JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA
YSR(KADAPA) Dist. 516 390, (A.P) INDIA
COURSE STRUCTURE (R20)
COMPUTER SCIENCE AND ENGINEERING
Effective from AY 2021-22
Induction Programme

S.No.	Course Code	Course Title	Category	L	T	P	Credits
1.		Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0	0	6	0
2.		Career Counselling	MC	2	0	2	0
3.		Orientation to all branches -- career options, tools, etc.	MC	3	0	0	0
4.		Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2	0	0	0
5.		Proficiency Modules & Productivity Tools	ES	2	0	0	0
6.		Assessment on basic aptitude and mathematical skills	MC	2	0	3	0
7.		Remedial Training in Foundation Courses	MC	2	0	3	0
8.		Human Values & Professional Ethics	MC	3	0	3	0
9.		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2	0	2	0
10.		Concepts of Programming	ES	2	0	0	0

SEMESTER - 1					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS05	Linear Algebra And Calculus	BS	3-0-0	3
2	20ABS03	Chemistry	BS	3-0-0	3
3	20ACS03	Python Programming	ES	3-0-0	3
4	20ABEE01	Basic Electrical & Electronics Engineering	ES	3-0-0	3
5	20AME04	Engineering Workshop	ES	0-0-3	1.5
6	20ACS05	It Workshop	ES	0-0-3	1.5
7	20ABS04	Chemistry Lab	BS	0-0-3	1.5
8	20ACS04	Python Programming Lab	ES	0-0-3	1.5
9	20ABEE02	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
Total					**19.5**

SEMESTER - 2					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS06	Differential Equations And Vector Calculus	BS	3-0-0	3
2	20ABS10	Applied Physics	BS	3-0-0	3
3	20AHS01	Communicative English	HS	3-0-0	3
4	20ACS08	C-Programming & Data Structures	ES	3-0-0	3
5	20AME01	Engineering Graphics	ES	1-0-4	3
6	20AHS02	Communicative English Lab	ES	0-0-3	1.5
7	20ABS11	Applied Physics Lab	BS	0-0-3	1.5
8	20ACS09	C-Programming & Data Structures Lab	ES	0-0-3	1.5
Total					**19.5**

SEMESTER - 3					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS14	Discrete Mathematics And Graph Theory	BS	3-0-0	3
2	20ACS14	Computer Organization	PC	3-0-0	3
3	20ACS16	Database Management Systems	PC	3-0-0	3
4	20ACS18	Object Oriented Programming Using Java	PC	3-0-0	3
5	20AHS04 20AHS05	Humanities Elective: **i.** Managerial Economics and Financial Analysis **ii.** Entrepreneurship And Innovation Management	HS	3-0-0	3
8	20ACS17	Database Management Systems Lab	PC	0-0-3	1.5
9	20ACS19	Object Oriented Programming Using Java Lab	PC	1-0-2	1.5
7	20ACS15	Computer Organization Lab	PC	0-0-3	1.5
6	20ACS20	(Skill Oriented Course – I) Web Development	SC	1-0-2	2
10	20ABS09	Environmental Science	MC	3-0-0	0
	20AMC01	NSS Activities	MC	0-0-2	0
Total					**21.5**

SEMESTER - 4					
S.No	**Course Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS15	Numerical Methods, Probability And Statistics	BS	3-0-0	3
2	20ACS22	Formal Language And Automata Theory	ES	3-0-0	3
3	20ACS23	Operating Systems	PC	3-0-0	3
4	20ACS25	Design And Analysis Of Algorithms	PC	3-0-0	3
5	20ACS27	Software Engineering	PC	3-0-0	3
6	20ACS29	Skill Oriented Course – Ii Mobile Application Development	SC	1-0-2	2
7	20ACS24	Operating Systems Laboratory	PC	0-0-3	1.5
8	20ACS26	Design And Analysis Of Algorithms Lab	PC	0-0-3	1.5
9	20ACS28	Software Engineering Laboratory	PC	0-0-3	1.5
10	20AMC02	Mandatory Non-Credit Course (Employability Skills) **APTITUDE AND REASONING SKILLS**	MC	3-0-0	0
11	20AHS07	Universal Human Values	MC	3-0-0	3
Total					**24.5**
Mandatory Community Service Project/ Internship during Summer Vacation					

- Eligible & interested students are permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Honours or a Minor from V Semester onwards.

