- Identify various vulnerabilities related to memory attacks.
- Apply security principles in software development.
- Evaluate the extent of risks.
- Involve selection of testing techniques related to software security in the testing phase of software development.
- Use tools for securing software

TEXT BOOKS:

1. Julia H. Allen, “Software Security Engineering”, Pearson Education, 2008
2. Evan Wheeler, “Security Risk Management: Building an Information Security Risk Management Program from the Ground Up”, First edition, Syngress Publishing, 2011

2. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Third Edition, McGraw Hill, 2014.

3. Narain Gehani and Melliyal Annamalai, “The Database Book: Principles and Practice Using the Oracle Database System”, Universities Press, 2012

CO's-PO's and PSO's MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	2	2	1	1	-	1	-	2	-	2	2			
CO 2	1	2	2	1	1	-	1	-	2	-	3	2			
CO 3	2	1	2	1	2	-	2	-	1	-	3	3			
CO 4	2	2	3	2	1	-	2	-	2	-	3	2			
CO 5	2	2	3	2	2	-	1	-	2	2	3	3			

CB1404A

CRYPTOGRAPHY AND INFORMATION SECURITY

L T P C
3 0 0 3

COURSE OBJECTIVES:

- Learn to analyze the security of in-built cryptosystems.
- Know the fundamental mathematical concepts related to security.
- Develop cryptographic algorithms for information security.
- Comprehend the various types of data integrity and authentication schemes • Understand cybercrimes and cyber security.

UNIT I INTRODUCTION TO SECURITY

9

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques, Transposition techniques, Steganography – Foundations of modern cryptography: Perfect security – Information Theory – Product Cryptosystem – Cryptanalysis.

UNIT II SYMMETRIC CIPHERS

9

Number theory – Algebraic Structures – Modular Arithmetic – Euclid’s algorithm – Congruence and matrices – Group, Rings, Fields, Finite Fields symmetric key ciphers: sdes – Block Ciphers – DES, Strength of DES– Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Pseudorandom Number Generators – RC4 – Key distribution.

UNIT III ASYMMETRIC CRYPTOGRAPHY

9

Mathematics of asymmetric key cryptography: primes – primality testing – factorization – euler’s totient function, fermat’s and euler’s Theorem – Chinese Remainder Theorem – Exponentiation and logarithm -

Asymmetric key ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve arithmetic – Elliptic curve cryptography.

UNIT IV AUTHENTICATION ALGORITHMS 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hashfunction: HMAC, CMAC – SHA – Digital signature and authentication protocols – DSS – Schnorr Digital Signature Scheme – ElGamal cryptosystem – Entity Authentication: Biometrics, Passwords, Challenge Response protocols – Authentication applications – Kerberos Mutual trust: Key management and distribution – Symmetric key distribution using symmetric and asymmetric encryption – Distribution of public keys – X.509 Certificates-PGP

UNIT V CYBER CRIME MANAGEMENT 9

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security- Dealing with Disaster –Emerging Technologies- the Law-International Laws- Cybercrime-Cyber Warfare and HomeLand Security.

COURSE OUTCOMES:

- Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
- Apply the different cryptographic operations of symmetric cryptographic algorithms CO3: Apply the different cryptographic operations of public key cryptography CO4: Apply the various Authentication schemes to simulate different applications. CO5: Understand various cyber crimes and cyber security.

TOTAL 45 PERIODS

TEXT BOOKS:

1. William Stallings, “Cryptography and Network Security – Principles and Practice”, Seventh Edition, Pearson Education, 2017.
2. Nina God bole, Sunit Belapure, “Cyber Security: Understanding Cyber crimes, Computer Forensics and Legal Perspectives”, First Edition, Wiley India, 2011.

REFERENCES:

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, “Cryptography and Network Security”, 3rd Edition, Tata Mc Graw Hill, 2015.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, “Security in Computing”, Fifth Edition, Prentice Hall, New Delhi, 2015.

HV1401A	UNIVERSAL HUMAN VALUES	L	T	P	C
		2	1	0	3

Universal Human Values : Understanding Harmony

COURSE OBJECTIVE:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family,

society and nature/existence

3. Strengthening of self-reflection.

4. Development of commitment and courage to act.

COURSE TOPICS:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

9

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

9

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human Relationship

9

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students’ lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence

9

as Coexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all pervasive space
21. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics 9

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. discuss the conduct as an engineer or scientist etc.

COURSE OUTCOMES:

- Understand the essentials of human values and skills, self-exploration, happiness and prosperity.
- Examine harmony in human being.
- Illustrate the role of harmony in family, society and universal order.
- Categorize the holistic perception of harmony at all levels of existence.
- Infer appropriate technologies and management patterns to create harmony in professional and personal lives.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE BOOKS:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad
 12. Vivekananda - Romain Rolland (English) 13. Gandhi - Romain Rolland (English)

CB1405A	DATABASE MANAGEMENT SYSTEMS AND SECURITY LABORATORY	L T P C 0 0 4 2
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COURSE OBJECTIVES:

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand attacks on databases and to learn to defend against the attacks on databases.
- To learn to store and retrieve encrypted data in databases

PRACTICAL EXERCISES:

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins.
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in database table.
9. Use SQLi to authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQLi attacks given in the previous exercise.
11. Write queries to insert encrypted data into the database and to retrieve the data using decryption.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Create databases with different types of key constraints.
- Write simple and complex SQL queries using DML and DCL commands. CO3: Realize database design using 3NF and BCNF.
- Use advanced features such as stored procedures and triggers.
- Secure databases and mitigate attacks on databases

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: Front end: VB/VC ++/JAVA or Equivalent Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent.

