आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

NAAC ACCREDITED

IFTM UNIVERSITY

N.H.-24 Lodhipur Rajput, Delhi Road, Moradabad, Uttar Pradesh- 244102

www.iftmuniversity.ac.in

Study & Evaluation Scheme of
Bachelor of Technology
[Session 2020-21]

Programme:	**Computer Science & Engineering**
Course Level:	**UG Degree**
Duration:	**Four Years (Eight Semesters)**
Medium of Instructions:	**English**
Minimum Required Attendance:	**75%**
Maximum Credit:	**226**

Programme Outcomes (POs):

At the end of the Programme, a graduate will be able to

1. Apply the knowledge of basic sciences and fundamental engineering concepts in solving engineering problems
2. Identify and define engineering problems, conduct experiments and investigate to analyze and interpret data to arrive at substantial conclusions.
3. Propose appropriate solutions for engineering problems complying with functional constraints such as economic, environmental, societal, ethical, safety and sustainability.
4. Perform investigations, design and conduct experiments, analyze and interpret the results to provide valid conclusions.
5. Select/develop and apply appropriate techniques and IT tools for the design & analysis of the systems.
6. Give reasoning and assess societal, health, legal and cultural issues with competency in professional engineering practice.
7. Demonstrate professional skills and contextual reasoning to assess environmental/societal issues for sustainable development.
8. Demonstrate Knowledge of professional and ethical practices
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary situations.
10. Communicate effectively among engineering community, being able to comprehend and write effectively reports, presentation and give / receive clears instructions.
11. Demonstrate and apply engineering & management principles in their own / team projects in multidisciplinary environment.
12. Recognize the need for, and have the ability to engage in independent and lifelong learning

Course Structure & Evaluation Scheme

BRANCH: B. Tech. in Computer Science & Engineering
(Effective from Session 2018-19)

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IFTM University Moradabad

B.Tech CS&E (Effective from session 2018-2019)

YEAR I, SEMESTER- I

S.N.	COURSE CODE	COURSE NAME	PERIODS			EVALUATION SCHEME				COURSE TOTAL	CREDITS
						MID TERM EXAM			EXTERNAL EXAM		
			L	T	P	CT	AS +AT	TOTAL			
THEORY											
1.	EMA -101	**Engineering Mathematics-I**	3	1	0	20	10	30	70	100	4
2.	EPH -101	**Engineering Physics-I**	3	1	0	20	10	30	70	100	4
3.	ECH -101 / ECH -102	Engineering Chemistry / **Environmental Science**	3	1	0	20	10	30	70	100	4
4.	PSD -101 / EME -101	**Professional Skill Development-I** / Engineering Mechanics	3	1	0	20	10	30	70	100	4
5.	EEE -101 / EEC -101	Electrical Engineering / **Electronics Engineering**	3	1	0	20	10	30	70	100	4
6.	EME -102 / ECS -101	Materials & Manufacturing / **Computer Fundamentals & Programming**	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	EPH -151 / ECH -151	**Physics Lab** / Chemistry Lab	0	0	2	30	20	50	50	100	1
8.	EEE -151 / EEC -151	Electrical Engg. Lab / **Electronics Engg. Lab**	0	0	2	30	20	50	50	100	1
9.	EME-152 / ECS -151	Materials & Manufacturing Lab / **Computer Lab**	0	0	2	30	20	50	50	100	1
10.	EME-153 / EME -151	**Engineering Graphics Lab** / Mechanical Engg. Lab	0	0	2	30	20	50	50	100	1
11.	EGP-101	**General Proficiency**	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

YEAR I, SEMESTER- II

S.N.	COURSE CODE	COURSE NAME	PERIODS			EVALUATION SCHEME				COURSE TOTAL	CREDITS
						MID TERM EXAM			EXTERNAL EXAM		
			L	T	P	CT	AS +AT	TOTAL			
THEORY											
1.	EMA -201	**Engineering Mathematics-II**	3	1	0	20	10	30	70	100	4
2.	EPH -201	**Engineering Physics-II**	3	1	0	20	10	30	70	100	4
3.	ECH -202 / ECH -201	Environmental Science / **Engineering Chemistry**	3	1	0	20	10	30	70	100	4
4.	EME -201 / PSD -201	**Engineering Mechanics** / Professional Skill Development-I	3	1	0	20	10	30	70	100	4
5.	EEC -201/ EEE -201	Electronics Engineering / **Electrical Engineering**	3	1	0	20	10	30	70	100	4
6.	ECS -201 / EME -202	Computer Fundamentals & Programming / **Materials & Manufacturing**	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	ECH -251 / EPH -251	**Chemistry Lab** / Physics Lab	0	0	2	30	20	50	50	100	1
8.	ECS -251 / EME -252	Computer Lab / **Materials & Manufacturing Lab**	0	0	2	30	20	50	50	100	1
9.	EEE -251 / EEC -251	**Electrical Engg. Lab** / Electronics Engg. Lab	0	0	2	30	20	50	50	100	1
10.	EME -251 / EME-253	**Mechanical Engg. Lab** / Engineering Graphics Lab	0	0	2	30	20	50	50	100	1
11.	EGP-201	**General Proficiency**	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

(Effective from Session 2018-19)

YEAR: II **SEMESTER: III**

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS301	Data Structures Using C	3	1	0	5	5	10+10	30	70	100	4
2.	ECS302	C++ Programming	3	1	0	5	5	10+10	30	70	100	4
3.	ECS303	Computer Organization	3	1	0	5	5	10+10	30	70	100	4
4.	ECS304	Operating System Concepts	3	1	0	5	5	10+10	30	70	100	4
5.	ECS305	Discrete Mathematical Structures	3	1	0	5	5	10+10	30	70	100	4
6.	EHU301	Disaster Management (audit Paper)	3	0	0	5	5	10+10	30	70*	100*	3*
7.	PSD301	Professional Skill Development -2	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
8.	ECS351	Data Structure Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS352	C++ Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS353	Digital and CO Lab	0	0	2	10	10	30	50	50	100	1
11.	ECS354	OS Lab	0	0	2	10	10	30	50	50	100	1
12.	EGP301	General Proficiency							100	--	100	1
											1100	29

*Disaster Management will be offered as a compulsory audit course and each student has to pass the subject at the minimum by getting 35 marks out of 100.

YEAR: II **SEMESTER: IV**

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS401	Data Communication & Network	3	1	0	5	5	10+10	30	70	100	4
2.	ECS402	Design and Analysis of Algorithms	3	1	0	5	5	10+10	30	70	100	4
3.	ECS403	Database Management System	3	1	0	5	5	10+10	30	70	100	4
4.	ECS404	Introduction to Microprocessor	3	1	0	5	5	10+10	30	70	100	4
5.	ECS405	Software Engineering	3	1	0	5	5	10+10	30	70	100	4
6.	EMA401	Computer Based Numerical & Statistical Techniques	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS451	Computer Networks Lab	0	0	2	10	10	30	50	50	100	1
8.	ECS452	DAA Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS453	DBMS Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS454	Microprocessor Lab	0	0	2	10	10	30	50	50	100	1
11.	EGP401	General Proficiency							100	--	100	1
											1100	29

(Effective from Session 2018-19)

YEAR: III **SEMESTER: V**

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS501	Computer Graphics	3	1	0	5	5	10+10	30	70	100	4
2.	ECS502	Internet & Java Programming	3	1	0	5	5	10+10	30	70	100	4
3.	ECS503	Artificial Intelligence	3	1	0	5	5	10+10	30	70	100	4
4.	ECS504	Theory of Computation	3	1	0	5	5	10+10	30	70	100	4
5.	ECS505	Computer Architecture	3	1	0	5	5	10+10	30	70	100	4
6.	EHU501	Human Values & Professional Ethics	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS551	Computer Graphics Lab	0	0	2	10	10	30	50	50	100	1
8.	ECS552	Internet & Java Programming Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS553	AI Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS554	CBNST lab	0	0	2	10	10	30	50	50	100	1
11.	EGP501	General Proficiency							100	--	100	1
											1100	29

YEAR: III **SEMESTER: VI**

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS601	Object Modeling Techniques & UML	3	1	0	5	5	10+10	30	70	100	4
2.	ECS602	Web Technology & E-Commerce	3	1	0	5	5	10+10	30	70	100	4
3.	ECS603	Compiler Design	3	1	0	5	5	10+10	30	70	100	4
4.	ECS604	Principles of Programming Language	3	1	0	5	5	10+10	30	70	100	4
5.	ECS605	Elective-I	3	1	0	5	5	10+10	30	70	100	4
6.	ECS606	Multimedia Technology	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS651	Mini Project-I	0	0	2	10	10	30	50	50	100	1
8.	ECS652	Web Technology & Multimedia Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS653	Compiler Design Lab	0	0	2	10	10	30	50	50	100	1
10.	ECS654	Python Lab	0	0	2	10	10	30	50	50	100	1
11.	EGP601	General Proficiency							100	--	100	1
											1100	29

(Effective from Session 2018-19)

YEAR: IV **SEMESTER: VII**

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS701	Distributed Computing	3	1	0	5	5	10+10	30	70	100	4
2.	ECS702	Digital Image Processing	3	1	0	5	5	10+10	30	70	100	4
3.	ECS703	Data Mining & Warehousing	3	1	0	5	5	10+10	30	70	100	4
4.	ECS704	Elective-II	3	1	0	5	5	10+10	30	70	100	4
5.	ECS705	Cryptography & Network Security	3	1	0	5	5	10+10	30	70	100	4
6.	EHU701	Industrial Management	3	1	0	5	5	10+10	30	70	100	4
PRACTICALS/Seminar/Projects												
7.	ECS751	Distributed Computing Lab	0	0	2	10	10	30	50	50	100	1
8.	ECS752	DIP Lab	0	0	2	10	10	30	50	50	100	1
9.	ECS753	Colloquium & Summer Training Viva	0	0	2	10	10	30	100	--	100	1
10.	ECS754	Mini Project-II	0	0	2	10	10	30	50	50	100	1
11.	EGP701	General Proficiency							100	--	100	1
											1100	29

YEAR: IV **SEMESTER: VIII**

S. NO	COURSE CODE	SUBJECT	PERIODS			SESSIONAL				ESE	TOTAL	CREDITS
			L	T	P	TA	AT	CT	Total			
1.	ECS801	Elective-III	3	1	0	5	5	10+10	30	70	100	4
2.	ECS802	Elective-IV	3	1	0	5	5	10+10	30	70	100	4
3.	ECS804	Big Data and Analytics	3	1	0	5	5	10+10	30	70	100	4
4.												
PRACTICALS/ Seminar/ Projects												
5.	ECS851	Project	0	0	--	75	75	150	300	300	600	15
6.	ECS852	Seminar	0	0	4	25	25	50	100	--	100	1
7.	EGP801	General Proficiency							100	--	100	1
											1100	29

Electives (CSE)

Elective-I

S.NO	COURSE CODE	NAME OF THE ELECTIVE
1.	ECS- 605(1)	Natural language Processing
2.	ECS- 605(2)	Advanced Database Management Systems
3.	ECS- 605(3)	Mobile Computing
4.	ECS- 605(4)	Advanced Computer Architecture

Elective-II

S.NO	COURSE CODE	NAME OF THE ELECTIVE
1.	EMA-704(1)	Optimization Techniques
2.	ECS-704 (2)	Advanced Web Applications
3.	ECS-704 (3)	Simulation and Modeling
4.	ECS-704 (4)	Embedded System

Elective-III

S.NO	COURSE CODE	NAME OF THE ELECTIVE
1.	ECS-801 (1)	Network Programming
2.	ECS-801 (2)	Parallel Computing
3.	ECS-801 (3)	Design of UNIX Operating System
4.	ECS-801 (4)	Virtual Reality

Elective-IV

S.NO	COURSE CODE	NAME OF THE ELECTIVE
1.	ECS-802 (1)	Wireless & Sensor Networks
2.	ECS-802 (2)	Semantic Web
3.	ECS-802 (3)	Real Time System
4.	ECS-802 (4)	TCP/IP Protocol Suite

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech Ist Year (I Semester)
(Effective from the session 2018-19)

ECS101/ ECS201 COMPUTER FUNDAMENTALS & PROGRAMMING L:T:P- 3:1:0

OBJECTIVE:

The objective of this course is to introduces the concepts of computer basics & programming with particular attention to Engineering examples and to learn the fundamentals of the C programming language

UNIT-I

Introduction: Introduction to Computer Systems, Generation of Computers, BIOS, Various types of memories, CPU organization, ALU, registers. Introduction to various operating Systems. Number systems: Binary, hexadecimal, octal and their inter conversions. Computer Languages and Software & hardware: High Level Languages and Low Level Language, Various types of software. Firmware, Compiler, Interpreter and Assembler. File Allocation Table, Hardware.

UNIT –II

Input, Output and storage units: Introduction to various Input and output Devices. Printers: Various type of Impact and Non- Impact Printers.
Introduction to algorithm and Flow chart: Representation of an algorithm, flowchart symbols and levels of flow chart, advantage and limitations of flowchart and pseudo code. Basics of programming: Introduction to the design and implementation of correct, efficient and maintainable programs. Use of high level programming languages for the development of programs.

UNIT-III

Standard I/O in "C", Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity.

UNIT-IV

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

UNIT-V

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules. Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, Structure, union, enumerated data types. Functions: Introduction, types of functions, functions with array, recursive functions, Introduction to pointers, Introduction to file handling, standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler.

COURSE OUTCOMES:

On completion of the course students will be able to

- Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming
- Write, compile and debug programs in C language and use different data types for writing the programs.
- Design programs using the concepts decision statements, loops, functions, arrays pointers etc

SUGGESTED READINGS:

- "Let us C", Yashvant Kanitkar
- "Programming with C", Byron Gottfried
- "Computer Fundamentals", Anita Goel, Pearson Education
- "Computer Concepts and Programming in C", E Balaguruswami, McGraw Hill
- "C programming", Kernighan and Ritchie, PHI
- "Computer Fundamentals and Programming in C", Reema Thareja, Oxford Publication

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

EPH-101 Engineering Physics-I L T P 3 1 0

OBJECTIVE:

The aim of this course is to impart knowledge of statistical mechanics, quantum mechanics, Laser system and their applications. The broad education is necessary to understand special theory of relativity.

UNIT- I (08 Sessions)

Relativistic Mechanics: Frame of reference, Michelson-Morley Experiment, Lorentz transformation equation, Length contraction & Time dilation, Addition of velocities, Variation of mass with velocity and Mass energy relation.

UNIT- II (08Sessions)

Statistical Mechanics: Concept of phase space, Density of states as a function of energy, Maxwell- Boltzmann statistics, Distribution law and its application in case of ideal gas, Energy and velocity distribution.

Bose -Einstein statistics Distribution Law and its application to Black body radiation to obtain Plank's law of radiation.

Fermi –Dirac statistics, Distribution law and its application to electrons in metals, Calculation of Fermi energy and average energy of electrons in metals.

UNIT- III (08 Sessions)

Quantum Mechanics: De-Broglie Hypothesis, Davisson -Germer Experiment, wave function and its properties, Uncertainty principle. Time Dependent & Time Independent Schrodinger Equation, Particle in one dimensional box, Eigen values and eigen function

UNIT- IV (08 sessions)

Laser: Principle of Laser, Stimulated and spontaneous emission, Population inversion, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.

UNIT- V (08 sessions)

Fiber Optics: Fundamental ideas of optical Fiber, Propagation Mechanism, Numerical aperture, Acceptance angle and Acceptance cone, Single and multi-mode fibers, Applications of optical fibers.

COURSE OUTCOME:

The students completing this course will be able to:

- Learn Frame of reference, Lorentz transformation equation
- Understand Statistical Mechanics, Maxwell- Boltzmann statistics and its applications.
- Study Bose -Einstein statistics and Fermi –Dirac statistics
- Understand De-Broglie Hypothesis, Davisson -Germer Experiment
- Study Time Dependent & Time Independent Schrodinger Equation and applications of these equations.
- Attain basic knowledge on different types of LASERs and their applications.
- Gain knowledge of optical fiber.

SUGGESTED READINGS:

- Beiser, "Concepts of Modern Physics
- Kittel, "Mechanics", Berkeley Physics Course, Vol.- I.
- W.T. Silf vast, "Laser Fundamental" Cambridge University Press (1996).
- G. Keiser "Optical Fiber Communication" New York.
- K.M. khanna" Statistical Mechanics"
- C.Kittel" Elementary Statistical Mechanics"

WEBSITE SOURCES:

- https://web.stanford.edu
- https://sites.google.com
- https://en.wikipedia.org
- https://www.khanacademy.org
- https://www.rp-photonics.com
- https://nptel.ac.in
- https://www.eatm.in

Note: Adhere to the latest editions of the Suggested Readings

ECE-101/201 **Environmental Science** **L T P 3 1 0**

OBJECTIVE:

The goals of environmental science are to provide every student with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment. To develop and reinforce new patterns of environmentally sensitive behavior among individuals, groups and society as a whole for a sustainable environment. Understand the trans-national character of environmental problems such as global warming, climate change, ozone layer depletion etc. and ways of addressing them, including interactions across local to global scales.

Unit I: **(12 Sessions)**

Environment: Definition of environment. Environmental education. Need for the public awareness. : Concept of Ecology: Ecosystem, energy and nutrients flow in ecosystem food chain.

Environmental segment: Atmospheric structure. Classification of air pollutants, sources of air pollution and their effect on human health and property.

Unit II: **(10 Sessions)**

Air quality and standard: Meteorological phenomenon and their influence on air quality, lapse rates, dispersion of pollutants. Air pollution control: Introduction to particulates and gaseous pollutants such as SOx, NOx & CO, and their effects.

Unit III: **(10 Sessions)**

Water quality: Physical. Chemical & biological parameters. Water quality standard, BOD. COD and BOD COD calculations. :

Environmental Analysis: pH, alkalinity, conductivity, ammonia, fluoride, sulphate, chloride. Analysis and measurement of gaseous pollutants.

Unit IV: **(08 Sessions)**

Pollution: Pollution from industry and agriculture. Polymers and plastic, food additives, fertilizers, insecticides, fungicides and herbicides. Heavy metal and energy their environmental implications. Solid waste and its managements. Pollution and public health aspect Environmental Protection-Role of government, initiatives by non-governmental organizations (NGO).

COURSE OUTCOME:

After completion of this course student will be able to:

- Understand the issues and challenges related to environmental and ecosystem due to some human activities.
- Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

SUGGESTED READINGS:

- "Environmental studies" Benny Joseph, Tata McgrawHill-2005
- "Environmental studies"-Dr D.L. Manjunath, Pearson Education-2006
- "Environmental studies" R. Rajagopalan, Oxford Publication-2005
- "Text book of environment science & Technology", M.Anji Reddy, BS Publication.

WEBSITE SOURCES:

- https://www.india.gov.in/official-website-ministry-environment-and-forests-0
- https://www.earthshare.org/environews/

Note: Adhere to the latest editions of the Suggested Readings

(PSD-101/PSD-201) PROFESSIONAL SKILL DEVELOPMENT-I Credit: 03

Followed in B. Tech. I Year, I/II Semester MCA, B. Sc. (BT, MB, FT, AG), I Semester

w.e.f. July, 2018

OBJECTIVES:

The objectives of Professional Skill Development-I are:

- To develop knowledge and understanding of grammar.
- To develop abilities to make use of the grammar in own writing English.
- To increase understanding and recall of what is read and listen including facts and main idea.
- To enhance competencies in writing paragraph, gist or abstract/précis of the passage in own words/ language and in writing resumes, bio-data, letters and applications of different kinds.
- To develop all the four skills of English language.

UNIT I (08 Sessions)

Basic Applied Grammar and Usage

The Sentences: Parts – Subject and Predicate; Kinds of Sentences and their Transformation. Parts of Speech. Noun: Kinds; Gender; Case; Number; Usage. Pronouns: Definition; Kinds; Usage. Adjectives: Kinds, Degrees of Comparison, Transformation of Degrees. Determiners: Kinds: many, many a, a great many; less and fewer; each and every; elder, eldest and older, oldest; much, many; little, a little, the little. Articles: Kinds, Articles and Number system, Articles and Gender system, Omission of Articles, Repetition of Articles. Verbs: Kinds; Auxiliaries: Principal Auxiliaries; Modal Auxiliaries; Semi-Modals; Usage

UNIT II

Basic Applied Grammar Continued (06 Sessions)

Non-Finite Verbs: Kinds; Infinitives; Gerund; Participle. Adverbs: Kinds and Usage. Prepositions: Kinds and Usage. Conjunctions: Kinds; Usage. Interjections: Definition; Usage.

UNIT III (10 Sessions)

Clauses and Phrases, Tenses, Active and Passive Voice, Direct and Indirect Speech

UNIT IV (06 Sessions)

Précis Writing: Techniques of Précis Writing; examples. Paragraph Writing: Structure of Paragraph, Construction of Paragraphs; Techniques of Paragraph Writing: unity, Coherence, Emphasis. Reading Comprehension. Listening Comprehension.

UNIT V (08 Sessions)

Writing of Resume, Bio-Data. Writing of Letters and Applications: Formats; Elements; Kinds: Leave Applications, Job Applications, Order Letters, Letters of Claims and Complaints, Letters of Adjustment.