B.Tech III Year I Semester

Semester - 5					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACS51	Computer Networks	PC	3-0-0	3
2	20ACS52	Compiler Design	PC	3-0-0	3
3	20ACS53	Artificial Intelligence	PC	3-0-0	3
4	20ACS54	Professional Elective – I	PE	3-0-0	3
	20ACS54A	Big Data and Analytics			
	20ACS54B	Data mining			
	20ACS54C	Data Visualization with Python			
5	20ACS55	Open Elective Course– I	OE	3-0-0	3
6	20ACS50	Web Technologies (Skill oriented course – III)	SC	1-0-2	2
7	20ACS57	Computer Networks Lab	PC	0-0-3	1.5
8	20ACS58	Artificial Intelligence lab	PC	0-0-3	1.5
9	20AHS11	Indian Constitution	MC	3-0-0	0
10	20ACS59	Evaluation of Community Service Project/Internship	PR	-------	1.5
				Total	**21.5**

Open Elective I (Interdisciplinary)

Branch	Subject Code	Subject
Mathematics	20ABS55A	Fuzzy Set Theory, Arithmetic and Logic
Physics	20ABS55B	Functional Nanomaterials for Engineers
Chemistry	20ABS55C	Chemistry of Energy Materials
CIVIL	20ACE55A	Basics of Civil Engineering
EEE	20AEE55A	Basics of Non-Conventional Energy Sources
ME	20AME55A	3D Printing
	20AME55B	Smart Materials
ECE	20AEC55A	Fundamentals of Electronics and Communication Engineering
	20AEC55B	Transducers and Sensors

Note: A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.

B.Tech III Year II Semester

Semester - 6					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACS61	Internet of Things	PC	3-0-0	3
2	20ACS62	Data Science	PC	3-0-0	3
3	20ACS63	Cyber Security	PC	3-0-0	3
4	20ACS64	Professional Elective – II (MOOC-I)	PE	3-0-0	3
5	20ACS65	Open Elective Course –II	OE	3-0-0	3
6	20ACS66	Internet of Things Lab	PC	0-0-3	1.5
7	20ACS67	Data Science Lab	PC	0-0-3	1.5
8	20ACS68	Cyber security Lab	PC	0-0-3	1.5
9	20AHS10	Soft Skills (Skill Oriented Course – IV)	SC	1-0-2	2
10	20ACS60	Design Thinking and Innovation for Product Innovation	MC	3-0-0	0
				Total	**21.5**
Industry Internship (Mandatory) for 6 - 8 weeks duration during summer vacation					

Open Elective II (Interdisciplinary)

Branch	Subject Code	Subject Name
Mathematics	20ABS65A	Numerical Techniques
Physics	20ABS65B	Materials Characterization Techniques
Chemistry	20ABS65C	Polymers and their applications
CIVIL	20ACE65A	Environmental Impact Assessment
EEE	20AEE65A	Energy Conservation and Management
ME	20AME65A	Programming of Robots and Control
	20AME65B	Non-Conventional sources of Energy
ECE	20AEC65A	Introduction to Microcontrollers & Applications
	20AEC65B	Principles of Digital Signal Processing

Note: Student shall register for MOOC Course in NPTEL/SWAYAM in concurrence with the department before commencement of semester. The advanced courses should opt which is not repetitive regular courses and syllabus.