CB1406A

**CRYPTOGRAPHY AND INFORMATION SECURITY
LABORATORY**

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- Learn different cipher techniques.
- Implement the algorithms DES, AES, RSA and Diffie-Hellman.
- Implement hashing techniques such as SHA-1, MD-5.
- Develop a digital signature scheme.

LIST OF EXPERIMENTS

1. To implement the following cipher techniques to perform encryption and decryption
 - i) Caesar Cipher
 - ii. Playfair Cipher
 - iii. Hill Cipher
2. To implement the following transposition techniques
 - (i) Rail fence technique – Row major transformation
 - (ii) Rail fence technique - Column major transformation
3. To implement DES algorithm
4. To implement AES algorithm
5. To implement RSA Encryption algorithm
6. To implement the Diffie-Hellman Key Exchange mechanism. Consider one of the parties as Alice and the other party as bob.
7. To calculate the message digest of a text using the SHA-1 algorithm.
8. To calculate the message digest of a text using the MD-5 algorithm.
9. To implement digital signature standard

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Develop a code for classical encryption techniques.
- Build a symmetric and asymmetric algorithm.
- Construct a code for various Authentication schemes.
- Apply the principles of digital signature

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: C / C++ / Java or equivalent compiler

HARDWARE: Standalone desktops – 30 Nos. (or) Server supporting 30 terminals or more.

HS1401A

EMPLOYABILITY AND SOFT SKILLS LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

- Strengthen the Employability skills of students and develop their personality towards placement and career advancement.
- Improve the listening, speaking, reading and writing skills for comprehending and responding in academic, general and professional contexts.
- Develop students' critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.
- Enrich the Soft Skills of the students to interact with others harmoniously.

UNIT I SOFT SKILLS 6

Soft Skills- Interpersonal Skills - Professionalism- Courtesy-Manners - Workplace Etiquette- Business Etiquette-Flexibility- Positive Attitude- Responsibility-Teamwork- Time Management.

UNIT II EMPLOYABILITY SKILLS 6

Communication- Oral Presentation Practice.- Writing Skill Development- Presentation Skills -Listening Practice– Listening To Longer Technical Talks And Completing Exercises Based On Them- Enhancing Elements of Effective Communication- Motivation and Initiative- Leadership- Reliability/Dependability- Adaptability- Patience- Problem Solving- Negotiation and Persuasion.

UNIT III WRITING 6

Writing-Plan before writing-Develop a paragraph: Topic sentence, Supporting Sentences, Concluding sentence- Coherence Markers-Writing Narrative, Descriptive, Expository, and Persuasive Paragraphs.

UNIT IV READING 6

Reading- Reading different Genres -Collection and Organization of Ideas- Review of Books/ Newspaper Articles, Reading General and Technical Passages Writing: Email, Resume, Job Application, Technical Articles, Projects and Proposals.

UNIT V VERBAL APTITUDE & LOGICAL REASONING 6

Aptitude- Verbal Analogy- Error Spotting, Sentence Completion for Preparation for Higher Studies and Placement- Logical Reasoning- Critical Reading and Thinking- Understanding How The Text Positions The Reader- **Writing-** Statement of Purpose- Letter of Recommendation- Vision Statement.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- Write for different purposes in general and technical context skills in articulating a complete idea with a clarity in pronunciation
- Write formal job applications
- Excel in Verbal aptitude, read and evaluate texts logically to solve the puzzles.
- Develop and demonstrate the employability and soft skills.
- Display critical thinking in various professional contexts.

TEXTBOOK:

1. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011
2. Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011

SOFTWARE: Globearena (English Language Lab & Career Lab Software)

REFERENCES:

1. Davis, Jason and Rhonda LIss.Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012
3. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004
4. Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000
5. Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well and Knowing Why. Business & Professional Publishing: Australia, 2004

WEBSITES:(Any three/ four may be listed out)

<https://placement.freshersworld.com>

<https://www.examenglish.com>

<https://www.faceprep.in>

<https://www.fresherslive.com/online-test>

IT1501A

COMPUTER NETWORKS

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport Layer.

UNIT I INTRODUCTION AND PHYSICAL LAYER

9

Motivation-Goals of networking-Need for a layered architecture, Network hardware-Network software - Reference models - Network standardization, RS-232 over serial line - Guided Transmission media - Wireless transmission media

UNIT II THE DATA LINK LAYER

9

The Data Link Layer: Data link layer design issues – services provided to the network layer, Framing – Flow and error control :Error detection and correction - Elementary data link protocols – A simplex stop and wait protocol –stop and wait ARQ-Sliding window protocols, piggy backing - Wired LANs: Ethernet - Wireless LANs – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III THE NETWORK LAYER

9

Network layer design issues –Switching techniques, IP addressing modes- IPV4, IPV6 subnetting, Routing algorithms: Flooding, Distance vector and Link state routing, Hierarchical routing, Multicasting and broadcasting - Congestion control algorithms –Internetworking

UNIT IV THE TRANSPORT LAYER

9

Duties of Transport layer– Services – Port Numbers -Multiplexing -Demultiplexing-Congestion control, Internet transport protocols UDP, TCP, SCTP, Case Study: ATM protocols.