COURSE OUTCOMES:

Students completing this course will be able to:

- Write paragraph, gist or abstract/précis of the passage in own words/ language and resume, bio-data, letters and applications of different kinds.
- Use targeted grammatical structures meaningfully and appropriately in oral and written production.
- Enhance competence in the four modes of literacy: writing, speaking, reading & listening.
- Understand and recall of what read and listen is including facts and main idea.

SUGGESTED READINGS:

- Remedial English Language by Malti Agarwal, Krishna Publications, Meerut.
- Professional Communication by Malti Agarwal, Krishna Publications, Meerut.
- High School English Grammar & Composition by Wren & Martin, S. Chand & Company LTD., New Delhi.

WEBSITE RESOURCES:

- www.wikipedia.com
- www.englishgrammar.org
- www.usingenglish.com
- www.grammarly.com

Note: Adhere to the latest editions of the Suggested Readings

EEE-101/201 **ELECTRICAL ENGINEERING** **L T P 3 1 0**

OBJECTIVE:

- To provide comprehensive idea about AC and DC circuits and its analysis
- To provide the working principles and applications of basic machines in electrical engineering.

UNIT-I **(08 Sessions)**

D.C. Circuit Analysis: Network, Active And Passive Elements, Concept of Linearity And Linear Network, Unilateral And Bilateral Elements, Sources, Source Transformation, Kirchhoff's Laws, Star-Delta Transformation, **Network Theorems:** Thevenin's Theorem, Superposition Theorem, Norton's Theorem, Maximum Power Transfer Theorem.

UNIT-II **(08 Sessions)**

Single Phase AC Circuits: AC Waveforms, Average and Effective Values, Form and Peak Factors, Analysis of Series, Parallel and Series-Parallel RLC Circuits, Active, Reactive and Apparent Powers, Power Factor, Causes of Low Power Factor, Resonance in Series and Parallel Circuits.

UNIT-III **(08 Sessions)**

Three Phase AC Circuits: Three Phase System, Advantages, Phase Sequence, Star and Delta Connections, Balanced Supply and Balanced Load, Three-phase Power and its Measurement,

Measuring Instruments: Types of Instruments, PMMC and Moving Iron Instrument, Single-Phase Dynamometer Wattmeter, Induction Type Energy Meter

UNIT-IV **(08 Sessions)**

Magnetic Circuits: Magnetic Circuit Concepts, Analogy between Electric & Magnetic Circuits, Magnetic Circuits with DC and AC Excitations, B-H Curve, Hysteresis and Eddy Current Losses,

Single Phase Transformer: Principle, Working, Construction, E.M.F. Equation, Power Losses, Efficiency, Introduction to Auto-Transformer (Excluding Numericals)

UNIT-V **(08 Sessions)**

Principles of Electro-Mechanical Energy Conversion,

DC Generator: Construction & Working, E.M.F. Equation of Generator, Types of D.C. Generator, Applications, **D.C. Motor:** Principle of operation, Torque Equation of a Motor, Types of D.C. Motor, Applications (Excluding Numericals)

Three Phase Induction Motor: Construction-(Squirrel cage and slip-ring motor),Principle of Operation, Applications (Excluding Numericals)

COURSE OUTCOME:

On completion of the course students will be able to:

- Predict the behavior of any electrical and magnetic circuits.
- Formulate and solve complex AC, DC circuits.
- Identify the type of electrical machine used for that particular application.
- Realize the requirement of transformers in transmission and distribution of electric power and other applications.
- Function on multi-disciplinary teams.
- Awareness of general structure of power systems.
- Acquire knowledge about the single phase and three base electrical circuits

SUGGESTED READINGS:

- V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International
- I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill
- D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering" Mc- Graw Hill
- T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering" Oxford University Press
- W.H. HaytP, "Engineering Circuit Analysis" Mc Graw Hill

WEBSITE SOURCES:

- www.lecturenotes.in
- www.examupdates.in
- www.iare.ac.in
- www.notes.specworld.in
- www.ocw.mit.edu
- www.nptel.ac.in
- www.vlab.co.in

Note: Adhere to the latest editions of the Suggested Readings

EME – 102 / 202 **MATERIALS & MANUFACTURING** **L T P 3 1 0**

OBJECTIVES:

The objective of this course is to familiarize the students with different types of engineering materials and manufacturing processes and to understand the design, selection and processing of materials for a wide range of applications in engineering and elsewhere.

UNIT-1

Basic Manufacturing: Importance of Materials & Manufacturing towards Technological & Socio - Economic developments. Classification of manufacturing processes, Plant location. Plant layout and its types. Production and its classification, Production versus Productivity.

Misc. Processes: Powder-metallurgy process and its applications, Plastic-products manufacturing, Galvanizing and Electroplating.

Properties of Engineering Materials: Mechanical properties, Chemical properties, Electrical properties, Dielectric and Magnetic properties, Optical and Physical properties. Introduction to elementary corrosion and oxidation. Elementary ideas of fracture, fatigue & creep.

UNIT 2

Engineering Materials: Ferrous Materials, Iron ore and its extraction. Furnaces. Cast iron, Steels & its classification based on % of carbon, its properties & applications. Alloy steels: stainless steel and tool steel.

Non-Ferrous metals & alloys: Various non-ferrous metals, Common uses of various non-ferrous metals. Alloying elements and their effect, Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin

Non-Metallic Materials: Common types & uses of different non metals such as Wood, Cement-concrete, Ceramics, Rubber, Plastics and Composite materials.

UNIT-3

Introduction to Metal Forming and its applications: Basic metal forming process: hot working and cold working process: Rolling Forging, Extrusion, Drawing, Wire & Tube-drawing, Product applications and their defect. Press - work, Die & Punch assembly. Sheet metal operations, Cutting and forming and its applications. Casting: Casting terms. Casting processes. Pattern & allowances. Pattern and mold making materials and its desirable properties. Molding method, mould making with the use of a core. Gating system. Die-casting and its uses, Casting defects & remedies.

Heat Treatment: Elementary introduction to Heat- treatment of carbon steels: annealing, normalizing, quenching, tempering and case-hardening.

UNIT-4

Introduction to Metal Cutting: Cutting tool, Chips and its formation process; Working principle, classification and operations performed on Lathe machine, Shaper machine and Planer machine. Operations performed on Drilling, Milling & Grinding machine.

UNIT-5

Introduction to Welding and its applications: Importance and basic concepts of welding, Classification of welding processes. Gas-welding, Types of flames. Electric-Arc welding, Resistance welding. Soldering & Brazing and its uses.

COURSE OUTCOMES:

Students completing this course will be able:

- To understand how and why the properties of materials are controlled.
- To understand how and why the structure and composition of a material may be controlled by processing.
- To identify the positive and negative impacts of manufacturing on society.
- To apply the knowledge in industries and organizations.

SUGGESTED READINGS:

- Manufacturing Process, B.S Raghuvanshi, DhanpatRai Publication.
- Manufacturing Processes, R.S. Khurmi and J.K. Gupta, S. Chand Publishing.
- Materials Science, Narula & Narula, McGraw Hill Education Private Limited.
- Manufacturing Technology, R. K. Rajput, Laxmi Publications Private Limited.
- An Introduction to Engineering Materials and Manufacturing Processes, NIIT, Prentice Hall of India Private Limited.

WEBSITE RESOURCES:

- www.wikipedia.org
- www.sciencedaily.com
- www.youtube.com
- www.slideshare.net
- https://onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

EME – 101 / EME – 201 **ENGINEERING MECHANICS** **L T P 3 1 0**

OBJECTIVES:

The primary purpose of the study of engineering mechanics is to develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering. This capacity requires more than a mere knowledge of the physical and mathematical principles of mechanics; also required is the ability to visualize physical configurations in terms of real materials, actual constraints ,and the practical limitations which govern the behavior of machines and structures.

UNIT-1

Two Dimensional Force Systems: Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position , Resultant of a force system, Simplest Resultant of Two dimensional concurrent and non-concurrent force systems, Free body diagrams, Equilibrium and Equations of Equilibrium, Applications.

UNIT-2

Trusses: Introduction, Simple Truss and solution of simple truss, Method of Joints and Method of Sections.

Friction: Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction, Belt friction, Application.

UNIT-3

Centroid and Moment of Inertia: Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorem, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

UNIT-4

Beam: Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shear force and Bending Moment Diagrams for Statically Determinate Beams.

UNIT-5

Kinematics of Rigid Body: Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion. Relative Velocity.

Kinetics of Rigid Body: Introduction, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium.

COURSE OUTCOMES:

Students completing this course will be able to:

- Recognize different force systems, moments and couple.
- To draw Free Body Diagram and label the reactions on it.
- Apply equilibrium equations in statics.
- Understand Newton's law in motion, and recognize different kinds of particle motions.

SUGGESTED READINGS:

- Engineering Mechanics by Irving H. Shames, Prentice-Hall
- Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
- Engineering Mechanics by R.K.Bansal, Laxmi Publications, New Delhi.
- Engineering Mechanics by SS BhaviKatti, New age International Publisher, New Delhi.

WEBSITE RESOURCES:

- https://nptel.ac.in/courses/122/104/122104014/
- https://www.coursera.org/learn/engineering-mechanics-statics
- https://www.edx.org/course/engineering-mechanics-2
- https://www.youtube.com/watch?v=ADR04oYgpAM

Note: Adhere to the latest editions of the Suggested Readings

ECH-101/ECH-201 **ENGINEERING CHEMISTRY** **L T P 3 1 0**

OBJECTIVES:

- To emphasize the relevance of fundamentals and applications of chemistry in the field of engineering.
- To take into account appropriate combinations of old and new emerging concepts for the potential uses in engineering.
- To address the principles of general chemistry and specific topics relevant to various engineering disciplines.
- To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
- To bring potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT 1:

MATTER - CHEMICAL BONDING AND ITS STATES : Types of bonds (Ionic, covalent and chemical bonds), valence bond theory, molecular orbital theory and its applications to homo and hetero (CO & NO) diatomic molecules. Solid state- Types of unit cells, space lattice (only cubes) calculation of density of the unit cell, two dimensional solids such as graphite and its conduction properties. Fullerenes and their applications.

UNIT 2:

CHEMICAL KINETICS AND ELECTROCHEMISTRY

Molecularity and order of reactions, zero, first and second order reactions, theories of reaction rates, electrode potential, electrochemical cells (galvanic and concentration), Nernst equation, electrochemical and galvanic series, definition, significance and classification of corrosion, electrochemical corrosion.

UNIT 3:

REACTION MECHANISM AND SPECTROSCOPY :Electrophile, Nucleophile (SN^1 and SN^2reactions) Mechanism of the following reactions: (i) Aldol condensation (ii) Beckmann rearrangement (iii) Cannizaro reaction (iv) Hoffmann rearrangement (v) Diels-Alder reaction and ((vi) Friedel craft reaction Elementary ideas and simple applications of UV, Visible, IR/FTIR & ^{1H}NMR spectroscopy, instrumental techniques, GA/DTA, SEM/TEM.

UNIT 4:

POLYMERS

Polymers, classification and applications, polymerization (addition and condensation), Thermoplastic and Thermosetting polymers, preparation, properties and uses of PVC, Dacron, nylon66 and Bakelite. Elastomers (Natural rubber, bunaN, bunaS) vulcanization, conducting polymers (Intrinsic & Extrinsic), doping, ion exchange resins, biodegradable polymers.

UNIT 5:

WATER TREATMENT AND FUELS

Hardness of water, calculation on hardness and its determination by EDTA method, sludge and scale formation, causes and prevention of scale formation (colloidal, phosphate, and calgon conditioning), removal of hardness (Soda lime process, zeolite process & ion-exchange process), calculations based on lime soda process. Definition of fuels, classification of fuels, calorific value, determination by Dulong's formula, analysis of coal (Proximate and ultimate analysis), petroleum, important fractions of petroleum and their uses, gaseous fuels (CNG & LPG)

COURSE OUTCOMES:

- Demonstrate knowledge of science behind common impurities in water and methods to treat them and also different methods to remove hardness of water.
- Students will also be able to understand and relate electrochemistry and corrosion.
- to analyze the basic knowledge of various types of Fuels, their properties and Industrial Applications ALONG WITH THE determination OF the calorific value of fuels .
- Apply the science for understanding corrosion and its prevention.
- Demonstrate knowledge of superconducting and organic electronic materials.
- Students will be able to understand about different polymers.

SUGGESTED READINGS:

- Text Book of Polymer Science by F.W. Billmeyer, John Wiley & sons, 1994.
- Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Series in Physical Chemistry, New York.
- Corrosion Engineering by M.G. Fontana McGraw Hill Publications
- Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
- Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

WEBSITE RESOURCES:

- http://www.commonchemistry.org/
- https://uri.idm.oclc.org/login?url=https://www.engineeringvillage.com/search/quick.url?CID=quickSearch&database=1
- https://www.technicalsymposium.com/

Note: Adhere to the latest editions of the Suggested Readings

EMA – 101 **ENGINEERING MATHEMATICS -I** **L T P 3 1 0**

OBJECTIVES:

The main aims of this course are to recall and remember basics of matrices, differential, integral and vector calculus. The focus of the subject to understand the concepts of basic mathematical methods to solve engineering problems, analyze engineering problems and evaluate the results.

UNIT – 1 (12 Sessions)

Matrices : Introduction of matrices, Special type of matrices, Elementary row and column transformation, Adjoint & inverse of matrices , Rank of matrix, , Consistency of linear system of equations, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Linear dependency and Independency of vector, Diagonalisation of matrices.

UNIT – 2 (10 Sessions)

Differential Calculus–I: Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem, Change of variables, Total differentiation, Jacobian, Expansion of function of several variables.

UNIT – 3 (10 Sessions)

Differential Calculus–II: Asymptotes, Curve tracing, Approximation of errors, Maxima & Minima of functions of several variables, Lagrange's method of multipliers.

UNIT – 4 (08 Sessions)

Multiple Integrals :Definite integral, Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Dirichlet integral, Liouville's extension formula, Applications to area and volume.

UNIT – 5 (12 Sessions)

Vector Calculus: Point functions, Gradient, Divergence and Curl of a vector and their properties, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems, Statements and problems (without proof).

COURSE OUTCOMES:

The student is able to

- Remember terminologies and formulae in matrices, differential, integral and vector calculus.
- Understand and interpret the concepts of matrices, differential, integral and vector calculus.
- Compare and analyze the methods in matrices, differential, integral and vector calculus.
- Predict and evaluate the problems in matrices, differential, integral and vector calculus.

SUGGESTED READINGS:

1. Prasad C. Advanced Mathematics for Engineers, Prasad Mudralaya.
2. B. S .Grewal, Engineering Mathematics, Khanna Publishers.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
4. C.Ray Wylie & Louis C . Barrett , Advanced Engineering Mathematics ,Tata Mc Graw –Hill Publishing Company Ltd.
5. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudranalaya.

WEBSITE RESOURCES:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Adhere to the latest editions of the Suggested Readings

EMA – 201 **ENGINEERING MATHEMATICS – II** **L T P 3 1 0**

OBJECTIVE: -

The main aims of this course are to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics Differential equation, series solutions, Fourier series and PDE introduced to serve as basic tools for specialized studies in many fields of engineering and technology.

UNIT – 1 **(08 Sessions)**

Differential Equations: Ordinary differential equations of first order and first degree, Linear differential equations of n^{th} order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solutions of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation).

UNIT – 2 **(08 Sessions)**

Series Solutions and Special Functions: Series solutions of ODE of 2nd order with variable coefficients with special emphasis to differential equations of Legendre and Bessel, Legendre polynomials, Bessel's functions**.**

UNIT – 3 **(08 Sessions)**

Fourier Series: Periodic functions, Trigonometric series, Fourier series of period 2π , Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.

UNIT – 4 **(08 Sessions)**

Partial Differential Equations: Introduction of partial differential equations, Solution of first order differential equations, Linear partial differential equations with constant coefficients of second order and their classification – Parabolic, Elliptic and Hyperbolic with illustrative examples.

UNIT – 5 **(08 Sessions)**

Applications of Partial Differential Equations : Method of separation of variables for solving partial differential equations, Wave equation up to two dimensions, Laplace equation in two-dimensions, Heat conduction equations up to two-dimensions, Equations of transmission Lines.

COURSE OUTCOME:

The student is able to

- Classify differential equations according to certain features.
- Solve first order linear differential equations and non linear differential equations of certain types and interpret the solutions.
- Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions.
- Find series solutions about ordinary and regular singular points for second order linear differential equations.
- Apply Fourier series to analyze the engineering problem.
- Solve partial differential equations with methods & its Applications.

SUGGESTED READINGS:

- Prasad C. Advanced Mathematics for Engineers, Prasad Mudralaya.
- A Textbook of Differential Equations, Pitamber Publications.
- B. S .Grewal , Engineering Mathematics , Khanna Publishers, New Delhi.
- E.Kreyszig, Advanced Engineering Mathematics , John Wiley & Sons.
- C.Ray Wylie & Louis C .Barrett , Advanced Engineering Mathematics ,Tata Mc Graw –Hill Publishing Company Ltd.
- Chandrika Prasad ,Advanced Mathematics for Engineers, Prasad Mudranalaya.

WEBSITE SOURCES:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Adhere to the latest editions of the Suggested Readings

EPH-201 **Engineering Physics-II** **L T P 3 1 0**

OBJECTIVE:

The goal of this course is to familiarize students about electromagnetic theory, magnetic materials, solid state Physics, superconductors and their applications.

UNIT- I

Electromagnetic Theory: Gauss law, continuity equation, Ampere's Law, Maxwell's equations (differential and integral forms), Pointing vector and Pointing Theorem , propagation of plane electromagnetic waves in free space Non conducting and in conducting media, Skin depth.

UNIT- II

Dielectric and Magnetic Properties of Materials Dielectric Properties: Dielectric constants, Polarization of dielectric materials, Polarizability, Claussius- Mossotti Equation, Application of dielectric.

Magnetic Properties: Magnetization, Magnetic moment, Dia, Para and Ferro magnetism, Langevin theory for diamagnetic material, Hysteresis Curve.

UNIT - III

Solid State Physics: Energy bands in metals, Semiconductors and insulators, Intrinsic and extrinsic semiconductors, Fermi energy levels for doped, undoped semiconductors, P-N junction, Tunnel diode, Zener diode.

UNIT- IV

Superconductivity: Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's Equation, Properties of superconductors & applications of superconductors.

Nano Materials: Basic principle of nano science and technology, Structure, properties and uses of Fullerene and carbon nano tubes, Application of nanotechnology.

Unit- V

X-Rays: Diffraction of X-rays, Production and properties, Bragg's Law, Bragg's spectrometer, Applications of X-rays.

Ultrasonics: Introduction, Production of Ultrasonics (Magneto striction and piezoelectric methods), properties & applications of Ultrasonic waves.

COURSE OUTCOME:

The students completing this course will be able to:

- Understand Gauss law, Ampere's Law, Maxwell's equations and their applications.
- Study of Propagation of plane electromagnetic waves in free space.
- Understand Dielectric and magnetic properties of the materials.
- Explain Intrinsic and extrinsic semiconductors.
- Construction, Operation and characteristics of diodes.
- Understand concepts of superconductors, Properties of superconductors & applications of superconductors.
- Gain basic knowledge on the properties, production and applications of X-rays.
- Basic principle of nano science and technology and applications of nanotechnology.

SUGGESTED READINGS:

- Concept of Modern Physics: A. BEISER
- Atomic Physics: Rajam
- Greiner : Quantum Physics
- Griffth : Introduction to Electrodynamics
- S. K. Gupta: Engineering Physics
- Beiser : Perspective of Modern Physics

WEBSITE SOURCES:

- https://www2.ph.ed.ac.uk
- http://web.mit.edu
- http://pcwww.liv.ac.uk
- http://sites.science.oregonstate.edu
- https://eng.libretexts.org
- https://shodhganga.inflibnet.ac.in
- https://www.electrical4u.com
- https://vardhaman.org

Note: Adhere to the latest editions of the Suggested Readings

EEC 101/ 201 **ELECTRONICS ENGINEERING** **L T P 3 1 0**

OBJECTIVE:

The objective of the course is to familiarize the students with concepts of semiconductor and its working along with their applications in real life.

UNIT – I

Theory of Semiconductor material: Energy band Theory of crystals, Insulators, Semiconductors and Metals, classification of semiconductors, Mobility and Conductivity, Donor and Acceptor Impurities, Mass- Action law, Variation in semiconductor parameters with Temperature, Hall – Effect.

UNIT – II

Semiconductor Diodes and Applications: p-n junction, depletion layer, V-I characteristics, diode resistance, capacitance, p-n junction as rectifiers, filter (Shunt capacitor filter), clipping circuits, clamping circuits, breakdown mechanism, breakdown characteristics, zener resistance, zener diode application as shunt regulator. Introduction of LED, and Photo diode.

UNIT– III

Bipolar Junction Transistor (BJT): construction, transistor action, CB, CE and CC configurations, concept of voltage gain, current gain. Field Effect Transistor (FET): JFET: construction, principle of working, concept of pinch-off, drain saturation current, characteristics, characteristic equation, CG, CS and CD configurations, MOSFET: depletion and enhancement type, construction.

UNIT – IV

Number system: conversion of bases (decimal, binary, octal and hexadecimal numbers) addition and subtraction, BCD numbers, Boolean algebra, logic gates, concept of universal gates. Canonical forms, minimization using K-map (Up to four variable, don't care conditions also)

UNIT – V

Operational Amplifier (Op-Amp): concept of ideal operational amplifier, parameters. Inverting, non-inverting and unity gain configurations, Op-amp as adder, subtractor, Block diagram of Communication Systems, Introduction to Modulation, Need for modulation, Definition of AM and FM.