B.Tech IV Year I Semester

Semester - 7					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACS71	Professional Elective – III	PE	3-0-0	3
	20ACS71A	Software project Management			
	20ACS71B	Software Testing			
	20ACS71C	Software Architecture			
2	20ACS72	Professional Elective – IV	PE	3-0-0	3
	20ACS72A	Micro services			
	20ACS72B	Cloud Computing			
	20ACS72C	Ad-hoc and sensor networks			
3	20ACS73	Professional Elective –V	PE	3-0-0	3
	20ACS73A	Block chain technologies			
	20ACS73B	Virtual Reality			
	20ACS73C	Statistical Analysis using R			
4	20ACS75	Open Elective – III	OE	3-0-0	3
5	20ACS76	Open Elective – IV (MOOC-II)	OE	3-0-0	3
6		Humanities Elective – II	HS	3-0-0	3
	20AHS12	Management Science			
	20AHS13	Business Environment			
7	20ACS70	Advanced Web Technologies (Skill oriented course − V)	SC	1-0-2	2
8	20ACS79	Evaluation of Internship	PR	-------	3
				Total	**23**

Open Elective III (Interdisciplinary)

Branch	**Subject Code**	**Subject Name**
Mathematics	20ABS75A	Mathematical Modeling
Physics	20ABS75B	Sensors and Actuators for Engineering Applications
Chemistry	20ABS75C	Chemistry of Nano-materials and applications
CIVIL	20ACE75A	Disaster Management and Mitigation
EEE	20AEE75A	IOT Applications in Electrical Engineering
ME	20AME75A	Introduction to Composite Materials
	20AME75B	Customer Relationship Management
ECE	20AEC75A	Fundamentals of Image Processing
	20AEC75B	Basics of VLSI Design

Open Elective-IV shall opt any of branch which shall not match with regular course and syllabus.

B.Tech IV Year II Semester

Semester - 8					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACS99	Full Internship & Project work	PR	--------	12

Total	**12**

Courses offered for Honours degree

1. Network Security

S.No.	Course Code	Course Title	Offered in Semester	Prerequisite if any	Contact Hours per week		Credits
					L	T	
1	20ACSH01	Network Security and Cyber Laws	V	Basics of Networks	3	1	4
2	20ACSH02	Social Mobile Analytics & Cloud	VI	Basics of cloud	3	1	4
3	20ACSH03	Storage Area Networks	VI	Basics of Data Base	3	1	4
4	20ACSH04	High Performance Computing	VII	Basics of computing techniques	3	1	4
5	20ACSH05	Natural Language Processing (MOOC Course)	V	Fundamentals of compiler design			2
6	20ACSH06	Multi Agent Systems (MOOC Course)	VII	Basics of sharing between two systems			2

Title of the Minor Degree
(Disciplines to which the Minor is offered)

S.No.	Branch	Name of the Minor degree	Course Code	Course Title	Offered in Semester	Contact Hours per week			Credits
						L	T	P	
1	CSE	Web Design & Development	20ACSM01	User Interface Design	V	3	1	0	4
2			20ACSM02	Advanced Java Script	VI	3	1	0	4
3			20ACSM03	Content Management & Distributed systems	VI	3	1	0	4
4			20ACSM04	Mongo DB	VII	3	1	0	4
5			20ACSM05	MOOC Course	V				2
6			20ACSM06	MOOC Course	VII				2
1	CSE	Data Science	20ACSM07	Data Science	V	3	1	0	4
2			20ACSM08	Data Analytics using Python and Lab	V	3	0	2	4
3			20ACSM09	Data Visualization	VII	3	1	0	4
4			20ACSM10	Machine Learning	VI	3	1	0	4
5			20ACSM11	MOOC Course	VI				2
6			20ACSM12	MOOC Course	VII				2
1	CE	Construction Technology	20ACEM01	Building Materials	V	3	1	0	4
2			20ACEM02	Building Construction	V	3	1	0	4
3			20ACEM03	Building planning and Drawing	VI	3	1	0	4
4			20ACEM04	Surveying	VI	3	1	0	4
5			20ACEM05	MOOC Course	VII				2
6			20ACEM06	MOOC Course	VII				2
1	EEE	Electrical Systems	20AEEM01	Basic Electric Circuits and Analysis	V	3	1	0	4
2			20AEEM02	Principles of Electrical Measurements	V	3	1	0	4
3			20AEEM03	Basics of Power Electronics and Devices	VI	3	1	0	4
4			20AEEM04	Fundamentals of Control Systems	VI	3	1	0	4
5			20AEEM05	MOOC Course	VII				2