UNIT V THE APPLICATION LAYER

9

WWW and HTTP–FTP–Email–Telnet–SSH–DNS–SNMP.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Describe the basics of the network and discuss the functions of the physical layer.
- Summarize the basics of data flow from one node to another.
- Demonstrate the various services and protocols of the network layer.
- Determine the services of different transport layer protocols.
- Examine the working of various application layer protocols.

TEXTBOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH,2013.

REFERENCES:

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Students will be able to analyze the evolution of centralized and distributed computing, including cluster and grid computing concepts.
- Students will gain knowledge of network-based technologies and hardware relevant to distributed systems, including SOA, multi-core systems, and GPGPU data storage.
- Students will understand cloud computing issues, characteristics, architectures, and various service and deployment models.
- Students will analyze cloud access mechanisms, reliability, fault tolerance, and security aspects, including privacy and compliance.
- Students will acquire practical skills in programming with cloud platforms such as AWS, Azure, and Google App Engine, and understand Docker for containerization and orchestration.

TEXT BOOK :

1. Kshemkalyani Ajay D, Mukesh Singhal, “Distributed Computing: Principles, Algorithms and Systems”, Cambridge Press, 2011.
2. Mukesh Singhal, Niranjana G Shivaratri, “Advanced Concepts in Operating systems”, McGraw Hill Publishers, 1994.

REFERENCES :

1. George Coulouris, Jean Dollimore, Time Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.
2. Pradeep L Sinha, “Distributed Operating Systems: Concepts and Design”, Prentice Hall of India, 2007.
3. Tanenbaum A S, Van Steen M, “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.
4. Liu M L, “Distributed Computing: Principles and Applications”, Pearson Education, 2004.
5. Nancy A Lynch, “Distributed Algorithms”, Morgan Kaufman Publishers, 2003.
6. Arshdeep Bagga, Vijay Madiseti, “ Cloud Computing: A Hands-On Approach”, Universities Press, 2014.

CB1502A

INTERNET OF THINGS

L T P C
3 0 2 4

COURSE OBJECTIVES:

The student should be made to:

- To learn the internal architecture and programming of an embedded processor.
- To introduce interfacing I/O devices to the processor.
- To introduce the evolution of the Internet of Things (IoT).
- To build a small low-cost embedded and IoT system using Arduino/Raspberry Pi/ open platform.
- To apply the concept of Internet of Things in real world scenario.

UNIT I EMBEDDED, CYBER-PHYSICAL SYSTEMS AND IOT

9

Introduction, application areas, examples, Common characteristics, Challenges and design flows, Modeling of Embedded and Cyber Physical Systems - Requirements, models of computation, Finite State Machines, Timed Automata, State Charts, Modeling of Hierarchy; Data flow modeling , Discrete Event Modeling , Continuous and Discrete time system concepts.

UNIT II IOT COMPONENTS 9

Design - Choosing the components HW platforms - Processors, Sensors, Actuators; SW stack – RTOS, Scheduling Real Time control tasks, IoT Fundamentals - Devices, Gateway; Elements of IoT - IoT Functional blocks, IoT Communication Modules and API.

UNIT III NETWORKING AND COMMUNICATION PROTOCOLS 9

Basics of Networking, Machine-to-Machine interaction, IoT Communication Protocols MQTT, ZigBee, CoAP.

UNIT IV CLOUD SECURITY 9

Concept of Cloud Computing: Everything as a Service (XaaS), Role of Cloud; Software Components - Programming APIs; Cloud Security basics; IoT Application Development - Solution Framework for IoT.

UNIT V DEVELOPMENT OF IOT APPLICATIONS 9

Complete Design of IoT – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare. IoT. Advanced topics - Data Analytics for IoT, Fault Tolerance in IoT based Systems; IoT Security.

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS

1. Introduction to Arduino board/Raspberry Pi, IDE/OS and programming. 2. Interface LED/Buzzer with Arduino.
3. Interface LED Simulate Traffic light using Arduino.
4. Control LED brightness using potentiometer using Arduino.
5. Interfacing Servo motor with Arduino.
6. Interface DHT11 sensor with Arduino/Raspberry Pi and print temperature and humidity readings and upload the data to ThingSpeak cloud server.
7. Mobile App controlled LED using ESP8266 and ThingSpeak cloud server.
8. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
9. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity reading

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Explain the architecture of embedded processors.
- Write embedded C programs.
- Design simple embedded applications.
- Compare the communication models in IOT
- Design IoT applications using Arduino/Raspberry Pi /open platform

TOTAL :75 PERIODS

TEXT BOOK:

1. Peter Mardwel, Embedded System Foundations of Cyber Physical Systems Springer 2nd

REFERENCES:

1. E. A. Lee, SanjitSeshia Introduction to Embedded Systems – A Cyber–Physical Systems Approach. 2. Rajeev Alur, Principles of Cyber-Physical Systems.
2. Pethuru Raj and Anupama C. Raman (CRC Press) , The Internet of Things : Enabling Technologies, Platforms and Use Cases.