COURSE OUTCOME:

- Understand the basic of semiconductor technology
- Define the purpose of different diodes used in several applications
- Develop understanding and impact of resistance regions
- Discuss how basic communication occurs over wireless medium
- Discuss the benefits of transistors over conventional vacuum tubes

SUGGESTED READINGS:

- S. Salivahanan, N Suresh Kumar, "Electronic Devices and circuits" 2nd Edition, TMH
- Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education
- Jacob Millman, Christos C. Halkias, "Integrated Electronics", TMH
- Morris Mano "Digital Computer Design", PHI 2003
- Kennedy, Davis, "Electronics Communication System" 4th Edition, TMH.

WEBSITE SOURCES:

- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)
- www.nptel.ac.in
- en.wikipedia.org

Note: Adhere to the latest editions of the Suggested Readings

EPH-151/251 **PHYSICS LAB** **L T P 0 0 2**

OBJECTIVE:

To achieve perfectness in experimental skills. The study of practical applications will bring more confidence and to learn the usage of electrical and optical systems for various measurements.

List of Experiments: **(20 Sessions)**

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using half shade polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To determine the specific resistance of the material of given wire using Carey Foster's bridge.
7. To determine the variation of magnetic field along the axis of a current carrying coil and thento estimate the radius of the coil.
8. To verify Stefan's Law by electrical method.
9. To calibrate the given ammeter and voltmeter.
10. To study the Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall-effect set up.
11. To determine energy bank gap of a given semiconductor material.
12. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
13. To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen.
14. To determine the ballistic constant of a ballistic galvanometer.
15. To determine the viscosity of a liquid.

COURSE OUTCOME:

The students completing this course will be able to:

- Understand principle, concept, working and application of technology and comparison of results with theoretical calculations.
- Apply the various procedures and techniques for the experiments.
- Understand usage of instruments and real time applications in engineering studies.
- Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

SUGGESTED READINGS:

- Engineering Practical Physics by S. L. Gupta
- Engineering Practical Physics by Navneet Gupta
- Engineering Practical Physics by S. K. Gupta

WEBSITE SOURCES:

- http://www.iiserpune.ac.in
- https://www.toppr.com
- https://wp.optics.arizona.edu
- https://www.gopracticals.com
- http://vlab.amrita.edu
- https://circuitglobe.com

Note: Adhere to the latest editions of the Suggested Readings

ECH 151/251 **CHEMISTRY LAB** **L T P 0 0 2**

OBJECTIVE:

- Practical implementation of fundamental concepts of qualitative and quantitative analysis.
- To gain the knowledge on existing future upcoming devices, materials and methodology used in chemistry practical's.
- To rely on elementary treatment and qualitative analysis and makes use of concepts involved.
- To provide an overview of preparation and identification of organic compounds

List of Experiments:(Minimum 08 experiments are required to be performed) **(16 Sessions)**

1. Determination of alkalinity of the given sample of water.
2. Determination of temporary and permanent hardness of water sample by Versinate method
3. Determination of available chlorine in bleaching powder.
4. Determination of quantity of dissolve oxygen in given sample of water.
5. Determination of iron content in the given water sample by Mohr's methods.
6. Determination of ion exchange capacity of given sample of ion-exchange material.
7. Determination of Equivalent weight of iron by the chemical displacement method. The equivalent weight of copper is 63.5.
8. Determination of viscosity of polystyrene by Ostwald Viscometer.
9. Preparation of Bakelite resin.
10. Element detection and functional group identification in organic

COURSE OUTCOME:

- Students are able to estimate the impurities present in water.
- Ability to prepare advanced polymer materials.
- Ability to know the strength of an acid present in secondary batteries.
- Ability to find the Fe^{+2}, Ca^{+2}& Cl^{-} present in unknown substances using titrimetric and instrumental methods.

SUGGESTED READINGS:

- Applied Chemistry by R. S. Katiyar & J.P. Chaudhary Publication B.B.P. & Co. Meerut
- March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.
- Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.
- Organic Chemistry, Finar, I.L.: Addision – Wesley Longman, Limited, 2004.
- Principles of Physical Chemistry, by Puri B.R., Sharma L.R., S. Nagin & Company, Delhi

WEBSITE SOURCES:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

Note: Adhere to the latest editions of the Suggested Readings

EEC 151/251 **ELECTRONICS ENGINEERING LAB** **L T P 0 0 2**

OBJECTIVE:

The objective of this lab is to familiarize the students with the basic working of diodes and also help them calculate voltage and currents through simple devices such as multimeter.

LIST OF EXPERIMENTS:(MINIMUM 08 EXPERIMENTS ARE REQUIRED TO BE PERFORMED) (16 Sessions)

1. To study of Digital Multimeters (measurement of AC and DC voltage, measurement of current, measurement of resistance, capacitance), passive components (resistor, capacitor) and verify using color code.
2. To Study Cathode Ray Oscilloscope (To study of controls of CRO, to measure amplitude, time period and frequency of time varying signals), function generator, power supply & Bread Board.
3. To study the Characteristics of a P-N Junction diode in forward & reverse bias connection.
4. To draw wave shape of the electrical signal at input and output points of the half wave rectifier.
5. To draw wave shape of the electrical signal at input and output points of the full wave rectifiers.
6. To study the Zener diode characteristic graphical measurement of forward and reverse resistance.
7. To Plot input / output characteristics for common base transistor.
8. To verify the truth table of basic logic gates (AND, OR, NOT)
9. To build and test the clipper circuit using diode.
10. To build and test the clamper circuit using diode

COURSE OUTCOME:

Students taking this lab will be able to:

- Measure voltage, current through multimeter.
- Understand the practical working of a diode
- Understand the graph transitions of a transistor
- Understand the concept of logic gates.

SUGGESTED READINGS:

- S. Salivahanan, N Suresh Kumar, “Electronic Devices and circuits” 2nd Edition, TMH
- Robert L. Boylestad/ Louis Nashelsky “Electronic Devices and Circuit Theory”, 9th Edition, Pearson Education 2007
- Jacob Millman, Christos C. Halkias, “Integrated Electronics”, TMH
- Morris Mano “Digital Computer Design”, PHI

WEBSITE SOURCES:

- www.nptel.ac.in
- www.gradeup.in
- en.wikipedia.org
- www.electr_basic.in

Note: Adhere to the latest editions of the Suggested Readings

EEE-151/ 251 **ELECTRICAL ENGINEERING LAB** **L T P 0 0 2**

OBJECTIVE:

- To design electrical circuits on bread board.
- To analyze a given network by applying various network theorems.
- To expose the students to the operation of dc generator
- To expose the students to the operation of dc motor and transformer.
- To examine the self -excitation in dc generators.

List of Experiments: **(16 Sessions)**

1. Verification of Kirchhoff's current law.
2. Verification of Kirchhoff's voltage law
3. Verification of Superposition theorem.
4. Verification of Thevenin's Theorem.
5. Verification of Maximum Power Transfer Theorem.
6. To study a Single phase induction motor and its various methods of starting.
7. To study running and speed reversal of a Three Phase Induction Motor and determine the slip.
8. To determine the transformation ratio and turns ratio and current ratio of a single-phase transformer.
9. To study the construction of a dc machine.
10. To study a single phase Induction type Energy meter.

COURSE OUTCOME:

After successfully studying this course, students will be able to:

- Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
- Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving both single phase and DC Machines
- Acknowledge the principles of operation and the main features of electric machines and their applications.
- Acquire skills in using electrical measuring devices.

SUGGESTED READINGS:

- V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International
- I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill
- D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering" Mc- Graw Hill
- T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering" Oxford University Press
- W.H. HaytP, "Engineering Circuit Analysis" Mc Graw Hill

WEBSITE SOURCES:

- www.iare.ac.in
- www.ocw.mit.edu
- www.nptel.ac.in
- www.vlab.co.in

Note: Adhere to the latest editions of the Suggested Readings

EME – 151 / 251 **MECHANICAL ENGINEERING LAB** **L T P 0**
0 2

OBJECTIVE:

The objective of the course is to introduce students to different engineering material and create an understanding of different mechanical properties by using Destructive testing methods. Also the students will be familiar with the basic working of IC engines & boilers.

LIST OF EXPERIMENTS

To conduct tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen using UTM Machine.

1. To conduct compression test and determine the ultimate compressive strength for a specimen using UTM Machine.
2. To conduct Impact-tests (Izod / Charpy) on Impact-testing machine to find the toughness.
3. To determine the hardness of the given specimen using Brinell/Rockwell hardness testing machine.
4. To study 2-stroke & 4-stroke I.C. Engine models.
5. To study Lancashire, Babcock Wilcox and Locomotive boiler models.
6. To study Steam Engine & Steam Turbine models.
7. To study vapor compression Refrigerator unit tutor / refrigerator.
8. To study window type Air conditioner.
9. To conduct torsion test on mild steel or cast iron specimens to find out modulus of rigidity.

COURSE OUTCOME:

Students completing this course will be able to:

- Describe the behavior of materials upon normal external loads.
- Predict the behavior of the material under impact conditions.
- Recognize the mechanical behavior of materials.
- Recognize parts of IC engines.
- Recognize components of boilers.

SUGGESTED READINGS:

- Engineering Mechanics by Irving H. Shames, Prentice-Hall
- Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
- Engineering Mechanics by R.K.Bansal, Laxmi Publications, New Delhi.
- Engineering Mechanics by SS BhaviKatti, New age International Publisher, New Delhi.

WEBSITE SOURCES:

- https://www.sciencedirect.com/topics/engineering/izod-impact
- https://www.twi-global.com/technical-knowledge/faqs/faq-what-is-charpy-testing
- https://www.hardnesstesters.com/test-types/brinell-hardness-testing
- https://www.youtube.com/watch?v=liiopCScMck

Note: Adhere to the latest editions of the Suggested Readings

EME 153/253 **ENGINEERING GRAPHICS LAB** **L T P 0 0 2**

OBJECTIVE:

- The course is aimed at developing Basic Graphic skills.
- Develop Skills In Preparation Of Basic Drawings.
- Skills in Reading and Interpretation of Engineering Drawings.

1. Introduction **(03 Sessions)**

Introduction, Drawing Instruments and their uses, BIS conventions, Lines & Lettering, Dimensioning and free hand practicing. Coordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale.

2. Orthographic Projections **(05 Sessions)**

Introduction, Definitions- Planes of projection, reference line and conventions employed. Principle of Orthographic projections, First and Third Angle projections.

Projection of Points, Pictorial view.

Terms used in Projection of lines. Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.**(First Angle Projection Only)**

3. Projections of Solids (First Angle Projection Only) **(06 Sessions)**

Introduction, Definitions- Projections of right regular- tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. Sections and Development of Lateral Surfaces of Solids, Sectional views, apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. Development of lateral surface of above solids, their frustums and truncations.

4. Isometric Projection (Using Isometric Scale Only) **(06 Sessions)**

Introduction, Principle of isometric projection, Terminology, Isometric scale, Isometric Projection of simple plane figures, Isometric Projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids.

COURSE OUTCOME:

Students completing this course will be able to:

- Use the drawing instruments effectively and able to dimension the given figures
- Appreciate the usage of engineering curves in tracing the paths of simple machine components
- Understand the concept of projection and acquire visualization skills, projection of points
- Able to draw the basic views related to projections of Lines, Planes

SUGGESTED READINGS:

- Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
- A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.
- Engineering Graphics – K.R. Gopalakrishna, 32nd edition, 2005 – Subash Publishers Bangalore.
- Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production – Luzadder Warren J., duff John M., Eastern Economy Edition, 2005 – Prentice- Hall of India Pvt. Ltd., New Delhi.
- Engineering Drawing with an introduction to Auto CAD by Dhananjay A Jolhe, Tata McGraw Hill Book Company, New Delhi.

WEBSITE SOURCES:

- https://lecturenotes.in/
- http://home.iitk.ac.in/
- http://www.fkm.utm.my/
- https://lecturenotes.in/

Note: Adhere to the latest editions of the Suggested Readings

EME-152/252 **MATERIALS & MANUFACTURING LAB** **L T P 0 0 2**

OBJECTIVE:

The objective of this course is to meet curriculum requirements and provide knowledge of different types of tools, instruments and machines and their applications in manufacturing to produce different metal components and articles and develop skills in the students.

LIST OF EXPERIMENTS

1. Carpentry Shop: **(03 Sessions)**

a. Study of tools & operations and carpentry joints.
b. Simple exercise using jack plane.
c. To prepare half-lap corner joint, mortise & tenon joints.
d. Simple exercise on woodworking lathe.

2. Fitting Bench Working Shop: **(03 Sessions)**

a. Study of tools & operations
b. Simple exercises involving fitting work.
c. Making perfect male-female joint.
d. Simple exercises involving drilling/tapping/dieing.

3. Black Smithy Shop: **(03 Sessions)**

a. Study of tools & operations
b. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & Swaging.

4. Welding Shop: **(03 Sessions)**

a. Study of tools & operations of Gas welding & Arc welding
b. Making simple Butt and Lap arc welded joints.
c. Simple exercises involving Oxy-acetylene Gas welding.

5. Sheet-metal Shop: **(02 Sessions)**

a. Study of tools & operations.
b. Making Funnel complete with 'soldering'.
c. Fabrication of tool-box, tray, electric panel box etc.

6. Machine Shop: **(03 Sessions)**

a. Study of machine tools and operations.
b. Simple exercises involving Plane turning.
c. Simple exercises involving Step turning
d. Simple exercises involving Taper turning.

7. **Foundry Shop:** **(03 Sessions)**

a. Study of tools and operations.
b. Preparation of sand for moulding.
c. Mould making using core.

COURSE OUTCOME:

Students completing this course will be able:

- To define and use different manufacturing process e.g. casting, forging, turning, drilling etc.
- To define and use different welding processes e.g. gas welding and electric arc welding.
- To acquire thorough knowledge of carrying out various operations in this lab.
- To acquire skills for creating different objects from raw materials.

SUGGESTED READINGS:

- Manufacturing Process, B.S Raghuvanshi, DhanpatRai Publication.
- Manufacturing Processes, R.S. Khurmi and J.K. Gupta, S. Chand Publishing.
- Materials Science, Narula & Narula, McGraw Hill Education Private Limited.
- Manufacturing Technology, R. K. Rajput, Laxmi Publications PVT. LTD.

WEBSITE SOURCES:

- www.wikipedia.org
- www.brcmcet.edu.
- www.slideshare.net
- https://onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech 2nd Year (III Semester)

ECS-301 **DATA STRUCTURES USING C** **L T P 3 1 0**

OBJECTIVES:

Data structure is a very important paper for a computer science & Engineering student. There are many objectives and outcome of this paper which are given below:

1. To teach efficient storage mechanisms of data for an easy access.
2. To improve the logical ability
3. To design and implementation of various basic and advanced data structures.
4. To introduce various techniques for representation of the data in the real world.
5. To develop applications using data structures.
6. To teach the concept of protection and management of data.
7. To teach various file management techniques.

UNIT-I

Introduction: Elementary Data Organization, Algorithm, Asymptotic notations, Space and Time Complexity of an algorithm, Time Space Trade off, Information and its storage representation, Representation and its manipulation of Strings, Pattern Matching.

Array: Linear data structures, Arrays, Single and Multidimensional Array, Representation of Array in memory, sparse matrices. Linear search, binary search.

UNIT-II

Linked List: Single Linked list, Array and Linked representation of Linked List, Two Way List, Operations on linked lists, Polynomial representation and addition using linked list.

UNIT-III

Queues: Queue operations, Circular queue, Priority queues, Array and linked representation of Queue, Dequeue.

Stacks: Stack operations, Array and linked representation of stack, Application of Stack, Prefix and postfix expressions, Recursion, Tower of Hanoi problem,

UNIT-IV

Non-Linear data structures: Trees, Binary tree, Inorder, Preorder and Postorder traversals of a Binary tree, Extended binary tree, complete tree, Huffman Algorithm, Multi linked structure, graphs and their representation, spanning trees, dynamic storage management,

Sorting: Selection sort, Bubble sort, Radix sort, Merge Sort, Quick Sort, Insertion Sort, Bucket Sort, Heap Sort, topological sorting, external sorting, internal sorting etc.

UNIT-V

Search Trees: Binary Search Tree, AVL Tree, B Trees

Hashing: Hashing functions, Collision resolution techniques, Application of Hashing techniques

File structures: external storage devices, sequential files, indexed sequential files, direct files, external searching, linear and virtual hashing.

COURSE OUTCOMES:

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list, tree etc.

SUGGESTED READINGS:

- SEYMOUR LIPSCHUTZ, “Data structures”, McGraw Hill International Edition.
- Sartaj Sahni, Data structures, Algorithms and Applications in Java , , McGraw Hill,
- J.P.Tremblay and Paul G. Sorenson, “An introduction to data structures with applications”,TMH.
- Robert Kruse C.L. Tondo and Bruce Leung, “Data Structures and Program Design in C”, Pearson Edu.
- Tenenbaum A.M and Augenstein M.J, " Data Structures using C ", Prentice Hall of India

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- http://courses.cs.vt.edu/csonline/DataStructures/Lessons/
- https://www.geeksforgeeks.org/

Note: Adhere to the latest editions of the Suggested Readings

ECS-302 **C++ PROGRAMMING** **L T P 3 1 0**

OBJECTIVES:

The main aim of this course is to understand the fundamental programming and object oriented concepts which are essential in building good programs in C++.

UNIT I:

Introduction to C++, Characteristics of Object Oriented languages, Memory model of C++, types of error, Basic program construction, preprocessor directives, comments, types of variables, input/ output using cin and cout, manipulator, type conversion, library functions
Arithmetic operators, relational operators, logical operators, different types of loops, decision making statements, control statements.

UNIT II:

Structures, enumerated data types, simple functions, passing arguments to functions, reference arguments, function overloading, function overriding, inline functions, default arguments, variable and storage classes, returning to reference.

UNIT III:

A simple class, C++ objects as physical objects, C++ objects as data types, Constructors, Objects as functions arguments, Returning objects from functions, structures and classes. Arrays, Arrays as class Member data, Arrays as objects, String, Overloading Unary operators, Overloading binary operators, Data Conversion

UNIT IV

Inheritance, Derived class and Base class, Derived class constructors, Abstract Class. Addresses and pointers, Pointers and Arrays, Pointers and Functions, Pointers and Strings, Memory Management, Pointers to Objects, Pointers to Pointers

UNIT V

Virtual Functions, Friend Functions, Static Functions, Assignment and copy Initialization, this pointer. Stream, String I/O, Character I/O. Object I/O, I/O with Multiple Objects, File Pointers, Disk I/O with Member Functions, Error Handling

COURSE OUTCOMES:

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

- To practice the fundamental programming methodologies using C/C++ programming language.
- To code, document, test, and implement, robust computer program using the C/C++ language.
- To write reusable modules (collections of functions).

SUGGESTED READINGS:

- Robert Lafore, “Object-Oriented Programming in Turbo C++”, Galgotia Publications pvt. Ltd., 2008
- Lipman, Stanley B, JonsceLajoie, C++ Primer Reading", AWL, 1999
- BjarneStroustrup, The C++ Programming Language (English) 3rd Edition, Pearson India, 2002
- E. Balagurusamy, Object Oriented Programming with C++ , McGraw Hill Education (India),

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in
- w3school.com
- tutorialspoint.com

Note: Adhere to the latest editions of the Suggested Readings

ECS-303 **COMPUTER ORGANIZATION** **L T P 3 1 0**

OBJECTIVES:

This course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system. This includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design. This course will also expose students to the basic architecture of processing, memory and i/o organization in a computer system.

UNIT-I

Basic structure of computers: Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data types, Complements, Data Representation. Fixed Point Representation. Floating Point Representation. Error Detection codes.

UNIT-II

Register transfer language and Micro operations: Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt.

UNIT-III

Central processing unit - Stack organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

Micro programmed control: Control memory, Address sequencing, micro program example, Design of control unit -Hard wired control. Micro programmed control

UNIT-IV

Computer arithmetic: Addition and subtraction, Multiplication Algorithms, Division Algorithms, Floating point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

The memory system: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

UNIT-V

Input-output organization : Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor(IOP), Serial communication.

Pipeline and vector processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline

COURSE OUTCOMES:

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

- Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
- Understand the concept of Pipelining and multiprocessor.
- Draw a flowchart for concurrent access to memory organization.
- Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
- Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and CISC &RISC methodology

SUGGESTED READINGS:

- 1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
- 2. Computer Organization – Car Hamacher, Zvonks Vranesic, Safwat Zaky, V Edition, McGraw Hill, 2002.
- 3. Computer Organization and Architecture – William Stallings Seventh Edition, PHI/Pearson, 2006.
- 4. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International editions, 1998.

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-304 **OPERATING SYSTEM CONCEPTS** **L T P 3 1 0**

OBJECTIVES:

The main objectives of this source can be stated as follows

- Recognize the concepts and principles of operating systems.
- Provide comprehensive introduction to understand the underlying principles, techniques and approaches which constitute a coherent body of knowledge in operating systems.
- To teach understanding how the various elements that underlie operating system interact and provides services for execution of application software

UNIT – I

Introduction: Definition, objective characteristics, functions and services of Operating system, Categorization of Operating systems. Computer system structure, operating system structure, system calls, Kernels, Monolithic and Microkernel

UNIT – II

Process concept: process state, process control block, process scheduling queue, schedulers, operation on the process, cooperating process, inter process communication, threads, benefits of threads, multithreading models, threading issues pthreads, Linux thread, java threads, Principle of Concurrency, Producer Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; critical region, monitors .