6			20AEEM06	MOOC Course	VII				2
1	ME	3D Printing	20AMEM07	Materials science for Engineers	V	3	1	0	4
2			20AMEM08	Computer Aided Machine Drawing	V	3	1	0	4
3			20AMEM09	3D Printing materials	VI	3	1	0	4
4			20AMEM10	Applications of 3D Printing	VII	3	1	0	4
5			20AMEM11	MOOC Course	VI				2
6			20AMEM12	MOOC Course	VII				2
1	ME	Robotics and Automation	20AMEM13	Introduction to Robotics	V	3	1	0	4
2			20AMEM14	Industrial Automation	V	3	1	0	4
3			20AMEM15	Hydraulic and Pneumatic circuits	VI	3	1	0	4
4			20AMEM16	Programming and control of Robot	VII	3	1	0	4
5			20AMEM17	MOOC Course	VI				2
6			20AMEM18	MOOC Course	VII				2
1	ME	Industrial Engineering	20AMEM19	Production Planning and Control	V	3	1	0	4
2			20AMEM20	Marketing Management	VI	3	1	0	4
3			20AMEM21	Customer Relationship Management	VI	3	1	0	4
4			20AMEM22	Six Sigma & Lean Manufacturing	VII	3	1	0	4
5			20AMEM23	MOOC Course	V				2
6			20AMEM24	MOOC Course	VII				2
1	ECE	Electronics & Communication Engineering	20AECM01	Electronic Circuits	V	3	1	0	4
2			20AECM02	Digital Electronics	V	3	1	0	4
3			20AECM03	Principles of Communications	VI	3	1	0	4
4			20AECM04	Electronic Instrumentation	VI	3	1	0	4
5			20AECM05	MOOC Course	VII				2
6			20AECM06	MOOC Course	VII				2

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – I SEMESTER (R20)
(Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Linear Algebra and Calculus	3	0	-	3

COURSE OBJECTIVES	
1	This course will illuminate the students in the concepts of calculus and linear algebra.
2	To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

COURSE OUTCOMES	
CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Utilize mean value theorems for real life problems
CO3	Familiarize with functions of several variables which is useful in optimization
CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2 and 3- dimensional coordinate systems.
CO5	Students will learn the utilization of special functions.

SYLLABUS

Unit I: Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, Normal form, solving system of non-homogeneous and homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix.

Unit II: Infinite series and Mean Value Theorems

Infinite series:

Series, Convergence and divergence, Geometric series, Integral test, P- series, comparison test, ratio test, root test.

Mean Value Theorems:

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem (without proof). Expansions of functions: Taylor's and Maclaurin's series, indeterminate forms and L-Hospital rule (Limits).

BOS Chairman
Mathematics

Unit III: Multivariable calculus

Functions of several variables – Limit and Continuity, Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

Unit IV: Multiple Integrals

Double integrals, change of order of integration, areas enclosed by plane curves, Triple Integrals, Volume of solid as double integral and as triple integral, change of variables in double integral and Triple integral.

Unit V: Special Functions- Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions. Derichlet's integral and its applications (Areas and Volumes of solids).

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – I Yr I sem (R20)

L	T	P	C
3	0	0	3

Chemistry

(EEE, ECE and CSE)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, Spectroscopy and polymers
- To introduce instrumental methods and modern engineering materials.

Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2, applications to hydrogen, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of N_2, O_2, CO and NO, π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Schrodinger wave equation to hydrogen atom (L3)
- **recall** molecular orbital theory and energy level diagrams of atoms (L1)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the calculation of bond order of O_2 and CO molecules (L2)
- **discuss** the basic concept of molecular orbital theory (L3)

Unit 2: Modern Engineering materials: (12 hrs)

i). Understanding of materials: Crystal field theory – salient features – splitting in octahedral, tetrahedral and square planar geometry. Properties of coordination compounds- oxidation state, coordination number, magnetic properties and colour.

ii). Semiconductor materials, superconductors- basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

iii). Supercapacitors: Introduction, basic concept-classification – applications.

iv). Nanochemistry: Introduction, classification of nanometerials, properties and applications of fullerenes, carbon nanotubes and graphene nanoparticles.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** splitting of in octahedral and tetrahedral geometryof complexes (L2).
- **recall** applications of semiconductors, super conductors, nanomaterials (L1)
- **discuss** the magnetic behaviour and colour of coordination compounds (L3).
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **demonstrate** the application of fullerenes, carbon nano tubes and graphene nanoparticles (L2).

Unit 3: Electrochemistry and Applications: (12 hrs)

Introduction to electrochemistry, electrodes – concepts of reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, pH metry, potentiometry- potentiometric titrations (redox titrations), concept of conductivity- Specific, equivalent & molar conductance and.cell constant, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors (glucose potentiometric sensor), amperometric sensors(Estimation of Uric Acid (UA))

Primary cells – Zinc-air, Na-Air batteries, secondary cells – Nickel-Cadmium (NiCd),and lithium ion batteries- working of the batteries including cell reactions; fuel cells: hydrogen-oxygen, methanol fuel cells – working of the cells and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **recall** applications of various batteries (L1).
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

Unit 4: Polymer Chemistry: (10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Calculation of molecular Weight of polymer by weight average and number average methods, polydispersity index

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the different types of polymers and their applications (L2)
- **find** number average and weight average of polymer (L1)
- **explain** the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit 5: Instrumental Methods and Applications (8 hrs)

Regions of electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible, IR Spectroscopies- Principle, selection rules and applications. Solid-Liquid Chromatography–TLC, retardation factor.

Learning outcomes:

After completion of Unit IV, students will be able to:

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of UV-Vis, IR Spectroscopy (L2)
- **find** retention time and volumes of samples (L1)
- **explain** the various applications of analytical instruments (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.

2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

Reference Books:

1.G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.

2. J.D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.

3. K. Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, Pearson Publication Pvt. Ltd.

4. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

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

- **compare** the materials for construction of battery and electrochemical sensors (L2)
- **recall** properties and applications of polymers and engineering materials (L1)
- **explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, TLC in separation of solid and liquid mixtures (L2)
- **apply** the principle of Band diagrams in application of conductors and semiconductors (L3)

Python Programming

(CSE)

I B. Tech – I Semester

L-T-P-C
3-0-0-3

OBJECTIVES:

- To introduce object oriented programming using an easy-to-use language.
- To use iterators and generators.
- To test objects and handle changing requirements.
- To be exposed to programming over the web.

UNIT I - INTRODUCTION, DATA TYPES AND EXPRESSIONS

Introduction: Computer science, Computer algorithms, Computer software, The Python programming language, First program in Python.

Data Types and Expressions: Literals, Variables and Identifiers, Operators, Expressions and Data types.

UNIT II - CONTROL STRUCTURES, LISTS, DICTIONARIES AND SETS

Control Structures: Control structures, Boolean expressions, Selection control and Iterative control.

Lists: List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.

Dictionaries, Tuples and Sets: Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.

UNIT III - DESIGN WITH FUNCTIONS, STRINGS AND TEXT FILES

Program routines, Functions, Recursion-Recursive functions, Recursive problem solving, Iteration Vs Recursion, A case study of Towers of Hanoi using recursion; Using text files, String processing, Exception handling, A Case study on cigarette Use/ Lung cancer Correlation program.

UNIT IV - OBJECTS AND THEIR USE, OBJECT ORIENTED PROGRAMMING

Objects and Their Use: Software objects, Turtle graphics- Creating a turtle graphics window, The default turtle, Fundamental turtle attributes and behavior, Additional turtle Attributes, creating multiple turtles.