3. Arshdeep Bagha and Vijay Madiseti Internet of Things: A Hands-on Approach.
4. Research articles from Journals and Conference Proceedings. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
5. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, McGraw Hill 1997
6. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
7. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata McGraw Hill, 2004.
8. Larry Pyeatt, "Modern Assembly Language Programming with ARM processor", Elsevier

CB1503A

CYBER SECURITY

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COURSE OBJECTIVES:

The student should be made to:

- Learn to analyze the security of in-built cryptosystems.
- Know the fundamental mathematical concepts related to security.
- Develop cryptographic algorithms for information security.
- Comprehend the various types of data integrity and authentication schemes
- Understand cyber crimes and cyber security

UNIT I INTRODUCTION TO CYBER SECURITY 9

Introduction-Computer Security-Threats-Harm-Vulnerabilities-Controls-Authentication-Access Control and Cryptography-Web-UserSide-Browser Attacks-Web Attacks-Targeting-Users- Obtaining User or Website Data-Email Attacks.

UNIT II SECURITY IN OS & NETWORKS 9

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit – Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service Distributed Denial-of-Service.

UNIT III VULNERABILITY DETECTION AND COUNTER MEASURES 10

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems –Network Management-Databases-Security Requirements of Databases-Reliability and Integrity-Database Disclosure.

UNIT IV CYBERSPACE AND PRIVACY POLICIES 9

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

UNIT V CYBER CRIMES AND CYBER SECURITY 8

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security-Case study on Ransom ware attack and Online Banking security.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Summarize the basic concepts of Cyber Security
- Identify the security applications for operating system and networks
- Describe security detection and classify then various security countermeasures. ● Infer the various applicable Privacy principles and policies
- Identify cyber crimes and wireless security ,security planning and effective management of cyber security

TEXT BOOKS:

1. JanL.Harrington, "Network Security–A Practical Approach", Morgan Kaufmann Publishers–An Imprint of Elsevier, 2005.
2. William Stallings, "Cryptography and Network Security–Principles and Practice", Pearson Education Asia, Fourth Edition, 2005
- 3.

REFERENCE BOOKS:

1. Edward Amoroso, "Cyber Security", Silicon Press, 2006
2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition, Pearson Education, 2015
3. George K. Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013.
4. Martti Lehto, Pekka Neittaanmäki, Cyber Security: Analytics, Technology and Automation edited, Springer International Publishing Switzerland 2015
5. Nelson Phillips and Enfinger Stuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.
6. Introduction to Cyber Security available at <http://uou.ac.in/foundation-course>
7. Fundamentals of Information Security <http://uou.ac.in/progdetail?pid=CEGCS-17>
8. Cyber Security Techniques <http://uou.ac.in/progdetail?pid=CEGCS-17>
9. Cyber Attacks and Counter Measures: User Perspective <http://uou.ac.in/progdetail?pid=CEGCS-17>
10. Information System <http://uou.ac.in/progdetail?pid=CEGCS-17>

IT1503A

NETWORKS LABORATORY

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COURSE OBJECTIVES:

The student should be made to:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.
- To learn error detection and correction techniques

LIST OF EXPERIMENTS

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
Echo client and echo server, Chat, File Transfer
4. Simulation of DNS using UDP sockets.

5. Write a code simulating ARP /RARP protocols.
6. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms
7. Study of TCP/UDP performance using Simulation tool.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Performance evaluation of Routing protocols using Simulation tool.
10. Simulation of error correction code (like CRC).
11. Configuring Network Operating Systems and network devices

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- Illustrate the use of TCP and UDP protocols.
- Examine the performance of different transport layer protocols.
- Use simulation tools to determine the performance of various network protocols.
- Apply various routing algorithms.
- Demonstrate the use of simulation tools.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: 1. C / C++ / Java / Python / Equivalent Compiler 30.2. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent

CS1502A

THEORY OF COMPUTATION

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COURSE OBJECTIVES:

- To understand the language hierarchy.
- To construct automata for any given pattern and find its equivalent regular expressions.
- To understand the real time applications on automata theory.
- To design a context free grammar for any given language.
- To understand Turing Machine and their capability.
- To understand undecidable problems and NP class problems.

UNIT I AUTOMATA FUNDAMENTALS

9

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Equivalence of NFA and DFA – Finite Automata with Epsilon Transitions – Equivalence of NFA with epsilon transitions and NFA without Epsilon Transitions

UNIT II REGULAR EXPRESSIONS

9

Regular Languages – Regular Expressions – FA and Regular Expressions – Arden’s Theorem –Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata

UNIT III CONTEXT FREE GRAMMAR AND NORMAL FORMS

10

CFG – Parse Trees – Ambiguity in Grammars and Languages – Normal Forms for CFG- Chomsky Normal Form – Griebach Normal Forms- Pumping Lemma for CFL – Closure Properties of CFL – Conversion of normal forms to Regular Expression.

UNIT IV PUSH DOWN AUTOMATA AND TURING MACHINE 9

Definition of the Pushdown Automata – Instantaneous Descriptions – Languages of Pushdown Automata – Equivalence of Pushdown Automata and CFG -- Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABILITY 8

Language not recursively enumerable – Undecidable Problem with RE – RICE Theorem – Undecidable Problems about TM – Recursive and recursively enumerable languages - Post’s Correspondence Problem –The Class P and NP.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Construction Of DFA,NFA and ϵ -NFA and Regular expression for the languages
- Understand the concept of converting NFA to DFA, ϵ -NFA to DFA,automata to regular expressions and regular expression to automata
- Remembering pumping lemma for regular languages and context free languages
- Construct a CFG,Parse trees and PDA.
- Understand the working Principles of Turning Machine and Post correspondence problem.