UNIT – III

CPU Scheduling: Scheduling Concepts, scheduling Criteria, scheduler, preemptive scheduling and non preemptive scheduling, Scheduling Algorithms, Multiprocessor Scheduling, real time scheduling, scheduling algorithm evaluation.

Deadlock: System model, Deadlock characterization, deadlock handling Strategies, Prevention, Avoidance and detection, Recovery from deadlock.

UNIT – IV

Memory Management: concept, address binding, Basic, dynamic loading, overlays, swapping, contiguous and non contiguous memory allocation, fragmentation, paging, page tables, segmentation, segmentation with paging, concept of virtual memory, demand paging, page replacement, Thrashing,

UNIT – V

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling algorithms, File System: File concept, File organization and access mechanism, File directories, and File sharing, file system implementation issues, File system protection and security.

COURSE OUTCOMES:

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

- Create processes and threads.
- Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
- Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
- Design and implement file management system.
- Develop the I/O management functions in OS

SUGGESTED READINGS:

- Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
- Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
- Harvey M Dietel, "An Introduction to Operating System", Pearson Education
- D M Dhamdhere, "Operating Systems: A Concept based Approach", 2nd Edition

WEBSITE RESOURCES:

- www.swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-305 **DISCRETE MATHEMATICAL STRUCTURES** **L T P 3 1 0**

OBJECTIVES:

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counterexamples.
5. Apply logical reasoning to solve a variety of problems.

UNIT-I

Set Theory: Introduction, Combination of sets, Multi-sets, Ordered pairs. Proof's of some general identities on sets.

Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations. Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of functions.

Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods, Proof by counter – example, Proof by contradiction.

UNIT-II

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields, Integers Modulo n.

UNIT-III

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram. Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

UNIT-IV

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

UNIT-V

Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.

Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring

Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.

Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle

COURSE OUTCOMES:

Students will be able to:

- Write an argument using logical notation and determine if the argument is or is not valid.
- Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
- Understand the basic principles of sets and operations in sets.
- Prove basic set equalities.
- Apply counting principles to determine probabilities.
- Demonstrate an understanding of relations and functions and be able to determine their properties. 7. Determine when a function is 1-1 and "onto".
- Demonstrate different traversal methods for trees and graphs. 9. Model problems in Computer Science using graphs and trees.

SUGGESTED READINGS:

- 1. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill
- 2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill
- 3. R.P. Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,
- 4. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill,
- 5. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, PHI

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- http://courses.cs.vt.edu/csonline/ Discrete Mathematics /Lessons/
- https://www.geeksforgeeks.org/

Note: Adhere to the latest editions of the Suggested Readings

(PSD-301/PSD-401) PROFESSIONAL SKILL DEVELOPMENT-II Credit: 03

OBJECTIVES:

The objectives of Professional Skill Development-II are:

- To Develop critical thinking, creativity and effective communication.
- To provide the essential foundational elements for leadership skill-building and student success.
- To Explore self-awareness that involves identification and articulation of various facets – cultural, social, and familial that contribute to the formation of one's identity.
- To develop mutually beneficial relationships through communication and cooperation with others, collaborate to achieve group goals, practice living and leading with integrity, and learn about issues of local and global significance in order to become active members of their communities.

UNIT I: Communicative Skills (05 Sessions)

Communication: Concept, Classification, Purpose, Process, Importance, Flow & Level of Communication, Barriers & Gateways in Communication, 7 C's of Communication, Types of Communication & communication without words

UNIT II: Intrapersonal Relationship Skills (07 Sessions)

Personality: Characteristics of Healthy & Sick Personality
Self Awareness
Self Esteem
Self Confidence
Assertiveness V/S Aggressiveness
Values: Types & Importance

UNIT III: Interpersonal Relationship Skills (08 Sessions)

Group: Concepts, Types, Stages
Team: Concepts, Elements, Types, Stages
Presentation Skills& strategies
Interview: Concepts, Types, Process, Interview Preparation Checklist, Interview Handling Skills, Common Interview mistakes

UNIT IV: Argumentative Skills (10 Sessions)

Debate
Role Play
Speeches
Elocution
Group Discussion

UNIT V: Campus to Company Skills (08 Sessions)

The corporate Fit: Dressing and Grooming
Basic Etiquette: Office (Do's and Don'ts for men and women), Telephone, Email
Dealing With People in Corporate

COURSE OUTCOMES:

Students completing this course will be able to:

- Apply the comprehensive set of skills and knowledge for life success.
- understand the communication process, its benefits and challenges
- Learn to effectively lead others on a project or in an organization
- Develop and articulate respect for the diversity of talents, ways of knowing and learning.

SUGGESTED READINGS:

- M.K. Sehgal & V. Khetrapal's Business Communication published by Excel Books.
- Rajendra Pal's Business Communication published by Sultan Chand & Sons Publication.
- P. D. Chaturvedi's Busines Communication published by Pearson Education, Delhi.
- Elizabeth B. Hurlock's Personality Development by Tata McGraw Hills, Delhi.

WEBSITE RESOURCES:

- www.wikipedia.com
- www.fluentu.com
- www.mindstool.com
- www.digitalcommons.pace.edu

Note: Adhere to the latest editions of the Suggested Readings

EHU-301 **DISASTER MANAGEMENT** **L T P 3 0 0**

OBJECTIVE:

The objective of this course is to provide students an understanding to the concepts and aspects of disaster and its relationship with development. To ensure awareness of Disaster Risk Reduction (DRR) approaches among students. To assist students develop ability to respond to their environment with potential response to disaster.

UNIT I: Introduction to Disasters **(12 Sessions)**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks; Types of disasters – Earthquake, Landslide, Flood, Drought, Fire, campus shooting, bomb threat, terrorist incidence and financial emergency etc.; Causes and Impacts including social, economic, political, environmental, health, psychosocial, etc.; Differential impacts- in terms of caste, class, gender, age, location, disability; Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II: Approaches To Disaster Risk Reduction **(10 Sessions)**

Disaster life cycle – its analysis, phases, culture of safety, prevention, mitigation and preparedness; Community based DRR (Disaster Risk Reduction), Structural-nonstructural measures; Roles and responsibilities of community: Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders

UNIT III: Inter-Relationship between Disasters and Development **(08 Sessions)**

Factors affecting Vulnerabilities, impact of Development projects such as dams, embankments, changes in Land-use etc.; Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India – Relevance of indigenous knowledge, appropriate technology and local resources; Role of international cooperation's in Disaster Management

UNIT IV: Disaster Risk Management In India **(08 Sessions)**

Hazard and Vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management; Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy – Other related policies, plans, programmes and legislation; Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V: Disaster Management: Applications, Case Studies and Field Works **(07 Sessions)**

The project /fieldwork are meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located. A few ideas or suggestions are discussed below:

Several governmental initiatives require Urban Local Bodies (ULBs) and Panchayati Raj Institutions (PRIs) to be proactive in preparing DM plans and community based disaster preparedness plans. Information on these would be available with the district collector or Municipal corporations.

Teachers could ask students to explore and map disaster prone areas, vulnerable sites, vulnerability of people (specific groups) and resources. The students along with teacher could work on ways of addressing these vulnerabilities, preparing plans and consultation with local administration or NGOs.

Students could conduct mock drills in schools, colleges or hospitals. They could also work on school safety, safety of college buildings, training in first aid.

Other examples could be- identifying how a large dam, road/ highway or an embankment or the location of an industry affects local environment and resources or how displacement of large sections of people creates severe vulnerabilities may be mapped by student project work.

The suggested topics for Project work for student could be as follows:

- Monitoring and evaluation plan for disaster response
- Low cost Home based water purification methods
- Planning Nutrition intervention programmes
- Safety tips before during and after earthquake, cyclone, floods and fire accidents.
- Mock Drills
- Major disasters in India
- Disaster Management in India
- Flood affected areas and damages in India
- Heat waves in India
- Earth quakes in India
- Historical Tsunamis in India
- Nuclear emergence
- Traffic accidents in India
- Train Accidents
- Major disease outbreak

Note: Adhere to the latest editions of the Suggested Readings

- Disaster management structure in India
- Precaution, mitigation of disaster in India
- Warning system in India to prevent disaster
- Bhopal gas tragedy
- Kutch earth quake
- Tsunami (2004)
- Kosi Calamity 2008
- Mayapuri radiation exposure Delhi (2010)
- Mock exercises

COURSE OUTCOME:

The students will be able to identify the nature and causes of disaster. Also the students will be able to apply the disaster risk reduction mechanism.

SUGGESTED READINGS:

- SatishModh, Introduction to Disaster Management, Macmillan Publisher India Ltd
- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Damon P. Coppola, Introduction to International Disaster Management, Butterworth-Heinemann,
- Singhal J.P. "Disaster Management", Laxmi Publications. ISBN-10: 9380386427 ISBN-13: 978-9380386423
- Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., . ISBN-10: 1259007367, ISBN-13: 978-1259007361]
- Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi
- KapurAnu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi.
- Carter, Nick. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
- Cuny, F. Development and Disasters, Oxford University Press. Document on World Summit on Sustainable Development.
- Govt. of India: Disaster Management Act 2005, Government of India, New Delhi. Government of India, 2009.
- Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi Indian Journal of Social Work.
- Special Issue on Psychosocial Aspects of Disasters, Volume 63, Issue 2, April.

WEBSITE SOURCES:

- https://www.physio-pedia.com/Disaster_Management
- http://www.ifrc.org/en/what-we-do/disaster-management
- http://www.wcpt.org/disaster-management/what-is-disaster-management
- en.wikipedia.org

Note: Adhere to the latest editions of the Suggested Readings

ECS-351 **DATA STRUCTURES LAB** **L T P 0 0 2**

OBJECTIVE:

The course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures

LIST OF EXPERIMENTS

Write a program to implement (Using C Programming)

1. Linear Search
2. Merging two sorted array
3. Multiply two matrices
4. Program to compare strings, concatenate strings, copy string
5. Stack operations using arrays
6. Circular queue operations using arrays
7. Infix-postfix operations
8. Postfix evaluation
9. Prefix-evaluation
10. Single linked list
11. Double linked lists
12. Bubble Sort
13. Selection Sort
14. Insertion Sort
15. Quick Sort
16. Heap Sort
17. Binary Search

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

- Develop programs using dynamic memory allocation and linked list ADT.
- Apply Stack and Queue to solve problems.
- Implement the concept of hashing in real time dictionaries.
- Identify and implement the suitable data structures for the given problem.
- Solve real world problems by finding minimum spanning tree and Shortest path algorithm.

Note: Adhere to the latest editions of the Suggested Readings

ECS-352 **C++ LAB** **L T P 0 0 2**

OBJECTIVE:

The objective of course is to develop programming skills of students, using object oriented programming concepts, learn the concept of class and object using C++ and develop classes for simple applications.

LIST OF EXPERIMENTS

1. Write a program in C++ to check whether a given number is even or odd.
2. Write a program in C++ the find greater number between two given numbers.
3. Write a program in C++ the find greatest number among three given numbers.
4. Write a program in C++ to print the table of a given number.
5. Write a program in C++ to find the root of a quadratic equation.
6. Write a program in C++ to check whether a given year is a leap year or not.
7. Write a program in C++ to do arithmetic operations using switch case.
8. Write a program in C++ to do arithmetic operations using if else.
9. Write a program in C++ to find the factorial of a given number.
10. Write a program in C++ to addition of two matrices.
11. Write a program in C++ to multiplication of two matrices.
12. Write a program in C++ to do transpose a matrix.
13. Write a program in C++ to do arithmetic operations using function.
14. Write a program in C++ to implement array using pointer.
15. Write a program in C++ to store record of a student using structure.
16. Write a program in C++ to implement an array of structure.
17. Write a program in C++ to implement the file handling.
18. Write a program in C++ to implement the single inheritance.
19. Write a program in C++ to implement the multiple inheritance.
20. Write a program in C++ to implement the encapsulation.

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to

- Design object oriented programs with static members and friend functions using C++
- Implement C++ programs with operator overloading and type conversions
- Develop class templates for various data structures like stack, queue and linked list.
- Create classes with necessary exception handling
- Construct simple test applications using polymorphism.

Note: Adhere to the latest editions of the Suggested Readings

ECS-353 **DIGITAL AND CO LAB** **L T P 0 0 2**

OBJECTIVES:

- To illustrate the students different electronic circuit and their application in practice.
- To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
- To evaluate the use of computer-based analysis tools to review performance of semiconductor device circuit

LIST OF EXPERIMENTS

1. Bread Board Implementation of various logic gates using NAND gate.
2. Bread Board implementation of Binary Adder (Half and Full)
3. Bread Board implementation of Adder/Subtractor.
4. Bread Board Implementation of Flip-Flops.
5. Experiments with clocked Flip-Flop.
6. Design of Counters.
7. Bread Board implementation of counters & shift registers.
8. Implementation of Arithmetic algorithms.
9. Bread Board implementation of Seven Segment Display.

COURSE OUTCOMES:

At the end of the course, a student will be able to:

- Identify relevant information to supplement to the Analog Electronic Circuit.
- Set up testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.
- Choose testing and experimental procedures on different types of electronic circuit and analyze their operation different operating conditions.
- Evaluate possible causes of discrepancy in practical experimental observations in comparison to theory.
- Practice different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.

Note: Adhere to the latest editions of the Suggested Readings

ECS-354 **OS LAB** **L T P 0 0 2**

OBJECTIVES:

The main objective of this course is to provide the students with an exposure to different OS with awareness of concepts of multiprogramming, multithreading and multitasking. It will also helps in demonstrating memory management algorithms, file-handling concept, computational issues, and resources in distributed environment.

LIST OF EXPERIMENTS

1. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, stat, opendir, readdir
2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time (2 sessions)
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time (2 Sessions).
6. Developing Application using Inter Process communication (using shared memory and pipes)
7. Simulate the Producer – Consumer problem using semaphores (using UNIX system calls).
8. Simulate First fit, best fit and Worst fit memory management algorithms.
9. Simulate Page Replacement Algorithms(FIFO, LRU and Optimal)
10. Simulate Paging memory management scheme

COURSE OUTCOMES:

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

- Understand the system calls and I/O system calls in UNIX
- Evaluate the process scheduling algorithms FCFS, SJF, Priority and Round robin
- Simulate the process communication through various techniques
- Simulate memory management schemes
- Simulate File allocation Techniques

Note: Adhere to the latest editions of the Suggested Readings

Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech 2nd Year (IV Semester)

ECS-401 **DATA COMMUNICATION & NETWORK** **L T P 3 1 0**

OBJECTIVES:

Students will try to learn:

1. Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
2. Acquire knowledge of various services provide a various layers of OSI and TCP/IP model.
3. Read the fundamentals and basics of Physical layer, and will apply them in real time applications

UNIT -I

Introduction: Data Communications, Networks, The internet, Protocols and Standards, Layered Tasks, Goals and Applications of Networks, The OSI reference model, layers in the OSI Model, TCP/IP Protocol Suite, and Addressing. Transmission Media, Coaxial Cable, Fiber Optics, Line Coding, Modems, Internetworking devices, Bridges, router, repeater, switch.

UNIT-II

Data link layer: Introduction, Framing, Error Detection and Correction, Linear block coding, Cyclic Codes, Checksum, Flow and error control, protocols, noiseless channels, noisy channels,

Medium Access sub layer: Channel Allocations, ALOHA protocols, Overview of IEEE standards, FDDI. HDLC, sliding window protocols, Frame relay, switching, Point to point protocols, LAN protocols, Wired LANs Ethernet IEEE 802.3, IEEE 802.4, IEEE 802.5, Wireless LANs

UNIT - III

Network Layer: Point to Point Networks, introduction to routing protocols, distance vector routing, Link state routing, Congestion control, Internetworking, TCP / IP, IP packet, IP addressing, Subnetting, IPv6 addresses, Internetworking, IPv4, IPv6 Protocols.

UNIT - IV

Transport Layer: Design issues, Duties of transport layer: Multiplexing, De-multiplexing, connection management, Sockets, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Congestion Control

Session Layer: Design issues, Remote procedure call.

UNIT-V

Presentation Layer: Design issues, Data compression techniques, cryptography, Window Management.

Application Layer: File Transfer, Access and Management, Electronic mail, Virtual terminals, other applications. Example Networks - Internet and Public Networks, WWW and HTTP, DNS,FTP, Network Management: SNMP, Network security, Introduction to Digital Signature.

COURSE OUTCOMES:

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

- Explain the functions of the different layer of the OSI Protocol.
- Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- Address the issues related to IPv4 and IPv6
- Configure DNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP
- Configure Bluetooth, Firewalls using open source available software and tools.

SUGGESTED READINGS:

- Forouzen, "Data Communication and Networking", TMH
- A.S. Tanenbaum, Computer Networks, Pearson Education
- W. Stallings, Data and Computer Communication, Macmillan Press
- G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-402 **DESIGN AND ANALYSIS OF ALGORITHMS** **L T P 3 1 0**

OBJECTIVES:

- To develop proficiency in problem solving and programming.
- To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
- To get a good understanding of applications of Data Structures.
- To develop a base for advanced study in Computer Science.

UNIT-I

Introduction: Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Recurrence relations, Master's Theorem, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time – counting sort, radix sort, bucket sort

.**UNIT** -II

Hash Tables, Binary Search Trees, Augmenting Data Structures, Advanced data structures: Red-Black trees, B-trees, Binomial Heaps, Fibonacci Heaps. Divide and Conquer with examples such as Sorting, Matrix Multiplication and Searching.

UNIT - III

Greedy methods, Knapsack, Huffman codes, Activity selection problem, Minimum Spanning trees – Prim's and Kruskal's algorithms, Amortized Analysis

Graph Algorithms: Topological sorting, Single source shortest paths, Dijkstra's and Bellman Ford algorithms, APSP.

UNIT - IV

Dynamic programming with examples such as - Matrix chain multiplication, Longest common subsequences, Knapsack, Backtracking, Branch and Bound, Travelling Salesman Problem, Graph Coloring, n-Queen Problem

UNIT -V

Sorting networks, String Matching, Matrix Operations, Number Theoretic Algorithms, Convex hull, Computational Geometry, Fast Fourier Transform, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

COURSE OUTCOMES:

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

- Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Analyze randomized algorithms and approximation algorithms

SUGGESTED READINGS:

- Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", PHI
- E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
- Berman, Paul," Algorithms", Cengage Learning.
- Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-403 **DATABASE MANAGEMENT SYSTEMS** **L T P 3 1 0**

OBJECTIVES:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS

UNIT-I

Introduction: An overview of database management system, database system Vs file system, Database architecture, data models, schema and instances, data independence, database language and interfaces, data definitions language, data manipulation language.

Data Modeling using the Entity Relationship Model:

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables.

UNIT-II

Relational data Model and Language: Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, advantage of SQL. SQl data types, Types of SQL commands, SQL operators, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.

UNIT-III

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

UNIT-IV

Transaction Processing Concept: Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Distributed Database: Concepts of distributed database management systems

UNIT-V

Concurrency Control Techniques: Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

COURSE OUTCOMES:

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

- Write relational algebra expressions for that query and optimize the developed expressions
- Design the databases using E-R method and normalization.
- Construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
- Optimize its execution using Query optimization algorithms
- Determine the transaction atomicity, consistency, isolation, and durability properties.

SUGGESTED READINGS:

- Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
- Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley
- Date, C. J., "An introduction to database systems", 8th Edition, Pearson Education.
- Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-404 **INTRODUCTION TO MICROPROCESSOR** **L T P 3 1 0**

OBJECTIVES:

- To illustrate the architecture of 8085 microprocessors.
- To introduce the programming and interfacing techniques of 8085 microprocessor.
- To analyze the basic concepts and programming of 8051 microcontroller
- To understand the interfacing circuits for various applications of 8051 microcontroller.
- To introduce the architecture of advanced microprocessors and microcontrollers.

UNIT-I

Introduction: Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram. Interfacing devices. Architectural advancement of microprocessor. Typical microprocessor development schemes.

UNIT-II

8-bit Microprocessors: Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status, interrupt and machine cycle. Instruction sets. Addressing modes, Instruction formats

Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives.

UNIT-III

16-bit Microprocessor:

Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, memory segmentation, Operating modes, Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts.

UNIT-IV

Programming: Assembly language programming based on Intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions

UNIT-V

Peripheral Interfacing: Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C.

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

- Understand the basics of 8085 microprocessor and its instruction set.
- Understand the 8086 architecture and its instruction set.
- Understand the 8086 programming.
- Know about the 8089 microprocessor's interfaces and their architecture
- Describe the evolution and various types of advanced microprocessors.

SUGGESTED READINGS:

- Gaonkar , Ramesh S , "Microprocessor Architecture, Programming and Applications with 8085" , Wiley
- Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH
- Hall D V ,"Microprocessor Interfacing', TMH
- Liu and Gibson G A , " Microcomputer System: The 8086/8088 family'' ,PHI
- Aditya P Mathur, " Introduction to Microprocessor", TMH
- Brey, Barry B, "INTEL Microprocessors", PHI

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-405 **SOFTWARE ENGINEERING** **L T P 3 1 0**

OBJECTIVES:

- This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering.
- It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems. It aims to set these techniques in an appropriate engineering and management context.