TEXT BOOKS:

4. J.E.Hopcroft, R.Motwani and J.D Ullman, —Introduction to Automata Theory, Languages and Computations, Second Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. H.R.Lewis and C.H.Papadimitriou, —Elements of the theory of Computation, Second Edition, PHI, 2003.
2. J.Martin, —Introduction to Languages and the Theory of Computation, Third Edition, TMH, 2003.
3. MichealSipser, —Introduction of the Theory and Computation, Thomson Brokecole, 1997.
4. Laurel Brodkorb, -- The Entscheidungs problem and Alan Turing, 2019.
5. Deepak D’ Souza – Modern Applications of Automata Theory, 2021.

IT1503A

NETWORKS LABORATORY

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COURSE OBJECTIVES:

The student should be made to:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.
- To learn error detection and correction techniques

LIST OF EXPERIMENTS

- 12.Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.

13. Write a HTTP web client program to download a web page using TCP sockets.
14. Applications using TCP sockets like:
Echo client and echo server, Chat , File Transfer
15. Simulation of DNS using UDP sockets.
16. Write a code simulating ARP /RARP protocols.
17. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms
18. Study of TCP/UDP performance using Simulation tool.
19. Simulation of Distance Vector/ Link State Routing algorithm.
20. Performance evaluation of Routing protocols using Simulation tool.
21. Simulation of error correction code (like CRC).
22. Configuring Network Operating Systems and network devices

TOTAL: 60 PERIODS

COURSE OUTCOMES

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

- Illustrate the use of TCP and UDP protocols.
- Examine the performance of different transport layer protocols.
- Use simulation tools to determine the performance of various network protocols.
- Apply various routing algorithms.
- Demonstrate the use of simulation tools.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: 1. C / C++ / Java / Python / Equivalent Compiler 30.2. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent

CS1503A	OPERATING SYSTEMS LABORATORY	L	T	P	C
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COURSE OBJECTIVES

- To learn UNIX commands and shell programming.
- To implement Process Creation, Inter Process Communication and various CPU Scheduling Algorithms.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms.
- To implement Page Replacement Algorithms.
- To implement File Allocation Strategies.

LIST OF EXPERIMENTS

1. Installation of LINUX using Virtual Machine
2. Basics of UNIX and LINUX commands
3. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
5. Shell Programming
6. Write C programs to implement the various CPU Scheduling Algorithms
7. Implementation of Semaphores
8. Implementation of Shared memory and IPC

9. Bankers Algorithm for Deadlock Avoidance
10. Implementation of Deadlock Detection Algorithm
11. Write C program to implement Threading & Synchronization Applications
12. Implementation of the following Memory Allocation Methods for fixed partition a) First Fit b) Worst Fit c) Best Fit
13. Implementation of Paging Technique of Memory Management
14. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) LFU
15. Implementation of the various file organization techniques and the following File Allocation Strategies a) Sequential b) Indexed c) Linked

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Learn various UNIX commands, shell programming
- Create processes, implement IPC and Semaphores and to compare the performance of various CPU Scheduling Algorithms
- Implement Deadlock avoidance and Detection Algorithms
- Analyze the performance of the various Page Replacement Algorithms
- Implement File Organization and File Allocation Strategies

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE: C / C++ / Java

CB1601A

CYBER FORENSICS

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COURSE OBJECTIVES:

- To learn cyber crime and forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data
- To understand cyber laws and the admissibility of evidence with case studies
- To learn the vulnerabilities in network infrastructure with ethical hacking

UNIT I BASICS OF CYBER FORENSICS

9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime - Cyber Forensics -Steps in Forensic Investigation - Forensic Examination Process - Types of CF techniques - Forensic duplication and investigation - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II DIGITAL EVIDENCE COLLECTION & FORENSICS TOOLS AND TECHNIQUES 9

Processing Crime and Incident Scenes – Digital Evidence - Sources of Evidence -Working with File Systems. - Registry - Artifacts - Current Computer Forensics Tools: Software/ Hardware Tools - Forensic Suite - Acquisition and Seizure of Evidence from Computers and Mobile Devices - Chain of Custody- Forensic Techniques

UNIT III FORENSIC ANALYSIS AND VALIDATION

9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics - Analysis of Digital Evidence - Admissibility of Evidence - Cyber Laws in India - Case Studies

UNIT IV BASICS OF ETHICAL HACKING

9

Introduction to Ethical Hacking - Ethical Footprinting Through Search Engines-Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing – Email Tracking

UNIT V APPLICATIONS AND LEARNING

9

Components of a Wireless Network -Wireless Hacking -Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Mobile Platforms.

TOTAL :45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

- Understand the basics of cyber crime and computer forensics
- Apply a number of different computer forensic tools to a given scenario
- Analyze and validate forensics data
- Understand Admissibility of evidence in India with Cyber laws and Case Studies
- Identify the vulnerabilities in a given network infrastructure

TEXT BOOKS:

- 1 Bill Nelson, Amelia Phillips, Christopher Steuart, — Guide to Computer Forensics and Investigations, Cengage Learning, India Sixth Edition, 2020.

REFERENCES:

1. John R.Vacca, “Computer Forensics “, Cengage Learning, 2005.
2. MarjieT.Britz, “Computer Forensics and Cyber Crime: An Introduction 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia “ Ethical Hacking, Second Edition, Macmillan India Ltd, 2006.
5. Kenneth C.Brancik “Insider Computer Fraud Auerbach Publications Taylor & Francis Group– 2008.

CB1605A CYBER FORENSICS LABORATORY

L T P C

0 0 4 2

COURSE OBJECTIVES

- Explore Forensic tools.
- Understand the recovery operation of deleted files.
- Acquire the forensic image of the hard disk with integrity checking.
- Understand the collection of email evidence and extraction of browser artifacts.
- Performing live Forensics Case Investigation.

LIST OF EXPERIMENTS

1. Study and Explore the following forensic tools:

- (a) FTK Imager
 - (b) Autopsy
 - (c) EnCase Forensic Imager
 - (d) LastActivityView
 - (e) USBDeview
2. Recover deleted files using FTKImager
 3. Acquire forensic image of hard disk using EnCase Forensics Imager and also perform integrity checking/validation
 4. Restore the Evidence Image using EnCase Forensics Imager.
 5. Study the following: (a) Collect Email Evidence in Victim PC. (b) Extract Browser Artifacts (Chrome History view for Google Chrome)
 6. Use USBDeview to find the last connected USB to the system
 7. Perform Live Forensics Case Investigation using Autopsy
 8. Study Email Tracking and EmailTracing and write a report on them.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE:

FTK Imager

Autopsy

EnCase Forensic Imager

LastActivityView

USBDeview

Chrome History View

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Utilize various forensic tools for investigation.
- Demonstrate data recovery and forensic imaging.
- Analyze and interpret forensic evidence.
- Demonstrate live forensic investigations.
- Generate comprehensive forensic report.

CB1602A

WEB APPLICATION SECURITY

L T P C

3 0 0 3

COURSE OBJECTIVES:

- Understand the fundamentals of web application security, authentication, authorization, communication.
- Analyse security challenges in web applications and implement secure development practices.
- Apply secure API development techniques to protect data and services from security threats.
- Evaluate web applications for vulnerabilities using assessment & penetration testing methodologies.
- Create security strategies by leveraging hacking techniques and security tools for threat mitigation.

Introduction–Definition – Future of Artificial Intelligence- Production systems, Types of Production systems –Typical Intelligent Agents – Agents and Environments – concept of rationality – nature of environments – Structure of agents.

UNIT II PROBLEM SOLVING METHODS

9

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

UNIT III LOGICAL REASONING

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 IV PROBABILISTIC REASONING

9

Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks

UNIT V APPLICATIONS AND LEARNING

9

Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition –Introduction to Machine Learning-Types of Machine Learning

TOTAL :45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able to:

- Illustrate the intelligent agent frameworks and its environments.
- Analyze real life problems and solve those using searching algorithms and AI techniques.
- Analyze and apply logical reasoning in solving AI problems using first order and predicate logic.
- Demonstrate the applications of Probabilistic Reasoning in Bayesian Networks.
- Examine the various applications of AI and types of Learning.

TEXT BOOKS:

- 1 S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.
- 2 I. Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press, 2009.
3. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
4. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
5. Gerhard Weiss, —Multi Agent Systems, Second Edition, MIT Press, 2013.
6. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

CB1603A

ETHICAL HACKING

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To learn about the importance of ethical information security.
- To learn different ethical scanning and enumeration methodologies and tools.
- To understand various ethical hacking techniques and attacks
- To be exposed to programming languages for ethical security professionals.
- To understand the different phases in ethical penetration testing.

UNIT I INTRODUCTION TO ETHICAL HACKING AND SECURITY 9

Ethical Hacking Overview - Role of Security and Penetration Testers - Penetration Testing, Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware -Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security.

UNIT II ETHICAL FOOTPRINTING AND NETWORK SCANNING 9

Ethical Footprinting Concept - Ethical Footprinting Through Search Engines, Web Services, Social Media Sites, Websites, Emails - Basic Information Gathering Techniques - Ethical Footprinting Through Social Engineering - Introduction to Network Scanning - Basic Port-Scanning Tools and Techniques - Identifying Network Vulnerabilities - Understanding IDS and Firewalls.

UNIT III ENUMERATION TECHNIQUES AND SYSTEM VULNERABILITIES 9

Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS, Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OS, Vulnerabilities- Vulnerabilities of Embedded Oss.

UNIT IV ETHICAL HACKING OF WEB AND WIRELESS NETWORKS 9

Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking - Tools of the Trade - Case Studies.

UNIT V NETWORK SECURITY, INTRUSION DETECTION, AND PREVENTION 9

Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems - Network- Based and Host- Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots - Tools & Frameworks.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Identify and analyse security threats in ethical hacking and penetration testing. (BTL-4)
- Apply ethical hacking tools for footprinting, scanning, and enumeration. (BTL-3)
- Evaluate vulnerabilities in Windows, Linux, and embedded systems. (BTL-5)
- Apply ethical hacking techniques to web servers and wireless networks. (BTL-3)
- Analyze the security requirements of a network and identify the appropriate measures, including firewalls, IDS, and intrusion prevention systems, to address potential vulnerabilities. (BTL-4)

TEXT BOOKS:

1. Rob Wilson, Michael T. Simpson, and Nicholas Antill, Hands-On Ethical Hacking and Network Defense, 4th Edition, Course Technology, Cengage Learning, 2022.
2. Patrick Engebretson, The Basics of Hacking and Penetration Testing, SYNGRESS, Elsevier, 2013.
3. Dafydd Stuttard and Marcus Pinto, The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2011.
4. Alana Maurushat, Ethical Hacking, University of Ottawa Press/Les Presses de l'Université d'Ottawa, 2019.