UNIT-I: Introduction: Software: Introduction, software applications, importance of software evolution of software, Software Components, Software Characteristics, Software Crisis & myths. Software Engineering paradigms: introduction, principles & Processes, Software Quality Attributes. Comparison between software engineering & computer science, & software engineering & Engineering. Some terminologies: product & process, deliverables and milestones, measures, metric & indicators. Programs & software products. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, RAD model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT-II: Software Requirement Specifications (SRS): Requirement Engineering Process: introduction, Information Modeling, Data Flow Diagrams, Decision Tables. SRS: Document, components, characteristics, IEEE Standards for SRS, validation Entity Relationship Diagrams. Software Reliability and Quality Assurance (SQA): Software Reliability: introduction, Verification and Validation, Software Reliability specification, software quality. Reliability issues, Reliability metrics, Reliability growth model (jelinski-moranda model, little wood and verall's model, step function model) Reliability assessment., etc., fault avoidance , fault tolerance, exception handling, Software Reliability Assurance (SQA): introduction, properties, plans, goals. SEI-CMM Model. ISO: introduction, ISO 9000 Models, ISO 9126 MODELS. Comparison between ISO 9000 & SEI – CMM Model

UNIT-III: Software Design and coding structure: Software design: Introduction, properties, principles Architectural Design: introduction, objectives. Object oriented designs: basic concept, terminologies, and examples. Low Level Design: Modularization, Structure Chart, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, relationship between Coupling and Cohesion, Design Strategies: Functional versus Object Oriented approach, design verification Software Coding: information hiding, programming style, monitoring and control for coding, structured programming, 4GT, etc. Software Measurement and Metrics: introduction, Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, and Cyclomatic Complexity Measures: Control Flow Graphs.

UNIT-IV: Software Testing: Testing: definition, principles, objectives, test oracles, test plan, test case design. Levels of testing: unit Testing: procedure, Integration Testing: objectives, approaches (incremental, top down, bottom up regression, smoke & sandwich), system testing: alpha, beta, acceptance testing. Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards, debugging, error fault & failure

UNIT-V: Software Maintenance and Software Project Management: Software maintenance: definition, nature of Software Maintenance, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, use of Software Maintenance, maintenance characteristics, Cost of Maintenance, maintainability, task during maintenance, maintenance side effects, maintenance ALIEN code, maintenance problems, Software Re-Engineering, reverse software Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, CASE: introduction, levels of case, architecture, case building blocks, objectives, case repository, characteristics of case tools, categories, Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

COURSE OUTCOMES:

Upon Successful completion of this course, the students will be able to

- Identify appropriate software design model based on requirement analysis.
- Formulate Software Requirements Specification (SRS) reports for the real world application
- Translate a specification into a design and identify the components to build the architecture

SUGGESTED READINGS:

- R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
- Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
- K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers
- Pankaj Jalote, Software Engineering, Narosa Publication
- A. Leon and M. Leon, Fundamentals of Software Engineering, Vikas Publication

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

EMA401 COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES L:T:P : 3:1:0

OBJECTIVES:

The main aims of this course are to provide suitable and effective methods by numerical analysis, for obtaining approximate representative numerical results of the problems. To have a proper understanding of Statistical applications in different areas

UNIT-I

Introduction: Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation

Solution of Algebraic and Transcendental Equations:

Bisection Method, Iteration method, Method of false position, Newton Raphson method, Methods of finding complex roots, Muller's method, rate of Convergence, polynomial equations.

UNIT-II

Solution system of linear equations, gauss- seidal method, LU decomposition method.

Interpolation: Finite Differences, Differences tables

Polynomial Interpolation: Newton's forward and backward formula.

Interpolation with unequal intervals: Lagrange's Interpolation, Newton divided difference formula

UNIT -III

Numerical Integration and Differentiation: Introduction Numerical differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.

Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runga- Kutta Methods, Predictor Corrector Methods.

UNIT-IV

Statistical Techniques –I

Moments, Moment generating functions, Skewness , Kurtosis, Linear, non- Linear and multiple regression analysis, Probability theory, Correlation, Binomial, Poisson and Normal distributions.

UNIT-V

Statistical Techniques –II

Sampling theory (small and large), Test of significance: Chi-square test, t- test, analysis of variance (one way), Application to engineering, medicine, agriculture etc.

Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, X, R, p, np, and c charts.

COURSE OUTCOMES:

The student is able to

- Apply Numerical analysis which has enormous application in the field of Science and Engineering.
- Understand numerical integration and differentiation, numerical solution of ordinary differential equations.
- Compare and analyze the methods statistical analysis and the omnipresent role of variability.
- Predict and evaluate the efficient design of studies and construction of effective sampling plans.
- Exploratory data analysis and formal inference process.

SUGGESTED READINGS:

- B. S .Grewal , "Engineering Mathematics" , Khanna Publishers
- B . S . Grewal , "Higher Engineering Mathematics", Khanna Publishers
- E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons
- C. Ray Wylie & Louis C . Barrett , "Advanced Engineering Mathematics" ,TMH
- Chandrika Prasad, "Advanced Mathematics for Engineers", Prasad Mudranalaya.
- Gupta & Malik, "Numerical Techniques In Science & Engineering Computer Fundamentals With Programming In C", Krishna Prakashan

WEBSITE RESOURCES:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Adhere to the latest editions of the Suggested Readings

ECS-451 **COMPUTER NETWORK LAB** **L T P 0 0 2**

OBJECTIVES:

Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking and experiments are made to understand the layered architecture and how do some important protocols work.

LIST OF EXPERIMENTS

1. Installation and configuration of NS2 and Qual Net
2. Creating a network: nodes, links and queues, Creating connections, traffic and computing routers Insertion of errors and analysis of trace file.
3. Study of basic network command and network configuration commands.
4. Simple project on NS2 – wired, wireless and combination of wired and wireless
5. Implementation of new protocols in NS2
6. Simulation study of pure ALOHA protocol;
7. Simulation study of slotted ALOHA protocol;
8. Simulation study of Token Bus LAN protocol;
9. Simulation study of Token Ring LAN protocol;
10. Simulation study of WAN protocol like Frame Relay, X. 25
11. Study of 802. 11 wireless LAN protocols.
12. Implement the Distance Vector Routing protocol for finding the shortest path.
13. Write a program to connect server with client and passes information from one system to another and vice versa that by creating / establishing connection.

COURSE OUTCOMES:

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

- Learn about various simulators like NS2 and Qual Net.
- Implement the various protocols of data link layer and network layer.
- Configuration of server in programming mode they will learn about socket programming, client server programming for deeply understanding TCP/ IP model and various protocols.
- Configure their own Network management systems

Note: Adhere to the latest editions of the Suggested Readings

ECS-452 **DAA LAB** **L T P 0 0 2**

OBJECTIVES:

The course should enable the students to learn how to analyze a problem and design the solution for the problem and to Design and implement efficient algorithms for a specified application. It will also strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

LIST OF EXPERIMENTS

Write a program in C language

1- To implement binary search
2- To implement Quick sort
3- To implement Merge sort
4- To implement counting sort
5- To implement Binary Search Tree
6- To implement Greedy knapsack problem
7- To implement minimum spanning tree (Prim's and Kruskal's)
8- To implement Red black tree
9- To implement Dijkstra's algorithm
10- To implement Bellman ford algorithm
11- To implement matrix chain multiplication
12- To implement longest common subsequences
13- To implement Rabin Karp string matching algorithm
14- To implement 0/1 knapsack problem (Dynamic programming)
15- To implement Naïve string matching algorithm

COURSE OUTCOMES:

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

- Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Analyze randomized algorithms and approximation algorithms.

Note: Adhere to the latest editions of the Suggested Readings

ECS-553 **DBMS LAB** **L T P 0 0 2**

OBJECTIVES:

The objective of this course is to develop the ability to design, implement and manipulate databases as well as to build Database management systems.

LIST OF EXPERIMENTS

The queries to be implemented on DBMS by using SQL

1. Write the queries for data definition and data manipulation language.
2. Write SQL queries using logical operators (=, <, >, etc.)
3. Write SQL queries using SQL operators (between..end, IN(List), Like, IS NULL and also with negating expressions.
4. Write SQL query using character, number and date data types.
5. Write SQL queries using group by and having clause.
6. Write SQL queries for UNION, INTERSECT and MINUS.
7. Write SQL queries for extracting data from more than one table (EQUI JOIN, NON EQUI JOIN, Outer Join).
8. Write SQL queries for sub queries, nested queries.

COURSE OUTCOMES:

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

- Develop programs using object oriented concepts, exception handling and multi-threading.
- Demonstrate java features such as Inheritance, Interfaces, Polymorphism for different scenarios
- Demonstrate java features such as Abstract class and method overriding
- Design and implement data driven applications and assign responsibilities.
- Develop web application using JDBC and Servlets

Note: Adhere to the latest editions of the Suggested Readings

ECS-454 **MICROPROCESSOR LAB** **L T P 0 0 2**

OBJECTIVES:

The objectives of this course is -

1. Students will be able to develop, implement and debug 8086 assembly language programs that meet the stated specifications.
2. Students should learn how to control components of a microprocessor based system through the use of interrupts.
3. The student will have the opportunity to apply all the previously acquired knowledge he/she will design of a microprocessors/microcontroller based embedded system to solve a electronic/software problem like temperature controller, Traffic light Simulation, Simple Robot or a simple game toy interfaced with PC.

LIST OF EXPERIMENTS

1. 8 – bit addition using 8085
2. 8 – bit subtraction using 8085
3. 8 – bit multiplication using 8085
4. 8 - bit division using 8085
5. 16 – bit addition using 8085
6. 16 – bit subtraction using 8085
7. 16 – bit multiplication using 8085
8. 16 – bit division using 8085
9. BCD to hexadecimal conversion
10. Hexadecimal to BCD conversion
4. Largest number in array of data
11. Addition using 8086
12. Subtraction using 8086
13. Multiplication using 8086
14. Division using 8086
15. Searching using 8085
16. Sorting using 8085

COURSE OUTCOMES:

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

- Apply the fundamentals of assembly level programming of microprocessors.
- Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- Develop the assembly level programming using 8086 loop instruction set.
- Write programs based on string and procedure for 8086 microprocessor.
- Analyze abstract problems and apply a combination of hardware and software to address the problem
- Make use of standard test and measurement equipment to evaluate digital interfaces

Note: Adhere to the latest editions of the Suggested Readings

Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech 3rd Year (V Semester)

ECS501 **COMPUTER GRAPHICS** **L:T:P : 3:1:0**

OBJECTIVES:

1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. To learn the basic principles of dimensional computer graphics.
3. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
4. Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
6. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications

UNIT – I

Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid point circle generating algorithm, and parallel version of these algorithms.

UNIT – II

Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing.

Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.

UNIT – III

Three Dimensional: 3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

UNIT – IV

Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory concepts of Spline, Bspline and Bezier curves and surfaces.

UNIT –V

Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.

COURSE OUTCOMES:

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.
4. Extract scene with different clipping methods and its transformation to graphics display device.
5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. f) Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

SUGGESTED READINGS:

1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education
2. Amrendra N Sinha and Arun D Udai,” Computer Graphics”, TMH
3. Donald Hearn and M Pauline Baker, “Computer Graphics with OpenGL”,Pearson education
4. Steven Harrington, “Computer Graphics: A Programming Approach”, TMH
5. Rogers, “ Procedural Elements of Computer Graphics”, McGraw Hill

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- http://courses.cs.vt.edu/csonline/ Computer Graphics /Lessons/
- https://www.geeksforgeeks.org/

Note: Adhere to the latest editions of the Suggested Readings

ECS502 **INTERNET AND JAVA PROGRAMMING** **L:T:P : 3:1:0**

OBJECTIVES:

The objectives of this course are as follows

1. To understand the concept of Internet and terms related to Internet.
2. To understand some fundamental basic concepts behind the Java Programming.
3. To understand the Java swing concepts and java database connectivity.
4. To understand the concepts of Java Beans and remote method invocation.
5. To understand the concepts of Java servlets.

UNIT I:

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

UNIT II:

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

UNIT III:

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

UNIT IV

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB),

RMI: Introduction to RMI (Remote Method Invocation), A simple client-server application using RMI.

UNIT V

Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).

COURSE OUTCOMES:

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

- Write Java programs with properly-designed constants, variables, methods and string handling to solve simple problems.
- Design Java object classes based on Object-Oriented concepts
- Use simple try-catch blocks for Exception Handling and manage I/O streams oriented interactions.
- Develop multi-thread programming for concurrency control based applications
- Construct user interfaces for Java applications and applets using GUI elements

Suggested Readings

- R. Krishnamoorthy, S. Prabhu, “Internet and Java Programming”, New Age International Publishers
- Margaret Levine Young, “The Complete Reference Internet”, Tata Mcgraw-hill Education Pvt. Ltd.
- Thampi, “Object Oriented Programming in JAVA” Wiley Dreamtech Publication.
- Balagurusamy E, “Programming in JAVA”, Tata Mcgraw-hill Education Pvt. Ltd.
- Dustin R. Callway, “Inside Servlets”, Addison Wesley.
- Mark Wutica, “Java Enterprise Edition”, QUE.
- Steven Holzner, “Java2 Black book”, Wiley Dreamtech Publication.
- Liang, “Introduction to Java Programming, Comprehensive Version”, Pearson Education.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- www.w3school.com

Note: Adhere to the latest editions of the Suggested Readings

ECS503 ARTIFICIAL INTELLIGENCE L:T:P : 3:1:0

OBJECTIVES:

1. To provide a strong foundation of fundamental concepts in Artificial Intelligence
2. To provide a basic exposition to the goals and methods of Artificial Intelligence
3. To enable the student to apply these techniques in applications that involve perception, reasoning and learning.

UNIT-I

INTRODUCTION: Introduction, What is Artificial Intelligence?, Problems and Search, The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success, Some General **Suggested Readings**,

UNIT-II

STATE SPACE SEARCH : Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional Problems, Heuristic Search Techniques: Generate-and- Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

UNIT-III

KNOWLEDGE REPRESENTATION: Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Predicate Logic, Semantic Nets, Frames, The Frame Problem, Syntactic-Semantic Spectrum of Representation, Logic and Slot-and-Filler Structures, Resolution ,Other Representational Techniques, Summary of the Role of Knowledge, Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.

UNIT- IV

EXPERT SYSTEM AND LEARNING: Existing Systems (DENDRAL, MYCIN), domain exploration, Meta , Knowledge, Expertise Transfer, Self Explaining System, Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

UNIT-V

STATISTICAL REASONING: Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual, dependency, fuzzy logic, forward and backward reasoning.

COURSE OUTCOMES:

Completion of the course students will be able to

- Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
- Apply these techniques in applications which involve perception, reasoning and learning.
- Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
- Acquire the knowledge of real world Knowledge representation.
- Analyze and design a real world problem for implementation and understand the dynamic behaviour of a system.
- Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

SUGGESTED READINGS:

- Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGrawHill
- Artificial Intelligence – A modern approach, Stuart Russel, Peter Norwig, Pearosn Education.
- Principles of Artificial Intelligence, Nelson N.J., Springer Verlag, Berlin

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- http://courses.cs.vt.edu/csonline/ artificial-intelligence /Lessons/
- https://www.geeksforgeeks.org/
- https://builtin.com/artificial-intelligence
- https://www.sas.com/en_in/insights/analytics/what-is-artificial-intelligence.html

Note: Adhere to the latest editions of the Suggested Readings

ECS504 THEORY OF COMPUTATION L:T:P : 3:1:0

OBJECTIVES:

1. Introduce concepts in automata theory and theory of computation
2. Identify different formal language classes and their relationships
3. Design grammars and recognizers for different formal languages
4. Prove or disprove theorems in automata theory using its properties
5. Determine the decidability and intractability of computational problems

UNIT-I

Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and non-deterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill-Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT-II

Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT-III

Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT-IV

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM, Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators. Properties of recursive & recursively enumerable languages, Universal Turing machine

UNIT-V

Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

COURSE OUTCOMES:

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

- To use basic concepts of formal languages of finite automata techniques
- To Design Finite Automata's for different Regular Expressions and Languages
- To Construct context free grammar for various languages
- To solve various problems of applying normal form techniques, push down automata and Turing Machines
- To participate in GATE, PGECET and other competitive examinations

.

SUGGESTED READINGS:

- K.L.P Mishra & N. Chandrasekaran, "Theory of Computer Science", PHI Learning
- John E. Hopcroft, Jeffery Ullman, "Introduction to Automata theory, Languages & computation" , Narosa Publishers.
- Michael Sipsev,"Theory of Computation", Cengage Learning
- John C Martin, "Introduction to languages and theory of computation", McGraw Hill
- Kohavi, "Switching & Finite Automata Theory", TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- https://www.ics.uci.edu/~goodrich/teach/cs162/notes/
- https://www.geeksforgeeks.org/
- https://www.tutorialspoint.com/automata_theory/index.htm

Note: Adhere to the latest editions of the Suggested Readings

ECS505 COMPUTER ARCHITECTURE L:T:P : 3:1:0

OBJECTIVES:

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization.
4. Learn the different types of serial communication techniques.
5. Summarize the Instruction execution stages.

UNIT-I

Overview of von Neumann architecture: Instruction set architecture; The Arithmetic and Logic **UNIT**, The Control **UNIT**, Memory and I/O devices and their interfacing to the CPU; Measuring and reporting performance; CISC and RISC processors.

UNIT II

Pipelining: Basic concepts of pipelining, data hazards, control hazards, and structural hazards; Techniques for overcoming or reducing the effects of various hazards.

Hierarchical Memory Technology: Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies.

UNIT III

Instruction level parallelism: Concepts of instruction-level parallelism (ILP), Techniques for increasing ILP; Superscalar, super-pipelined and VLIW processor architectures; Vector and symbolic processors; Case studies of contemporary microprocessors,

UNIT IV

Multiprocessor Architecture: Taxonomy of parallel architectures; Centralized shared-memory architecture, synchronization, memory consistency, interconnection networks; Distributed shared-memory architecture, Cluster computers.

UNIT V

Non von Neumann Architectures: Data flow Computers, Reduction computer architectures, Systolic Architectures.

COURSE OUTCOMES:

- Understand the theory and architecture of central processing unit.
- Analyze some of the design issues in terms of speed, technology, cost, performance.
- Design a simple CPU with applying the theory concepts.
- Use appropriate tools to design verify and test the CPU architecture.
- Learn the concepts of parallel processing, pipelining and inter-processor communication.
- Understand the architecture and functionality of central processing unit.
- Exemplify in a better way the I/O and memory organization.
- Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation

SUGGESTED READINGS:

- John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann.
- John Paul Shen and Mikko H. Lipasti, Modern Processor Design: Fundamentals of Superscalar Processors, Tata McGraw-Hill.
- M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House.
- Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

EHU501 **HUMAN VALUES & PROFESSIONAL ETHICS** **L:T:P : 3:1:0**

OBJECTIVE:

• To create an awareness on Engineering Ethics and Human Values.
• To understand social responsibility of an engineer.
• To appreciate ethical dilemma while discharging duties in professional life.

1. HUMAN VALUES: Morals, Values and Ethics – Integrity – Work Ethic – Service – Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing - Honesty – Courage –Valuing Time – Co-operation – Commitment - Empathy – Self-Confidence – Character - Spirituality.

2. ENGINEERING ETHICS: Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - Moral dilemmas - Moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - custom and religion - uses of ethical theories. Valuing Time – Co-operation – Commitment.

3. ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

4. SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.
Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property rights (IPR) – Discrimination.

5. GLOBAL ISSUES: Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers and engineers as expert witness and advisors -moral leadership – Sample code of Ethics like ASME, ASCE, IEEE, IETE etc.

COURSE OUTCOMES:

- It ensures students sustained happiness through identifying the essentials of human values and skills.
- It facilitates a correct understanding between profession and happiness
- It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
- Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.

SUGGESTED READINGS:

- Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York 1996.
- Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
- Jayshree Suresh and B.S.Raghavan, “Human values and Professional Ethics”, S.Chand & Company Ltd., New Delhi.

WEBSITE RESOURCES:

- https://examupdates.in/professional-ethics-and-human-values
- https://www.uptunotes.com/universal-human-values-and-professional-ethics
- https://lecturenotes.in/

Note: Adhere to the latest editions of the Suggested Readings

ECS-551 **COMPUTER GRAPHICS LAB** **L T P 0 0 2**

OBJECTIVES:

Objective is to make students aware of the concepts underlying modern Computer Graphics and Machine Vision. At the end of the course the student will have the generic skills to design algorithms for digital image synthesis for a broad-based set of computing problems in various domains. This course contains 2D geometric transformations , Algorithms for clipping, 3D geometric and modeling transformation, Illumination models and surface rendering methods etc.

LIST OF EXPERIMENTS

1 Write a program to draw a line using Bresenham's Algorithm.
2 Write a program to draw a line using DDA algorithm.
3 Write a program for circle drawing using Bresenham's algorithm.
4 Write a program to draw a circle using Midpoint algorithm.
5 Write a program to rotate a triangle about origin.
6 Write a program to scale the triangle
7 Write a program to translate the triangle
8 Write a program to rotate a point about origin.
9 Write a program to reflect the triangle
10 Write a program for line clipping.