REFERENCES:

1. EC-Council, "Ethical Hacking and Countermeasures: Attack Phases", Cengage Learning, 2010.
2. Jon Erickson, "Hacking, 2nd Edition: The Art of Exploitation", No Starch Press Inc., 2008.
3. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning, 2013.
4. Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy", Second Edition, Elsevier, 2013.
5. RafayBoloach, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2014.

45 PERIODS

CB1604A ENGINEERING SECURE SOFTWARE SYSTEMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Know the importance and need for software security.
- Know about various attacks.
- Learn about secure software design.
- Understand risk management in secure software development.
- Know the working of tools related to software security.

UNIT I NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS 9

Software Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – Memory-Based Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attacks

UNIT II SECURE SOFTWARE DESIGN 9

Requirements Engineering for secure software - SQUARE process Model - Requirements elicitation and prioritization- Isolating The Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles

UNIT III SECURITY RISK MANAGEMENT 9

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management

UNIT IV SECURITY TESTING 9

Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing – Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation - Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection- Tools for Penetration Testing

UNIT V SECURE PROJECT MANAGEMENT 9

Governance and security - Adopting an enterprise software security framework - Security and project management - Adequate Security- Risk Management Framework for Software Security - Maturity of Practice

TOTAL:45**PERIODS****COURSE OUTCOMES:**

At the end of the course, the students should be able to:

CO1: Identify various vulnerabilities related to memory attacks. (BTL-3)

- CO2: Apply security principles in software development.(BTL-3)
 CO3: Evaluate the extent of risks.(BTL-4)
 CO4: Apply testing techniques related to software security in the testing phase of software development.(BTL-3)
 CO5: Identify the tools for securing software.(BTL-3)

TEXT BOOKS:

1. Julia H. Allen, “Software Security Engineering”, Pearson Education, 2008
2. Evan Wheeler, “Security Risk Management: Building an Information Security Risk Management Program from the Ground Up”, First edition, Syngress Publishing, 2011
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, “The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)”, Addison-Wesley Professional, 2006

REFERENCES:

- 1.Robert C. Seacord, “Secure Coding in C and C++ (SEI Series in Software Engineering)”, Addison-Wesley Professional, 2005.
- 2.Jon Erickson, “Hacking: The Art of Exploitation”, 2nd Edition, No Starch Press, 2008.
- 3.Mike Shema, “Hacking Web Apps: Detecting and Preventing Web Application Security Problems”, First edition, Syngress Publishing, 2012
- 4.Bryan Sullivan and Vincent Liu, “Web Application Security, A Beginner's Guide”, Kindle Edition, McGraw Hill, 2012
- 5.Lee Allen, “Advanced Penetration Testing for Highly-Secured Environments: The Ultimate Security Guide (Open Source: Community Experience Distilled)”, Kindle Edition, Packt Publishing,2012
- 6.Jason Grembi, “Developing Secure Software”

CS1703A

SUMMER INTERNSHIP

L	T	P	C
0	0	0	2

COURSE OBJECTIVES:

To enable the students to

- Get connected with reputed industry/ laboratory/academia / research institute
- Get practical knowledge on Product Development / Services and operations / Software Design and Development / Testing / Analytics/ research/ startups/ professionalism / business processes and insights / domain knowledge/ Industry Practices/ and other related aspects and develop skills to solve related problems
- Develop technical, soft, team skills to cater to the needs of the industry / academia / businesses / research / organizations in the core aspects of Automation, Digitalization

The students individually undergo training in reputed firms/ research institutes / laboratories for the specified duration. After the completion of training, a detailed report should be

submitted within ten days from the commencement of next semester. The students will be evaluated as per the Regulations.

No. of Weeks: 04

COURSE OUTCOMES:

At the end of the course, students would:

- Understand the basic concepts related to the assigned project work during industrial training/certification course.
- Analyze the assigned problem by considering its impact on society and environment
- Justify and discuss the design solution for the problem.
- Demonstrate the ability to work effectively in team with commitments to professional ethics.
- Conclude the project work through proper documentation in the form of project report.

MG1701A	PRINCIPLES OF MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To enable the students to study the evolution of Management.
- To study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs. Entrepreneur – types of managers – managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises – Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

COURSE OUTCOMES :

- Understand about the planning and decision making process of management.
- Understand the organization structure, HR planning and control.
- Apply functions of management like motivation, leadership and communication.
- Analyze the performance controlling process, techniques of control and reporting to the management.
- Apply principles of management in order to execute the role as a manager in IT industry.

TEXTBOOKS:

1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India) Pvt. Ltd., 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011.
2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata Mc Graw Hill, 1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.

CS1701A

MACHINE LEARNING

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COURSE OBJECTIVES

- To understand the concepts of machine learning and types of problems tackled by machine learning.
- To explore the different supervised learning techniques.
- To learn different aspects of unsupervised learning and reinforcement learning.
- To learn the role of probabilistic methods for machine learning
- To understand the basic concepts of neural networks and deep learning

UNIT I INTRODUCTION TO MACHINE LEARNING

7

Types of Machine Learning, Supervised learning: Classification, Regression, Unsupervised learning, Generative and Discriminative Models, Some basic concepts in machine learning, The Machine Learning Process, Reinforcement Learning.