COURSE OUTCOMES:

- To list the basic concepts used in computer graphics.
- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- To describe the importance of viewing and projections.
- To define the fundamentals of animation, virtual reality and its related technologies.
- To understand a typical graphics pipeline
- To design an application with the principles of virtual reality

Note: Adhere to the latest editions of the Suggested Readings

ECS-552 **INTERNET & JAVA PROGRAMMING LAB** **L T P 0 0 2**

OBJECTIVES:

1. To get familiar with basics of the Internet Programming.
2. To acquire knowledge and skills for creation of web site considering both client and server side Programming
3. To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
4. To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
5. Discuss the principles of inheritance, interface and packages and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
6. To understand importance of Multi-threading & different exception handling mechanisms.
7. To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.

LIST OF EXPERIMENTS

1. To understand of basic operations in JAVA.
2. To understand the control statement in JAVA.
3. To understand the concept of class and object in JAVA.
4. To understand the concept of constructor in JAVA.
5. To understand the concept of inheritance in JAVA.
6. To understand the concept of method overloading and method overriding in JAVA.
7. To understand the concept of Array in JAVA.
8. To understand the concept of Exception handling in JAVA.
9. To understand the concept of AWT in JAVA.
10. To understand the concept of JavaBeans in JAVA.

COURSE OUTCOMES:

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

- Develop programs using object oriented concepts, exception handling and multi-threading.
- Demonstrate java features such as Inheritance, Interfaces, Polymorphism for different scenarios
- Demonstrate java features such as Abstract class and method overriding
- Design and implement data driven applications and assign responsibilities.
- Develop web application using JDBC and Servlets

Note: Adhere to the latest editions of the Suggested Readings

ECS-553 **AI LAB** **L T P 0 0 2**

OBJECTIVES:

The objectives of the AI Lab are to enable both basic and applied interdisciplinary research at high international level, and foster strong partnerships between academia, business, industry and the public sector. We provide infrastructure and a framework for close cooperation with diverse partners.

LIST OF EXPERIMENTS

1. Introduction to PROLOG. How SWI PROLOG system to run Prolog programs?
2. WAP to represent Facts in prolog.
3. WAP to represent Facts with Arguments.
4. WAP to represent Variables and Unification.
5. WAP to represent rules.
6. WAP in Prolog for Backtracking.
7. WAP in Prolog for Recursion.
8. WAP in Prolog for List.
9. Write Prolog expression which represents the semantic net for the following facts.
10. Define INPUT and OUTPUT

COURSE OUTCOMES:

After undergoing this course, the students will be able to

- Build intelligent agents for search and games
- Solve AI problems through programming with Python
- Learning optimization and inference algorithms for model learning
- Solve game challenging problems
- Design and develop programs for an agent to learn and act in a structured environment.

Note: Adhere to the latest editions of the Suggested Readings

ECS-554 **CBNST LAB** **L T P 0 0 2**

OBJECTIVES:

With the current deployment of computer technology and tools, it is very important to develop efficient algorithms for solving problems in science, engineering, technology, insurance & banking. Thus, the objective of this course is to enable students to obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis and gain experience in the implementation of numerical methods using a computer. They would also gain an appreciation of the concept of error in these methods and the need to analyze and predict it

LIST OF EXPERIMENTS

1. Write a program in "C" Language to find out the root of the Algebraic and Transcendental equations using Bisection Method
2. Write a program in "C" Language to implement Newton's Forward and Backward Interpolation formula.
3. Write a program in "C" Language to implement Gauss Forward and Backward interpolation formula.
4. Write a program in "C" Language to implement Bessel's interpolation formula.
5. Write a program in "C" Language to implement Sterling's Interpolation Formula.
6. Write a program in "C" Language to implement Newton's Divided Difference formula.
7. Write a program in "C" Language to implement Lagrange's interpolation formula.
8. Write a program in "C" Language to implement Least Square Method for curve fitting.
9. Write a program in "C" Language to implement trapezoidal rule.
10. Write a program in "C" Language to implement Simpson 3/8 rule.

COURSE OUTCOMES:

- Students will be able to understand about different methods to solve algebraic and transcendental equations and interpolation methods.
- Students will be able to apply knowledge of Mathematics in Physical sciences and engineering problems.
- Students will be able to understand numerical technique for applying in engineering problem.
- Students will be able to apply techniques to interpret the output generated from them.
- Students will be able to present and discuss results of output generated by hand or from software packages preferably in C language.
- Perform statistical inference tasks using C and to specify the calculations involved in such tasks and to be aware of assumptions necessary for the validity of results.

Note: Adhere to the latest editions of the Suggested Readings

Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech 3rd Year (VI Semester)

ECS-601 **OBJECT ORIENTED TECHNIQUES & UML** **L:T:P : 3:1:0**

OBJECTIVES:

1. To understand the object oriented concepts for designing object oriented models.
2. To understand the use of UML (Unified Modeling Language) for object oriented analysis and design.
3. To describe the step by step object oriented methodology of software development from problem statement through analysis, system design, and class design.
4. To understand the issues for implementing object oriented designs or models.
5. To understand the concept of different patterns for constructing software architectures through object oriented models.
6. To understand the problems, communicating with application experts, modeling enterprises, preparing documentation, and designing programs by using object oriented models.

UNIT I

Introduction: The meaning of Object Orientation, object identity, Abstraction, Encapsulation, information hiding, polymorphism, inheritance, importance of modeling, principles of modeling.

Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.

UNIT – II

Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.

UNIT – III

Functional Modeling: Data flow diagram, nested data flow diagrams, Control flows, specifying operations, constraints, Relation of functional to object and dynamic models.

UNIT- IV

OMT Methodology

Object Oriented Analysis, Object oriented design, Object design, Combining three models, Designing algorithms, design optimization, Implementation of control, Adjustment of inheritance, Object representation, Physical packaging. Documenting design Decisions.

Comparison of Methodologies: Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD).

UNIT- V

Mapping object oriented concepts using non-object oriented language, Translating classes into data structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features: Abstraction & Encapsulation.

COURSE OUTCOMES:

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

- Specify simple abstract data types and design implementations, using abstraction functions to document them.
- Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
- Name and apply some common object-oriented design patterns and give examples of their use.
- Design applications with an event-driven graphical user interface.
- Design the convenient way for handling of files

SUGGESTED READINGS:

- James Rumbaugh et. al, “Object Oriented Modeling and Design”, PHI
- Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language ser Guide”, Pearson Education
- Booch, Maksimchuk, Engle, Young, Conallen and Houstan, “Object Oriented Analysis and Design with Applications”, Pearson Education

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WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS602 WEB TECHNOLOGY AND E COMMERCE L:T:P : 3:1:0

OBJECTIVES:

The main objective of the course is present the basic web technology concepts that are required for developing web applications. The key technology components are descriptive languages, server side program elements and client side program elements. In addition the course gives specific contents that are beneficial for developing web-based solutions, like relational data-base communication basics and information security principles and approaches.

UNIT I:

Web: Introduction to web, W3C, protocols governing the web, web project and traditional project, web team.

HTML: Elements, list, table, images, frames, forms, Introduction to HTML5, difference between HTML4 and HTML5

UNIT II:

Cascaded Style Sheet (CSS): Introduction, Style rule, Selectors, Introduction to CSS3, difference between CSS and CSS3

XML: DTD, XML schemas, parsing of XML

JavaScript: Introduction, variables, condition statements, operators, JavaScript popup boxes, functions, events and event handling; introduction to AJAX

UNIT III:

Web Server: Introduction to web server, Understanding of Tomcat web server

JSP: Introduction, features of JSP, JSP architecture, types of JSP directives, JSP actions, Error handling within JSP, JSP sessions, Java Database connectivity (JDBC).

UNIT IV

E-Commerce: Introduction to E-Commerce, E-Commerce framework, E-Commerce and Media Convergence, The anatomy of E-Commerce Applications, E-Commerce consumer applications, E-Commerce Organization applications

Network Infrastructure for E-Commerce: Market forces influencing the I-Way, Components of the I-Way, Network Access equipment

Network Security and Firewalls: Client-Server Network Security, Emerging Client-Server security threats, Firewall in practice, Data and Message Security

UNIT V

E-Commerce and World Wide Web: Architectural Framework for E-Commerce, World Wide Web as the Architecture, Security and the Web

E-Payment Systems: Types of E-payment systems, Digital Token-Based E-payment systems, smart cards and E-payment Systems, Risk and e-payment systems

Electronic Data Interchange: Definition of EDI, EDI vs. E-Mail, EDI Applications in Business, EFT, EDI Legal, Security and Privacy issues, Supply Change Management

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

- Learn the best practices for designing Web forms and Usability Reviews
- Understand the principles behind the design and construction of Web applications
- Develop the application for XML parsers
- Develop the application that implements the concept of CGI
- Develop and Deploy an Enterprise Application using ASP.NET

Suggested Readings

- Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison- Wesley.
- Ivan Bayross,” HTML, DHTML, Java Script, Perl & CGI”, BPB Publication.
- Ivan Bayross,” HTML5 and CSS3 made simple”, BPB Publication.
- Xavier, C, “ Web Technology and Design” , New Age International
- Deitel, “Java for programmers”, Pearson Education
- Jackson, “Web Technologies” Pearson Education
- Patel and Barik, ”Introduction to Web Technology & Internet”, Acme Learning
- Laudon, “E-Commerce: Business, Technology, Society”, Pearson Education

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- w3school.com
- tutorialspoint.com

Note: Adhere to the latest editions of the Suggested Readings

ECS603 **COMPILER DESIGN** **L:T:P : 3:1:0**

OBJECTIVES:

The Objectives of this course is to explore the principles, algorithms, and data structures involved in the design and construction of compilers. Topics include context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization.

UNIT I

Introduction Language Processors, The Structure of a Compiler, The Science of Building a Compiler, Applications of Compiler Technology. Lexical Analysis The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical Analyzer LEX, Finite Automata, From Regular Expressions to Automata, Design of Lexical Analyzer Generator.

UNIT II

Syntax Analysis Context Free Grammars, Writing a Grammar, Top Down Parsing, Bottom Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR parsers, Using Ambiguous Grammars, Parser Generators.

UNIT III

Syntax Directed Translation Syntax Directed Definitions, Applications of Syntax Directed Translation, Syntax Directed Translation Schemes. Intermediate Code Generation Variants of Syntax Trees, Three Address Code, Types & Declarations, Translation of Expressions, Type Checking, Control Flow, Back patching, Switch Statements.

UNIT IV

Run Time Environments Storage Organizations, Access to Nonlocal Data on Stack, Heap Management, Introduction to Garbage Collection. Code Generation Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator.

UNIT V

Machine Independent Optimizations The Principal Sources of Optimizations, Introduction to Data Flow Analysis, Foundations of Data Flow Analysis, Constant Propagation, Partial Redundancy Elimination, Loops in Flow Graphs, Region Based Analysis, Symbolic Analysis.

COURSE OUTCOMES:

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

- Develop the lexical analyzer
- Design top-down and bottom-up parsers
- Develop syntax directed translation schemes
- Draw DAG representation for problem statement
- Develop algorithms to generate code for a target machine

SUGGESTED READINGS:

- Compilers, Principles, Techniques & Tools (Second Edition). Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffery D. Ullman.
- C. Fischer and R. LeBlanc. Crafting a Compiler, Benjamin Cummings, 1991.
- V Raghvan, " Principles of Compiler Design", TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-604 PRINCIPLES OF PROGRAMMING LANGUAGES L:T:P : 3:1:0

OBJECTIVES:

- To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages.
- To introduce notations to describe syntax and semantics of programming languages.
- To analyze and explain behavior of simple programs in imperative languages using concepts such as binding, scope, control structures, subprograms and parameter passing mechanisms.
- To introduce the concepts of ADT and object oriented programming for large scale software development.
- To introduce the concepts of concurrency control and exception handling.

UNIT -I

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

UNIT -II

Elementary and Structured Data Types: Data object variables, constants, data types, elementary data types, declaration, assignment and initialization, enumeration, characters, strings. Structured

data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, Sets files. Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programs, abstract data types.

UNIT -III

Sequence Control; Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programs, exception handling, co routines, Scheduled sub programs, concurrent execution. Data control referencing environments, static and dynamic scope, local data local data referencing environment, shared data: Explicit common

environment dynamic scope parameter passing mechanism.

UNIT -IV

Storage Management: Major run time requirements, storage management phases, static storage management, stack based, heap based storage management. Syntax and translation: General syntactic criteria, syntactic element of a language, stages in translation, formal syntax and semantics.

UNIT -V

Operating and Programming Environment: Batch Processing Environments, Embedded system requirements, Theoretical models, Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language, Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc.

COURSE OUTCOMES:

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

- Knowledge of, and ability to use, language features used in current programming languages.
- An ability to program in different language paradigms and evaluate their relative benefits.
- An understanding of the key concepts in the implementation of common features of programming languages.

SUGGESTED READINGS:

- Terrance W Pratt, "Programming Languages: Design and Implementation" PHI
- Sebesta, "Concept of Programming Language", Addison Wesley
- E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley
- "Fundamentals of Programming Languages", Galgotia

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- w3school.com
- tutorialspoint.com

Note: Adhere to the latest editions of the Suggested Readings

ECS606 **MULTIMEDIA TECHNOLOGY** **L:T:P : 3:1:0**

OBJECTIVES:

The course is designed for:

1. Program students who want to broadening their knowledge by including multimedia studies.
2. Visiting program students looking for a foundation from which to pursue advanced topics in multimedia studies.
3. Professional developers who want a technical foundation for developing applications with distributed multimedia components.
4. Networks professionals who needs to manage multimedia delivery service.

UNIT-I:

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products Stages of Multimedia Projects : Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools

UNIT-II

Introduction to multimedia components, multimedia hardware, SCSI, IDE, MCI, multimedia data and file formats, RTF,TIFF, MIDI, JPEG, DIB, MPEG, multimedia tools, presentations tools.

UNIT-III

Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modeling. Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression.

UNIT-IV

Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

UNIT-V

Multimedia authoring and user interface, hypermedia messaging, mobile messaging, hypermedia message component, creating hypermedia message, integrated multimedia message standards, integrated document management, distributed multimedia systems.

COURSE OUTCOMES:

Upon successful completion of this course, you should be able to

- Identify the essential features of graphics/image data types, file formats, and color models in images and video.
- Explain the technical details of multimedia data representations.
- Perform a comparative analysis of the major methods and algorithms for multimedia data compression.
- Explain the technical details of popular multimedia compression standards.
- Write code and develop a multimedia application using JAI and JMF.
- Explain the principles and technical details of several wired and wireless networking protocols.
- Configure and manage multimedia content delivery platforms.
- Identify the essential issues of quality of service in multimedia networking.
- Explain technical aspects of popular multimedia web applications, including VoD and VoIP.

SUGGESTED READINGS:

- Tay Vaughan “Multimedia, Making IT Work” Osborne McGraw Hill.
- Buford “Multimedia Systems” Addison Wesley.
- Agrawal & Tiwari “Multimedia Systems” Excel.
- Mark Nelson “Data Compression Book” BPB.
- David Hillman “Multimedia technology and Applications” Galgotia Publications.
- Rosch “Multimedia Bible” Sams Publishing.
- Sleinreitz “Multimedia System” Addison Wesley.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-652 **WEB TECHNOLOGY & MULTIMEDIA LAB** **L T P 0 0 2**

OBJECTIVES:

The objective of this lab is to to develop an ability to design and implement static and dynamic website

LIST OF EXPERIMENTS

1 To understand basic elements in HTML.
2 To understand use of table in HTML.
3 To understand use of frame in HTML.
4 To understand use of form in HTML.
5 To understand validation in HTML through JAVASCRIPT.
6 To understand the use of XML.
7 To understand the installation and working of TOMCAT Server.
8 Understand the use of Cookies in Servlet.
9 To understand the connectivity of JDBC to Servlet.
10 To understand the JSP

COURSE OUTCOMES:

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

- Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
- Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
- Get introduced in the area of Online Game programming.

Note: Adhere to the latest editions of the Suggested Readings

ECS-653 **COMPILER DESIGN LAB** **L T P 0 0 2**

OBJECTIVES:

1. To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
2. To implement NFA and DFA from a given regular expression
3. To implement front end of the compiler by means of generating Intermediate codes.
4. To implement code optimization techniques.

LIST OF EXPERIMENTS

1. Implementation of DFA for (a/b)*abb.
2. Implement of DFA accepting keyword begin end, else, if, then.
3. Implement of DFA accepting keyword <,=,>,<=,>=,<>.
4. Implementation of Parser.

COURSE OUTCOMES:

At the end of this course student will:

- Design Lexical analyzer for given language using C and LEX tools.
- Design and convert BNF rules into YACC form to generate various parsers.
- Generate machine code from the intermediate code forms
- Implement Symbol table

Note: Adhere to the latest editions of the Suggested Readings

ECS-654 **PYTHON LAB** **L T P 0 0 2**

OBJECTIVES:

The main objective of this course is to learn

1. Basics of Python programming
2. Decision Making and Functions in Python
3. Object Oriented Programming using Python
4. Files Handling in Python
5. GUI Programming and Databases operations in Python
6. Network Programming in Python

LIST OF EXPERIMENTS

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

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

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

Note: Adhere to the latest editions of the Suggested Readings

Bachelor of Technology (B.Tech) Computer Science & Engineering
B.Tech 4th Year (VII Semester)

ECS-701 **DISTRIBUTED COMPUTING** **L:T:P : 3:1:0**

OBJECTIVES:

- Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems.
- Recognize the inherent difficulties that arise due to distributed-ness of computing resources. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.
- At the end students will be familiar with the design, implementation and security issues of distributed system.

UNIT I

Introduction, Goals of distributed computing. Characterization of distributed system, Theoretical foundation of distributed system, Hardware Concepts, bus based multiprocessor switched multiprocessor, bus based multicomputer, switched multicomputer, Software Concepts, Network Operating Systems, True Distributed System,

UNIT II

Multiprocessor time sharing system, Design issues, Communication, Layered Protocols, ATM networks.

Client Server model, Remote Procedure Call, Group Communication, Synchronization: Clock Synchronization, Mutual Exclusion, Election Algorithms, Atomic Transaction.

UNIT III

Deadlock, Threads, System models, Processor Allocation, Scheduling in Distributed Systems, Fault Tolerance, Real time distributed systems.

Agreement protocols: Introduction, system model, classification of agreement protocols, Application of agreement protocols, Atomic commit in distributed database system.

UNIT IV

Distributed file systems: Distributed file system design, implementation, Trends in Distributed File Systems, Distributed shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, and distributed programming languages

UNIT V

Case studies: Amoeba: Introduction, Objects and capabilities in Amoeba, Process and Memory Management in Amoeba, Communication in Amoeba, The Amoeba Services. DCE: Introduction, Threads, Remote Procedure call, Time, Directory Service and Security Services, Distributed File System

COURSE OUTCOMES:

Upon Successful completion of this course, the students will be able to

- Acquire the theoretical and conceptual foundations of distributed computing.
- Conceptualize the ideas of distributed operating systems and its issues.
- Understand the issues involved in distributed resource environment
- Realize the importance of transaction and how to recovery the system from deadlocks.
- Explore the principles of fault tolerance and its protocols.

SUGGESTED READINGS:

- G. Coulouris, J. Dollimore, T. Kindberg, " Distributed systems concepts and design" Pearson
- Andrew S.Tanenbaum, "Distributed Operating Systems", Pearson Education Asia, 2001.
- Mukesh singhal and Niranjan G.Shivaratri, "Advanced concepts in Operating system', Tata McGraw Hill.
- Pradeep.k and Sinha, "Distributed operating systems, PHI, New Delhi, 2001.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-702 **DIGITAL IMAGE PROCESSING** **L:T:P : 3:1:0**

OBJECTIVES:

The objectives of this course are to:

1. Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. Cover the basic theory and algorithms that are widely used in digital image processing
2. To study the image fundamentals and mathematical transforms necessary for image processing.
3. To study the image enhancement techniques
4. Expose students to current technologies and issues that are specific to image processing systems
5. Develop hands-on experience in using computers to process images
6. Familiarize with MATLAB Image Processing Toolbox. In this course, we try to explore the algorithms and techniques involved in Digital Image Processing using computational tools like Octave, Scilab, mat lab, python etc. The course will comprise of comprehensive understanding of signals, signal processing, digital imagery and digital image processing.
7. -Develop critical thinking about shortcomings of the state of the art in image processing.

UNIT – I

Digital Image Fundamentals: - Digital image Representation – Functional unit of an Image processing system. Visual perception – Image Model _ Image sampling and Quantization – grayscale resolution – pixel relationship – image geometry. Image Transforms – unitary Transform, Discrete Fourier Transform, Cosine Transform, Sine Transform, Hadamard Transform, Slant and KL Transform.

UNIT – II

Image Enhancement – Histogram processing, Spatial domain enhancement, Image smoothing, Image Sharpening, Frequency domains Enhancement, Color Image Processing methods- Color Image Models

UNIT –III

Image restoration and compression Degradation Model – Discrete Formulation – Circulant matrices – Constrained and Unconstrained restoration geometric transformations fundamentals – Compression Models – Error Free Compression – Lossy Compression – International Image Compression Standards.

UNIT – IV

Image Analysis and Computer Vision: Spatial feature Extraction – Transform feature –Edge detection-Boundary Representation-Region Representation-Moment Representation-Structure-Shape Features-Texture-Scene Matching and Detection-Image Segmentation-Classification techniques-Morphology- Interpolation.

UNIT –V

Sensing 3D shape: how the 3rd dimension changes the problem. Stereo 3D description, 3Dmodel, matching, TINA. Direct 3D sensing-structured light, range finders, range image segmentation. Emerging IT applications: Recognition of characters, Fingerprints and faces-Image databases.

COURSE OUTCOMES:

This course provides the knowledge of analog and digital communication system analysis and design. After study through lectures and assignments, students will be able to

- 1. Analyze general terminology of digital image processing.
- 2. Examine various types of images, intensity transformations and spatial filtering.
- 3. Develop Fourier transform for image processing in frequency domain.
- 4. Evaluate the methodologies for image segmentation, restoration etc.
- 5. Apply image processing algorithms in practical applications

SUGGESTED READINGS:

- Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, 2nd Ed, Pearson Edu, 2004
- S.Sridhar , ” Digital Image processing”,,Oxford university press, 2012
- A.K. Jain, “Fundamental of Digital Image Processing”, PHI. 2003
- Fundamentals of Digital Image Processing-A.K.Jain
- Image Processing and machine vision-Milan Sonka,Vaclav Hlavae
- Pattern Recognition Principles-J.T. Tou and R.C.Gonzalez

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- https://sisu.ut.ee/imageprocessing/book/1
- https://www.geeksforgeeks.org/

Note: Adhere to the latest editions of the Suggested Readings

ECS-703 DATA MINING AND WAREHOUSING L:T:P : 3:1:0

OBJECTIVES:

- To understand the basic principles, concepts and applications of data warehousing and data mining,
- Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
- Have a good knowledge of the fundamental concepts that provide the foundation of data mining.

UNIT-I

Introduction: Data Mining Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation.

Data Reduction:- Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

UNIT-II

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi Dimensional Association rules from Relational Databases.

UNIT-III

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm. Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis, Applications and Trends in Data Mining.

UNIT-IV

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mart.

UNIT-V

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

COURSE OUTCOMES:

Students who successfully complete this course should be able to

- Interpret the contribution of data warehousing and data mining to the decision-support level of organizations
- Evaluate different models used for OLAP and data preprocessing
- Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis
- Design and implement systems for data mining
- Evaluate the performance of different data-mining algorithms
- Propose data-mining solutions for different applications

SUGGESTED READINGS:

- M.H.Dunham,"Data Mining:Introductory and Advanced Topics" Pearson Education
- Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier
- Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, Pearson Education
- Mallach,"Data Warehousing System",McGraw –Hill
- Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson education.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

ECS-705 CRYPTOGRAPHY AND NETWORK SECURITY L:T:P : 3:1:0

OBJECTIVES:

In this course, students will gain a broad understanding of the word cryptography comes from two Greek words meaning "secret writing" and is the art and science of information hiding.

- Encryption and Decryption:-
- Encryption is the process of encoding a message so that its meaning is not obvious i.e. converting information from one form to some other unreadable form using some algorithm called cipher with the help of secret message called key.
- The converting text is called is plaintext and the converted text is called cipher text.
- Decryption is the reverse process, transforming an encrypted message back into its normal, original form. In decryption process also the use of a key is important.

UNIT-I

Introduction to cryptography, Introduction to security attacks, services and mechanism,. Classical encryption techniques substitution Ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers Conventional Encryption: Conventional encryption model, classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

UNIT-II

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, Euclid's Algorithm, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) , Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

UNIT-III

Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

UNIT-IV

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

UNIT-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted
systems.

COURSE OUTCOMES:

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

- Understand cryptography and network security concepts and application
- Apply security principles to system design
- Identify and investigate network security threat
- Analyze and design network security protocols

SUGGESTED READINGS:

- William Stallings, "Cryptography and Network Security: Principals and Practice",
- Pearson Education.
- Behrouz A. Frouzan: Cryptography and Network Security, TMH
- Bruce Schiener, "Applied Cryptography". John Wiley & Sons
- Bernard Menezes," Network Security and Cryptography", Cengage Learning.
- Atul Kahate, "Cryptography and Network Security", TMH

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in

Note: Adhere to the latest editions of the Suggested Readings

EHU701 **INDUSTRIAL MANAGEMENT** **L:T:P : 3:1:0**

OBJECTIVE:

The objective of this course is to familiarize the students to gain insight about managerial techniques through various assessment tools/models to control and enhance the productivity of the work environment.

Unit-I **(10 Sessions)**

Introduction: Concept, Development, application and scope of Industrial Management.

Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.

Unit-II **(08 Sessions)**

Management Function: Principles of Management- Management Tools – time and motion study, work simplification- process charts and flow diagrams, Production Planning, Specification of Production requirements.

Unit-III **(08 Sessions)**

Inventory control: Inventory, cost, Deterministic models, Introduction to supply chain management.

Unit-IV **(07 Sessions)**

Quality control: Meaning, process control, SQC control charts, single, double and sequential sampling, Introduction to TQM.

Unit-V **(07 Sessions)**

Environmental Issues: Environmental Pollution – various management techniques to control Environmental pollution – Various control acts for Air, Water, Solid waste and Noise pollution.

COURSE OUTCOME:

Students completing this course will be able to:

- Understand the scope of Industrial Management.
- To apply various management tools in systems of different industrial configurations.
- To use various control charts to determine the product acceptability as per designed criteria .
- To control environmental pollution by various management techniques.

SUGGESTED READINGS:

- Khanna O.P.: Industrial Engineering
- T.R. Banga: Industrial Engineering and Management
- Sharma B.R.: Environmental and Pollution Awareness.
- R.K.Singal: Industrial Management, Vayu Education of India Pub.
- Onkar N. Pandey: Industrial Management, S.K.Kataria& Sons (Katson) Pub.
- Dewan J. M. and Sudarshan K. N.: Industrial Management, Discovery Publishing Pvt. Ltd

WEBSITE SOURCES:

- nptel.ac.in/course.html
- www.nsf.gov
- en.wikipedia.org
- www.sciencedirect.com
- www.slideshare.net
- www.researchgate.net
- www.sanfoundry.com

Note: Adhere to the latest editions of the Suggested Readings

ECS-751 **DISTRIBUTED COMPUTING LAB** **L T P 0 0 2**

OBJECTIVES:

Given the knowledge of operating systems and sequential program design, the students of the second semester M. Tech. CSE will be able to design and develop fault tolerant and efficient distributed algorithms to solve large problems where data and control is distributed over different nodes

LIST OF EXPERIMENTS:

1. Simulate the functioning of Lamport's Logical Clock in 'C'.
2. Simulate the Distributed Mutual Exclusion in 'C'.
3. Implement a Distributed Chat Server using TCP Sockets in 'C'.
4. Implement RPC mechanism for a file transfer across a network in 'C'
5. Implement 'Java RMI' mechanism for accessing methods of remote systems.
6. Simulate Balanced Sliding Window Protocol in 'C'.
7. Implement CORBA mechanism by using 'C++' program at one end and 'Java' program on the other**.**

COURSE OUTCOMES:

Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc.

- Design and develop distributed programs using sockets and RPC/RMI.
- Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems.
- Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints.

Note: Adhere to the latest editions of the Suggested Readings

ECS-752 **DIP LAB** **L T P 0 0 2**

OBJECTIVES:

1. This Lab helps the student to understand the Fundamentals of Digital image and its processing.
2. Perform the image enhancement technique for the improvement of pictorial information for human perception i.e. enhancing the quality of the image so that the image will have a better look
3. Apply the concepts of image segmentation and compression using which a graduate will be able to remove the redundancy pixels and transmit the image using less bandwidth.
4. Describe object detection and recognition technique learning which a graduate will be able to understand the fundamentals of digital signal processing with particular emphasis on problems in biomedical research and clinical medicine.

LIST OF EXPERIMENTS:

1. To provides the thresholding an image and the evaluation of its histogram using histogram equalization and illustrates the relationship among the intensities (gray levels) of an image and its histogram
2. To shows image rotation, scaling, and translation using Geometric transformations.
3. To perform the Two-dimensional Fourier transforms operation in an image.
4. To perform the linear filtering using convolution in an image
5. Image Edge Detection Using Sobel Filtering and Canny Filtering
6. To perform the following operations in an image. (a) Erosion, (b) dilation,
7. To perform the following operations in an image. (a) Opening, (b) closing

COURSE OUTCOMES:

- The ability to interpret the foundation and strategy of hardware and software of computer systems. Graduates can solve the problems in the areas related to algorithms, multimedia, data analytics, cloud computing, human computer interface, robotics, artificial intelligence and networking for efficient design of computer systems
- The ability to understand the software development lifecycle and methodologies of software systems. Graduate will learn competent skills and knowledge of software design process. Graduate will be acquaintance to practical proficiency with a broad area of programming concepts.

Note: Adhere to the latest editions of the Suggested Readings

ECS-804 **BIG DATA AND ANALYTICS** **L:T:P : 3:1:0**

OBJECTIVES:

Students will try to learn:

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql, Map Reduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

UNIT I:

Types of Digital Data: Structured, Sources of structured data, Ease with Structured data, Semi-Structured, sources of semi-structured data, Unstructured, sources of unstructured data, Issues with terminology, Dealing with unstructured data, Place me in the basket

Big data: Introduction to big data, need of big data, characteristics of big data, Challenges with big data, Big data stack

UNIT II:

Big Data Analytics: Analytics 1.0, Analytics 2.0, Analytics 3.0, Traditional BI vs. Big Data Environment

Big Data technology Landscape: NoSQL Databases, NoSQL Vs. RDBMS, NewSQL, Hadoop, Hadoop 1.0 vs. Hadoop 2.0, Introduction to Data Science is multi-disciplinary and Data Scientist

UNIT III:

Hadoop: Why not RDBMS, Distributed Computing Challenges, A Brief History of Hadoop, Hadoop Overview, Hadoop Components, High Level Architecture of Hadoop

Hadoop Distributed File System: HDFS Architecture, Daemons Related to HDFS, Working with HDFS Command, Special Features of Hadoop

UNIT IV

Processing Data With Hadoop: Introduction, How Map Reduce Works, Map Reduce Example, Word Count Example using Java

NoSQL: Recap of NoSQL databases, MongoDB - CRUD, MongoDB- Arrays, Java Scripts, Cursors, Map Reduce Programming, Aggregations

Cassandra: CQLSH - CRUD, Counter, List, Set, Map, Tracing

UNIT V

Hive: Introduction to Hive, History of Hive and Recent Releases of Hive, Hive Features,Hive Integration and Work Flow, Hive Data **UNIT**s, Hive Architecture, Hive Primitive Data Types and Collection Types, Hive File Formats

Hive Query Language - Statements: DDL, DML, Hive Partitions, Bucketing, Views, Sub Query, Joins, Hive User Defined Function, Aggregations in Hive, Group by and Having, Serialization and Deserialization, Hive Analytic Functions

COURSE OUTCOMES:

Students will be able to:

- Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
- Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
- Interpret business models and scientific computing paradigms, and apply software tools for big data analytics. 4. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc

Suggested Readings

- Seema Acharya, Subhashini Chellapan, “Big Data and Analytics”, Wiley
- Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman,”Big data for dummies”, Wiley
- Tom White ,”Hadoop: The Definitive Guide”, Orielly
- Chuck Lam, “Hadoop in action”, Manning Publications
- irk Deroos, Paul C. Zikopoulos, Roman B. Melnyk,Bruce Brown, “Hadoop for dummies”, Wiley

WEBSITE RESOURCES:

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- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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ELECTIVE-I

ECS605(1) NATURAL LANGUAGE PROCESSING L:T:P : 3:1:0

OBJECTIVES:

- Teach students the leading trends and systems in natural language processing.
- Make them understand the concepts of morphology, syntax, semantics and pragmatics of the language and that they are able to give the appropriate examples that will illustrate the above mentioned concepts.
- Teach them to recognize the significance of pragmatics for natural language understanding.
- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

UNIT-I

Introduction: Knowledge in Language Processing, Ambiguity, Models and Algorithm. Regular Expressions and Automata: Regular Expressions, Finite State Automata. Morphology and Finite State Transducers: Survey of Mostly English Morphology, Finite State Morphological Parsing, Combining FST Lexicon and Rules.

UNIT-II

N-Grams: Counting Words in Corpora, Simple (Unsmoothed) N-Grams, Smoothing, Backoff, Deleted Interpolation. Word Classes and Part of Speech Tagging: English Word Classes, Targets for English, Part of Speech Tagging, Rules Based Part of Speech Tagging. Context Free Grammars for English: Context Free Rules and Trees, Sentence Level Constructions, The Noun Phrase, Co-ordination, The Verb Phrase Subcategorization, Auxiliaries.

UNIT-III

Parsing with Context Free Grammars: Parsing as Search, A Basic Top Down Parser, The Earley Algorithm, Finite State Parsing Methods. Features and Unification: Feature Structures, Unification of Feature Structures, Implementing Unification, Parsing with Unification Constraints, Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic Context Free Grammars, Probabilistic Lexicalized CFGs, Dependency Grammars.

UNIT IV

Representing Meaning: Computational Desiderata for Representations, Meaning Structure of Language, First Order Predicate Calculus. Semantic Analysis: Syntax Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Earley Parser, Robust Semantic Analysis. Lexical Semantics: Relations Among Lexemes and Their Senses, The Internal Structure of Words, Creativity and the Lexicon. Word Sense Disambiguation and Information Retrieval.

UNIT V

Discourse: Reference Resolution, Text Coherence, Discourse Structure. Natural Language Generation: An Architecture for Generation, Surface realization, Discourse Planning. Machine Translation: Language Similarities & Differences, The Transfer Metaphor, The Interlingua Idea: Using Meaning, Direct Translation, Using Statistical Techniques.

COURSE OUTCOMES:

After successful completion of this course, student will be able to

- Understand approaches to syntax and semantics in NLP.
- Understand approaches to discourse, generation, dialogue and summarization within NLP.
- Understand current methods for statistical approaches to machine translation.
- Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP

SUGGESTED READINGS:

- Jurafsky,D., Martin, J.H., “Speech and language processing”, PHI
- Manning, C.D., Schutze, H, “Foundations of statistical natural language processing” MIT press.
- Allen, J., “Natural Language Processing”, Benjamin/ Cummins Publishing
- Wall L. et W, “Programming PERL”, O’Reilly

WEBSITE RESOURCES:

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- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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ECS605(2) **ADVANCED DATABASE MANAGEMENT SYSTEMS** **L:T:P : 3:1:0**

OBJECTIVES:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

UNIT- I

DATA STORAGE & QUERYING: File Structures: Heap files, Sorted files, Hashing, RAID., Indexing files: Single level, Multiple level, B-Trees, Query Processing & Optimization: Translating SQL queries in relational algebra, External sorting, Various operations like SELECT, JOIN etc, Combining operations using pipelining, Query optimization using heuristics, Selectivity & Cost estimation. Database Tuning: Physical Database Design, Tuning in Relational Systems.

UNIT-II

TRANSACTION MANAGEMENT: Transaction processing concepts: Properties, Schedules, Serializability, Transaction support in SQL. Concurrency control techniques: Two phase locking, Timestamp ordering, Multiversion, Database recovery techniques: Recovery concepts, Deferred update, Immediate update, Shadow paging.

UNIT-III

DATABASE SECURITY: Database security issues, Discretionary access control, Mandatory & role based access control, Database audit.

UNIT-IV

DISTRIBUTED DATABASES: Distributed database concepts, System architecture; Distributed database design, Fragmentation, Replication, Allocation; Types of distributed databases; Query processing in distributed databases.

UNIT-V

EMERGING TECHNOLOGIES: Data mining: Data mining concepts, Association rules, Classification, Clustering, Application of data mining. Data warehousing: Characteristics of Data warehouses, Data modeling of data warehouses, typical functionality of data warehouses. XML & Internet databases, Object relational databases, case studies of leading database systems.

COURSE OUTCOMES:

Upon successful completion of this course, students should be able to:

- Describe the fundamental elements of relational database management systems
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
- Improve the database design by normalization.
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing

SUGGESTED READINGS:

- Elmasri R. & Navathe S. B. , Fundamentals of Database Systems, Pearson Education.
- Silberschatz A., Korth H. F. & Sudarshan S., Database System Concepts, McGraw Hill.
- Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. Snodgrass, V.S. Subrahmanian, Roberto Zicari "Advanced Database Systems", The Morgan Kaufmann Series
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management Systems", McGraw-Hill Education

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- https://www.geeksforgeeks.org/

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ECS605(3) **MOBILE COMPUTING** **L:T:P : 3:1:0**

OBJECTIVES:

- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To appreciate the contribution of Wireless Communication networks to overall technological growth.
- To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
- To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks

UNIT-I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, GPRS.

UNIT- II

Wireless Networking, Wireless LAN Overview: MAC issues MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), WAP: Architecture, protocol stack, application environment, applications. Dynamic Host Configuration Protocol (DHCP).

UNIT-III

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP. Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT-IV

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques. Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications, security in MANETs.

UNIT-V

Research issues in Mobile Ad hoc Networks: Clustering issues in mobile Ad hoc Networks, Energy Conservation and Consumption Issues, QoS issues in MANET, Study of Network Simulators (Glomosim / NS2),

COURSE OUTCOMES:

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

- Impart knowledge of mobile and wireless computing systems and techniques.
- Understand the knowledge of wireless network
- Understand the concepts of mobile discovery process.
- Understand the concepts routing protocols.
- Understand the working of mobile tracking in wireless network

SUGGESTED READINGS:

- 1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, second edition, 2004.
- 2. Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2002
- 3. Charles Perkins, Mobile IP, Addison Wesley.
- 5. Charles Perkins, Ad hoc Networks, Addison Wesley.
- 6. Upadhyaya, “Mobile Computing”, Springer
- 7. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, “Fundamentals of Mobile and Pervasive Computing”, ISBN: 0071412379, McGraw-Hill Professional, 2005.
- 8. Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, Springer, second edition, 2003.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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ECS605(4) ADVANCED COMPUTER ARCHITECTURE L:T:P : 3:1:0

OBJECTIVES:

To make students know about the Parallelism concepts in Programming

1. To give the students an elaborate idea about the different memory systems and buses.
2. To introduce the advanced processor architectures to the students.
3. To make the students know about the importance of multiprocessor and multicomputer.
4. To study about data flow computer architectures

UNIT-I

Parallel computer models: The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms.

UNIT-II

Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

UNIT-III

Arithmetic for computers: Signed and unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point. CPU Performance and Its factors, evaluating performance of CPU.

UNIT – IV

Memory Hierarchy Introduction, The basics of Cache, Measuring and Improving of Cache Performance, Virtual Memory, Common framework for memory hierarchies

UNIT V

Enterprise Memory subsystem Architecture: Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

COURSE OUTCOMES:

- Demonstrate concepts of parallelism in hardware/software.
- Discuss memory organization and mapping techniques.
- Describe architectural features of advanced processors.
- Interpret performance of different pipelined processors.
- Explain data flow in arithmetic algorithms
- Development of software to solve computationally intensive problems**.**

SUGGESTED READINGS:

- Kai Hwang, “Advanced computer architecture”; TMH. 2000
- D. A. Patterson and J. L. Hennessey, “Computer organization and design”, Morgan Kaufmann, 2nd Ed. 2002
- Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, **2006.**

WEBSITE RESOURCES:

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- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

Note: Adhere to the latest editions of the Suggested Readings

Elective-II

EMA704(1) **OPTIMIZATION TECHNIQUES** **L:T:P : 3:1:0**

OBJECTIVES:

To enable the student to

1. Enumerate the fundamental knowledge of Linear Programming and Dynamic
2. Programming problems. Learn classical optimization techniques and numerical methods of optimization.
3. Know the basics of different evolutionary algorithms.
4. Explain Integer programming techniques and apply different optimization
5. Techniques to solve various models arising from engineering areas.

UNIT -I

Introduction to linear Programming: Introduction to Linear Programming Problems, Formulation of Linear Programming Problems, Graphical method for solution of LPP, Additional Examples,

Solving LPPs: The simplex method for solution of LPP, the essentials of simplex method, setting up the simple method, The Algebra of the simplex method, simplex method in Tabular form. Tie Breaking in simplex method,

Solution of maximization and minimization problems, Big-M method, Two phase method, Unbounded and degenerate solution of LPP, Duality in Linear programming

UNIT -II

Duality theory: Primal Dual Relationships, Other Algorithm for linear programming, The dual simplex method, Transportation & assignment Problems: The transportation Problems, A streamlined simplex method for the transportation problems, North West corner rule, Least cost method, Vogel's approximation method for obtaining initial feasible solutions, Stepping stone and MODI method to get optimal solution, Transshipment problem. The Assignment Problem, Hungarian model.

UNIT -III

Network optimization Models, The shortest path Problem, the minimum spanning tree problem, the maximum flow problem, the minimum cost flow problem, The Project Management with PERT/CPM, Scheduling problem with PERT/CPM, Dealing with uncertain activity durations, considering Time cost Tradeoffs, Scheduling and Controlling, Projects costs, An evaluation of PERT/CPM.

UNIT -IV

Game Theory: The formation of two persons, Zero sum games, solving simple games, games with mixed strategies, Graphical solution Procedure, Solving by LP.

UNIT -V

Inventory Theory: Components of inventory models, Deterministic continuous review models, A deterministic periodic review model, A stochastic continuous review model.