UNIT II SUPERVISED LEARNING

11

Supervised Learning, learning a Class from Examples, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Classification, Decision trees – Support vector machines -Neural networks (Gradient Descent and Back Propagation), Naïve Bayes Algorithm, Linear Regression and Logistic Regression, Random Forest, Ensemble Learning

UNIT III UNSUPERVISED LEARNING

9

Introduction - Clustering Algorithms -K – Means – Hierarchical Clustering - Cluster Validity - Dimensionality Reduction –Principal Component Analysis — EM algorithm.

UNIT IV REINFORCEMENT LEARNING

9

Reinforcement Learning – Elements –Uses- Model based Learning – Temporal Difference Learning - Generalization - Markov Decision Processes- Partially Observable States Example: Getting Lost- Values:Q-Learning and Sarsa Algorithm - Back on Holiday: Using Reinforcement Learning, The Tiger Problem

UNIT V **PROBABILISTIC METHODS FOR LEARNING**

9

Introduction - Maximum Likelihood -Maximum Apriori -Bayesian Belief Networks -Probabilistic Modelling of Problems -Inference in Bayesian Belief Networks – Probability Density Estimation - Sequence Models – Markov Models – Generative Models :Hidden Markov Models

LIST OF EXPERIMENTS:

1. Implement the concept of decision trees with suitable data sets from real world problem and classify the data set to produce a new sample.
2. Detecting Spam mails using Support vector machine
3. Implement facial recognition application with artificial neural network
4. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select the appropriate data set for your experiment and draw graphs.
5. Implement the kmeans algorithm
6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using the standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
7. Mini-project: students work in team on any socially relevant problem that needs a machine learning based solution, and evaluate the model performance.

COURSE OUTCOMES:

Upon the completion of course, students will be able to

Understand the basic concepts of machine learning and its types

Solve the problems of different applications using supervised learning algorithms

Analyze typical Unsupervised learning algorithms for different types of applications.

Demonstrate the various Reinforcement algorithms

Examine probabilistic methods for real world applications.

TEXTBOOKS:

1. Ethem Alpaydin, “Introduction to Machine Learning”, Third Edition, Adaptive Computation and Machine Learning Series, MIT Press, 2014
2. Stephen Marsland, “Machine Learning: An Algorithmic erspective”, Chapman & Hall/CRC, 2nd Edition, 2014.

REFERENCES

1. Kevin Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
2. Tom M Mitchell, “Machine Learning”, McGraw Hill Education, 2013.
3. Christopher M. Bishop ,Pattern Recognition and Machine Learning, Springer Publications,
4. Peter Flach, “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, First Edition, Cambridge University Press, 2012.
5. Ameet V Joshi, Machine Learning and Artificial Intelligence, Springer Publications, 2020

PRACTICALS 30 PERIODS

THEORY: 45 PERIODS

TOTAL : 75 PERIODS

CS1702A

MACHINE LEARNING LABORATORY

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LIST OF EXPERIMENTS:

1. Implement the concept of decision trees with suitable data set from real world problem and classify the data set to produce new sample.
2. Detecting Spam mails using Support vector machine
3. Implement facial recognition application with artificial neural network
4. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
5. Implement character recognition using Multilayer Perceptron
6. Implement the kmeans algorithm
7. Implement the Dimensionality Reduction techniques
8. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
9. Using Weka Tool Perform a. Data preprocessing by selecting or filtering attributes b. Data preprocessing for handling missing value
10. Mini-project: students work in team on any socially relevant problem that needs a machine learning based solution, and evaluate the model performance.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- Implement supervised learning algorithms for real world dataset
- Apply the concept of unsupervised learning algorithms for suitable application.
- Make use of appropriate probabilistic methods for real time application
- Apply various tools Weka/MATLAB etc for implementing machine learning algorithms
- Implement Machine Learning algorithms to solve real world problems

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Python/Java with ML Package/R

HARDWARE: 30 terminals.

IT1702A

CLOUD COMPUTING LAB

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COURSE OBJECTIVES:

- To learn the fundamentals of Cloud Computing and designing Private Cloud and Public Cloud Environment.
- To learn the basic ideas and principles of Virtualization Technology.
- To learn the dynamic programming models for Cloud.
- To gain knowledge on various cloud components mechanism for data center design and management.

LIST OF EXPERIMENTS

1. Virtualization

- a. Find procedure to run the virtual machine of different configuration using virt-manager.
- b. Virtualize a machine and check how many virtual machine can be utilized at a particular time.
- c. Create a VM clone and attach virtual block to the cloned virtual machine and check whether it holds the data even after the release of the virtual machine.

2. Public Cloud

- a. Develop a simple application to understand the concept of PAAS using GAE/Amazon Elastic Beanstalk/IBM Blue Mix/GCC and launch it.
- b. Test how a SaaS applications scales in response to demand.
- c. Find the procedure to launch a Cloud instance using a Public IaaS cloud like AWS/GCP.

3. Private Cloud

- a. Setup a Private Cloud by performing the procedure using a Single node Openstack/Opennebula implementation.
- b. Perform Creation, Management and Termination of a CentOS instance in Openstack/Opennebula.
- c. Show the virtual machine migration based on certain conditions from one node to the other.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Demonstrate the cloud, its characteristics, various delivery and deployment models
- Relate fundamental cloud components mechanism with which cloud data centers are managed and administered.
- Design and deploy a web application in a PaaS & SaaS environment.
- Outline the strength of virtualization and its role in enabling the cloud computing model
- Validate Hadoop single node cluster and run applications with map reduce commands

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: VM Ware, Windows OS, VM Workstation, CentOS, OpenNebula, C, Java

HARDWARE: 30 terminals.