COURSE OUTCOMES:

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

- Explain the fundamental knowledge of Linear Programming and Dynamic Programming problems.
- Use classical optimization techniques and numerical methods of optimization.
- Describe the basics of different evolutionary algorithms.
- Enumerate fundamentals of Integer programming technique and apply different techniques to solve various optimization problems arising from engineering areas.

SUGGESTED READINGS:

- Hiller and Lieberman, Introduction to Operation Research (Seventh Edition) Tata McGrawHill Publishing Company Ltd
- Ravindren Philips and Solberg, Operation Research Principles and Practice(Second Edition) John Wiley & Sons.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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ECS704 (2) **ADVANCED WEB APPLICATIONS** **L:T:P : 3:1:0**

OBJECTIVES:

The objectives of this course is to help students gain familiarity with advanced modern web applications and utilize appropriate web tools for the development of web application which offer rich user experience.

UNIT I

Introduction to Markup languages, SGML, SGML vs. HTML, introduction to XML, Document type definitions, XML Schemas, XML namespaces, Object Models, Presenting XML Using XML Processors: DOM and SAX, Parsing XML documents

UNIT II

Introduction to XML Web services, Creating Web Service, Setting the Web Service, Attribute, Test and Run Your Web Service, Consuming a Web Service in Client, Application, Consuming a Third Party Web service

UNIT III

Database Processing: Database programming using ODBC, studying database connectivity APIs, accessing database from server side scripting page, Application specific database Actions

Crystal Report: Overview to Crystal Reports, Creating Crystal Reports with wizards, integrating with Web Applications, Customizing the Report Viewer

UNIT IV

Understanding AJAX Technology, How AJAX Works, Building a ASP.NET Page with Ajax, Using Update Panel Control, AJAX Server Controls, AJAX Control Toolkit, Downloading and Installation, AJAX Control Toolkit Extenders

UNIT V

IIS: Architecture of IIS 7, Internet Information Service Manager

Deployment: Methods of Deploying Web Application, Deploy Windows Application, Deploying Website, Publishing Website

COURSE OUTCOMES:

Upon successful completion of this course students should be able to:

- Define and discuss major concepts, tools, techniques, and methods of web applications and web services.
- Identify and utilize best practices for web application development and management.
- Creating ASP.NET page with Ajax.
- Analyze emerging web technologies, applications, and business models.
- Plan, design, and develop a modern web application solution in a specific context.

SUGGESTED READINGS:

- Burdman, “Collaborative Web Development” Addison Wesley.
- Chris Bates, “Web Programing Building Internet Applications”, 2nd Edition, WILEY, Dreamtech
- Joel Sklar , “Principal of web Design” Vikash and Thomas Learning
- Horstmann, “CoreJava”, Addison Wesley.
- Herbert Schieldt, “The Complete SUGGESTED READINGS: Java”, TMH.
- Hans Bergsten, “Java Server Pages”, SPD O’Reilly

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- https://www.geeksforgeeks.org/

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ECS704 (3) **SIMULATION AND MODELLING** **L:T:P : 3:1:0**

OBJECTIVES:

Define the basics of simulation modeling and replicating the practical situations in organizations Generate random numbers and random variates using different techniques.

1. Develop simulation model using heuristic methods
2. Analysis of Simulation models using input analyzer, and output analyzer
3. Explain Verification and Validation of simulation model

UNIT-1

System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

UNIT-II

System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

UNIT-III

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

UNIT-IV

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model.

UNIT-V

Simulation of PERT Networks, critical path computation, uncertainties in activity duration, resource allocation and consideration, Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation, packages, CSMP-III, MODSIM-III.

COURSE OUTCOMES:

After the successful completion of the course, the students will be able to:

- Describe the role of important elements of discrete event simulation and modeling paradigm.
- Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.
- Develop skills to apply simulation software to construct and execute goal-driven system models.
- Interpret the model and apply the results to resolve critical issues in a real world environment

Suggested Readings

- 1. Geoftrey Gordon, “System Simulation”, PHI
- 2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, “Discrete Event System Simulation”, Pearson Education
- 3. Averill M. Law, W. David Kelton, “System Modeling and simulation and Analysis”,TMH

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ECS704 (4) **EMBEDDED SYSTEMS** **L:T:P : 3:1:0**

OBJECTIVES:

1. Develop an understanding of the technologies behind the embedded computing systems.
2. To introduce students to the design issues of embedded systems.
3. Enable students to analyze and develop software programs for embedded systems

UNIT-I

Introduction to embedded systems: Classification, History, Characteristics and requirements, embedded software Architectures, inside embedded system: Processor, memory, peripherals, software, algorithms, Examples of embedded system, Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

UNIT-II

Timing and clocks in embedded systems, Task Modeling and management, Real time operating System issues. Embedded Processor: Embedded system Design Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing.

UNIT-III

Modeling and Characterization of Embedded Computation System. Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

UNIT-IV

Programming Concepts and Embedded Programming in C, C++, Programming in assembly language (ALP) vs. High Level Language, Embedded Programming in C++, Programming of 8051 microcontroller, instruction set, addressing modes, port programming.

UNIT-V

Introduction to Real time operating system, task concepts and task scheduling in RTOS, Rate monotonic (RM), EDF scheduling, resource allocation, Fault-Tolerance, Formal Verification.

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

- Develop assembly language programs for 8051 and its applications in the field of information technology using different types of interfacing
- Acquire knowledge on embedded systems basics and describe the architecture and operations of ARM processor
- Develop skills in writing small programs for ARM processor
- Apply different types of interfaces with interrupt handling mechanism
- Understand the multiple process operating environments and use standard system call interfaces to monitor and control processes

SUGGESTED READINGS:

- H.Kopetz, “Real-Time Systems”, Kluwer, 1997.
- R.Gupta, “Co-synthesis of Hardware and Software for Embedded Systems”, Kluwer 1995.
- Rajkamal, “Embedded Systems”, TMH, 2008
- Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
- Mazidi & Mazidi,“ The 8051 microcontroller and embedded systems”, PHI

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Elective-III

ECS801 (1) **NETWORK PROGRAMMING** **L:T:P : 3:1:0**

OBJECTIVES:

Having successfully completed this course, the student will be able to:

1. Demonstrate mastery of main protocols comprising the Internet.
2. Develop skills in network programming techniques.
3. Implement network services that communicate through the Internet.
4. Apply the client-server model in networking applications.
5. Practice networking commands available through the operating systems

UNIT-I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II

Sockets: Address structures, Byte ordering and manipulation function, Elementary TCP sockets– Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT-III

TCP client server: Introduction, TCP Echo server functions, Normal start-up, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT-IV

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-V

IPC: Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

COURSE OUTCOMES:

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

- To impart the knowledge of socket programming
- Understand the basic concept of TCP/IP model
- Understand the basic concept of Middleware communications
- To impart the knowledge of web programming
- Understand the basic concepts of client server programming.

Suggested Readings:

- UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
- UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

WEBSITE RESOURCES:

- swayam.gov.in
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Note: Adhere to the latest editions of the Suggested Readings

ECS801(2) **PARALLEL COMPUTING** **L:T:P : 3:1:0**

OBJECTIVES:

1. To introduce you to the major concepts and ideas in parallel computing and its applications
2. To help you understand various models of parallelism (e.g., shared versus distributed memory models) and their strengths and limitations
3. To introduce you to basic "bottlenecks" encountered in parallel computing, e.g., I/O bottlenecks
4. To give you the basic knowledge to write simple MPI parallel programs

UNIT I

Introduction of parallel computing, Model of parallel computing: Synchronous - vector/array, SIMD, Systolic; Asynchronous - MIMD, reduction model.

Flynn's classifications, Handler's classifications, Kung's taxonomy, SPMD.

UNIT II

Abstract parallel computing models: Combinational circuits, Sorting network, PRAM models, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism

UNIT III

Performance Measurement: Laws governing performance measurements. Metrics - speedups, efficiency, utilization, communication overheads, single/multiple program performances, bench marks.

UNIT IV

Parallel Processors: Taxonomy and topology - shared memory multiprocessors, distributed memory networks. Processor organization - Static and dynamic interconnections. Embeddings and simulations.

UNIT V

Parallel Programming: Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming.

Scheduling and Parallelization: Parallel programs scheduling. Loop scheduling. Parallelization of sequential programs. Supporting environments for parallel computing.

COURSE OUTCOMES:

- Be proficient at programming multiple parallel machines in more than one special programming language or programming system
- Be able to descriptively compare the performance of different programs and methods on one machine.
- Demonstrate advanced knowledge of the elements of parallel programming, parallel communication and system implementation
- Recall the history of parallel systems, principles of parallel algorithms and describe the developments in the field of parallel computing.

SUGGESTED READINGS:

- M. J. Quinn.Parallel Computing: Theory and Practice, McGraw Hill.
- T. G. Lewis and H. El-Rewini. Introduction to Parallel Computing, Prentice Hall.
- Vipin Kumar, Ananth Grama, Anshul Gupta, George Karpis "Introduction to Parallel Computing: Design and Analysis of Parallel Algorithms", IEEE Distributed System

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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ECS801(3) DESIGN OF UNIX OPERATING SYSTEM L:T:P : 3:1:0

OBJECTIVES:

- To familiarize students with the concepts, design, and structure of the UNIX operating system.
- To teach students the use of basic UNIX Utilities
- To teach students the principles of UNIX shell programming.

UNIT-I

Overview of the System: System structure, User perspective, Operating System Services, Introduction to the Kernel: Architecture of the UNIX Operating System, Introduction to system concepts, Kernel Data structures, System Administration, The Buffer Cache: Buffer Headers, Structures of the buffer pool, scenarios for retrieval of the buffer, Reading and writing of the Disk blocks, Advantages and disadvantages of the buffer cache

UNIT-II

Internal representation of files: INODE, structure of a regular file, directories, conversion of a path name to an INODE, Superblock, INODE assignment to a new file, allocation of disk blocks, other file types, System calls for the file System: Open, read, write, file and record locking, adjusting the position of the file I/O, Close, file creation, change directories and change root, pipes, mounting and un-mounting file systems, link and uplinks, file system abstractions and maintenance.

UNIT-III

The structure of processes: process state and transitions, layout of system memory, the context of a process, process address space manipulation, sleep, Process Control: process creation and termination, signals, the user ID of a process, changing the size of a process, the shell, system boot and INIT process

UNIT-IV

Process scheduling and time: system calls for scheduling and time, memory management policies: swapping and demand paging, The I/O system: Driver interfaces, disk and terminal drivers, Interprocess communication: Process tracing, network communications, sockets

UNIT-V

Multiprocessor systems: problem and solution of multiprocessor systems, the TUNIS system, performance limitations, And Distributed UNIX systems: satellite processors, the new castle connection, Transparent distributed file system, transparent distributed model

COURSE OUTCOMES:

A successful student will be able to understand the basic components of a computer operating system, and the interactions among the various components.

SUGGESTED READINGS:

- Maurice J. Bach, " The design of the UNIX Operating system" PHI

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ECS801(4) VIRTUAL REALITY L:T:P : 3:1:0

OBJECTIVES:

In this course, we will cover:

1. Historical and modern overviews and perspectives on virtual reality.
2. Fundamentals of sensation, perception, and perceptual training.
3. The scientific, technical, and engineering aspects of virtual reality systems.
4. Evaluation of virtual reality from the lens of design.

UNIT I

Introduction: The three I's of virtual reality, commercial VR technology and the five classic components of a VR system.

UNIT II

Input Devices: (Trackers, Navigation, and Gesture interfaces): Three dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces. Output Devices: Graphics displays, sound displays and haptic feedback.

UNIT III

Modeling: geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management Human factors: Methodology and terminology, user performance studies, VR health and safety issues.

UNIT IV

Applications: Medical applications, military applications, robotics applications. VR programming-I: Introducing Java 3D, loading and manipulating external models, using a lather to make shapes

UNIT V

VR programming-II: 3D Sprites, animated 3D sprites, particle systems.

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- Understand geometric modeling and Virtual environment.
- Study about Virtual Hardware and Software
- Present geometric model for VR systems
- Identify which type hardware and software is suitable to design their own VR systems
- Develop Virtual Reality applications.

SUGGESTED READINGS:

- Virtual Reality Technology, Second Edition, Gregory C. Burdea & Phillippe Coiffet John Wiley & Sons, Inc.
- Killer Game Programming in Java, Andrew Davison, Oreilly- SPD, 2005.

WEBSITE RESOURCES:

- swayam.gov.in
- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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Elective-IV

ECS802(1) WIRELESS & SENSOR NETWORKS L:T:P : 3:1:0

OBJECTIVES:

1. To understand the WSN node Architecture and Network Architecture
2. identify the Wireless Sensor Network Platforms
3. To program WSN using embedded C
4. To design and Develop wireless sensor node

UNIT 1

Understanding wireless network principles: Wireless channel, propagation, multiple access and modulation, Wireless technologies and architectures, Significance of sensor networks in the wide subject of wireless networking; Introducing sensor node: Hardware and software components of a node ,Limitations of a sensor node ,Characteristics of a sensor node, Example sensor nodes

UNIT 2

Sensor network architecture and design principles: Sensor network scenarios, Optimization goals and figures of merit, Designing sensor Networks, Service interfaces and gateway concept; WSN Programming and Medium access control (MAC): WSN Programming Demo, Fundamentals of MAC protocols. Different types of MAC protocols.

UNIT 3

Link Layer protocols and Addressing: Fundamentals of Link Layer, Error Control, Framing & Link Management, Addressing and naming in sensor networks; Time synchronization and topology control: Time synchronization, Topology Control

UNIT 4

ID-Centric Routing protocols and WSN Simulation, Gossiping and energy efficient Unicast, Broadcast, Multicast and Geographic routing, Sensor Network Simulation Tutorial; Data Centric and Content-based networking: Introduction and data-centric routing, Data aggregation.

UNIT 5

Transport layer and quality of service: Reliable Delivery, Coverage and Deployment, Congestion and rate control, QoS; Sensor network security: Network security basics, Wireless network security ,Security for sensor networks ; Advanced topics and potential research areas about sensor networks

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

- Impart the trends in emerging field of wireless ad hoc and sensor networking.
- Focus on layered communication modeling, such as the media access control and network layer.
- Learn the need of energy management systems
- Address quality of service issues and network reliability for transmission of real-time information.
- Learn the various routing protocols of ad hoc and sensor networks

SUGGESTED READINGS:

- Handbook of Sensor Networks: Algorithms and Architectures, I. Stojmenovic, John Wiley & Sons, 2005.
- Ad Hoc & Sensor Networks: Theory and Applications, C. De Morais Condeiro and D.Agrawal, World Scientific Pub, 2006.
- Networking Wireless Sensors, B. Krishnamachari, Cambridge University Press, 2006.
- Algorithms for Sensor and Ad Hoc Networks, Ed. Wagner, D., Wattenhofer, R., Springer Verlag, 2007.
- Wireless Sensor Networks: An Information Processing Approach, Feng Zhao and Leonidas Guibas, Morgan Kaufman, 2004.
- Mobile, Wireless, and Sensor Networks: Technology, Applications and Future Directions, Rajeev Shorey, A. Ananda, Mun Choon Chan, and Wei Tsang Ooi (Eds), IEEE Press, 2006.
- Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, Mohammad Ilyas, Imad Mahgoub, CRC Press, 2004.
- Protocols and Architectures for Wireless Sensor Networks, by Holger Karl and Andreas Willig Publisher: John Wiley & Sons (May 31, 2005) ISBN: 0470095105

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ECS802(2) **SEMANTIC WEB** **L:T:P : 3:1:0**

OBJECTIVES:

The objectives of this course are to teach the students the concepts, technologies and techniques underlying and making up the Semantic Web.

UNIT I

Structured Web Documents in XML Introduction , The Semantic Web Vision , Today's Web, From Today's Web to the Semantic Web Layered approach to Semantic Web Technologies

UNIT-II

Overview of Structured Web Documents in XML , XML Language Overview , Structuring ,Namespaces , Addressing and Querying XML Documents , Processing of documents.

UNIT III

Describing Web Resources in RDF Understanding content: Metadata, metadata standards, XML, metadata specification, RDF Basics, XML-Based Syntax, RDF Schema: Direct Inference System for RDF, Querying in RQL

UNIT IV

Web Ontology Language: , Web Ontology Language, OWL , Future Extensions , case study of any one ontology editor i.e. Sesame or Protégé, Monotonic Rules syntax and Semantics , No monotonic Rules syntax and semantics .

UNIT V

Applications Semantic Applications, demonstrating power of semantic technology for search, personalization, contextual directory and custom/enterprise applications; next generation semantic content management , Contributions of IR, AI, Logic, NLP, DB and IS to Semantic Web, Ontology integration versus interoperation

COURSE OUTCOMES:

On successful completion of the module students should be able to:

- Understand the rationale behind Semantic Web.
- Model ontologism using Resource Description Framework (RDF).
- Design RDF Schemas for ontologism.
- Model and design ontologism using Web Ontology Language (OWL).
- Query ontologism using SPARQL.
- Understand and reflect on the principles of Ontology Engineering.
- Make an association between Semantic web and Web 2.0.
- Apply Semantic web technologies to real world applications

Suggested Readings:

- Grigoris Antoniou and Frank van Harmelen, A Semantic Web Primer , The MIT Press
- Daconta, Obrst and Smith , The Semantic Web: A Guide to the Future of XML, Web Services and Knowledge Management. Wiley 2003.
- Munindar P. Singh and Michael N. Huhns, Service-Oriented Computing, Wiley & Sons.

WEBSITE RESOURCES:

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- onlinecourses.nptel.ac.in
- https://www.geeksforgeeks.org/

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ECS802(3) **REAL TIME SYSTEM** **L:T:P : 3:1:0**

OBJECTIVES:

The objective of this course is to

1. Develop an understanding of various Real Time systems Application
2. Obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
3. Get in-depth hands-on experience in designing and developing a real operational system.

UNIT I:

Introduction to real time systems, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc, Hard Real Time Systems and Soft Real Time System, structure, issues, task classes, performance measures for real time systems-their properties, traditional measures, cost functions and hard deadlines. Estimation of program runs time-source code analysis, accounting for pipelining and caches.

UNIT II:

Task Assignment and Scheduling-Rate monotonic scheduling algorithm, Preemptive earliest deadline first algorithm, using primary and alternative tasks. Task Assignment-Utilization balancing algorithm, next fit for RM(Rate monitoring) scheduling, Bin packing assignment algorithm for EDF, Myopic offline scheduling(MOS) algorithm, Focused addressing and bidding(FAB) algorithm, Buddy strategy, Assignment with precedence conditions.

UNIT III:

Programming Languages & Tools- Desired language characteristics,, data typing, control structures, hierarchical decomposition, packages, run time error handling, Overloading and genetics, Multitasking, Low level programming, Fex, Euclid, Run time support.

UNIT IV:

Real time Communication-Communication media, network topologies. Protocols-Contention based, Token based, Stop-and-Go, Polled bus, Hierarchical round robin, deadline based.

UNIT V:

Fault Tolerance Techniques- Fault, fault types, fault detection, fault and error containment, hardware and software redundancy, time redundancy, information redundancy. Reversal checks, Malicious or Byzantine failures, Integrated failure handling.

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to

- Grasp a fundamental understanding of goals, components and evolution of real time systems
- Explain the concepts of real time scheduling
- Learn the scheduling policies of modern operating systems
- Understand the resource access control techniques in real time systems.
- Understand the concept of real time communication

SUGGESTED READINGS:-

- C.M Krishna and Kang G. Shin, Real Time Systems, TMH
- Stuart Bennelt, Real time computer control and introduction, Pearson education, 2003
- Jane W.S Liu, Real time systems, Mc-Graw Hill

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ECS802(4) **TCP/IP PROTOCOL SUITE** **L:T:P : 3:1:0**

OBJECTIVES:

1. To study the standards of TCP / IP protocol and addressing types.
2. To Study various protocols like ARP, RARP, UDP, ICMP, IGMP
3. To learn Multicasting protocols, SNMP, SMTP and TCP/IP on Embedded Systems and IPV6.
4. To study the important network protocols and IPV6 standards.
5. To study the standards of TCP / IP protocol and addressing types

UNIT I

Introduction: Uses of Computer Networks, Network and Protocol Architecture, Reference Model (ISO-OSI, TCP/IP-Overview

UNIT II

Physical Layer: Data and signals, Transmission impairments, Data rate limits, performance factors, Transmission media, Wireless transmission, Telephone system (Structure, trunks, multiplexing & Switching)

UNIT III

Data Link Layer: Design issues, Error detection & correction, Data Link Protocols, sliding window protocols, HDLC, WAN Protocols.

UNIT IV

Medium Access Sub layer: Channel allocation problem, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Network Devices-repeaters, hubs, switches bridges.

UNIT V

Network Layer: Design issues, Routing algorithms, congestion control algorithms, Internetwork protocols, and Internetwork operation

COURSE OUTCOMES:

- To understand the various standards on data communication
- To understand the functionality of reference model for data communication
- To understand the various layers of different protocols
- To understand the basic concept of socket programming and client server model

SUGGESTED READINGS:

- W. Stallings, “Data and Computer Communications”, Pearson Education, 8th Ed, 2007.
- D. E. Comer., “Computer Networks & Internets”, Pearson Education, 4th Ed, 2007
- B. A Forouzan.,”Data Communications & Networking”,4th Ed, Tata McGraw Hill, 2007.
- S. Tanenbaum. “Computer networks”, Pearson Education, 4th ed , 2006.

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