Object Oriented Programming: Encapsulation, Inheritance, and Polymorphism.

UNIT V - GUI PROGRAMMING

Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; tkinter coding alternatives, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons and Radio buttons, Scales, Menus.

TEXT BOOKS:

1. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2016.

2. Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

REFERENCE BOOK:

1. Kenneth Lambert and B.L. Juneja, *Fundamentals of Python,* Cengage Learning, Third Edition, 2012.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA
YSR (KADAPA) Dist 516 390, (A.P) INDIA

I B.Tech – II Sem (ME)
I B Tech - I SEM (CSE)

LTPC

3 0 0 3

Basic Electrical & Electronics Engineering

Part A: Basic Electrical Engineering

~~(Civil, Mechanical, CSE)~~

Course Objectives:

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on low voltage electrical installations

Unit 1 DC & AC Circuits:

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

Unit Outcomes: Able to

- Recall Kirchoff laws (L1)
- Analyze simple electric circuits with DC excitation (L4)
- Apply network theorems to simple circuits (L3)
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations (L4)

Unit 2 DC & AC Machines:

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [Elementary treatment only]

Unit Outcomes: Able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor (L2)
- Explain operation of transformer and induction motor. (L2)
- Explain construction & working of induction motor & DC motor

Unit 3 Electrical Installations:
Components of LT Switchgear: Switch fuse unit (SFU),MCB,ELCB,MCCB,Tpes of wires and cables,Earthing. Types of batteries,important Characteristics for Batteries. Elementary Calculations for energy consumption,power factor improvement and battery backup

Unit Outcomes: Able to

- Explain principle and operation of protecting equipments.
- Come to know different types of batteries and their usage.

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I B.Tech I Sem

COURSE NO. - Basic Electrical & Electronics Engineering

(Common to Mechanical, CSE)

L	T	P	C
3	0	0	3

Part B: Basic Electronics Engineering

Course Objectives:

- To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT, FET, MOSFET and operational amplifier
- To introduce fundamentals of digital electronics
- To educate on principles of various communication systems
- To teach efficacy of electronic principles which are pervasive in engineering applications

UNIT I ANALOG ELECTRONICS

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: photodiode, phototransistor, LCD and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications.

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

Unit Outcomes:

- Describe operation and characteristics of diodes and transistors
- Make use of diodes and transistors in simple, typical circuit applications
- Understand operation of basic op-amp circuits

UNIT II DIGITAL ELECTRONICS

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.

Unit Outcomes:

- Explain different logic gates using truth table
- Distinguish combinational and sequential circuits
- Analyze various combinational circuits such as adders, multiplexers and decoders
- Understand functionality of flip-flops, shift registers and counters

UNIT III COMMUNICATION AND DATA ACQUISITION SYSTEMS

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach). Data Acquisition System, D/A and A/D converters, Data loggers, Digital Transducer.

Unit Outcomes:

- Describe basic elements of a communication system
- Understand functioning of various communication systems
- Explain the need for Data Acquisition Systems.

TEXT BOOKS:

1. D.P. Kothari, I.J. Nagrath, Basic Electronics, 2nd edition, McGraw Hill Education (India) Private Limited
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

REFERENCES:

1. R. Muthusubramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th EDn., 2008.
3. H S Kalsi, Electronic Instrumentation, Tata McGraw Hill Education (India) Private Limited.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA
DEPARTMENT OF MECHANICAL ENGINEERING
I YEAR I SEMESTER (CIVIL, MECH, CSE)

Subject Code	Title of the Subject	L	T	P	C
	Engineering Workshop	0	0	3	1.5

	COURSE OBJECTIVES
1	To bring awareness about workshop practices for Engineers.
2	To familiarize how wood working operations can be performed.
3	To teach the practices for sheet metal operations.
4	To develop the technical skills related to fitting and electrical wiring.

COURSE OUTCOMES	
CO1	**Apply** wood working skills in real world applications.
CO2	**Apply** fitting operations in various applications.
CO3	**Build** different parts with metal sheets in real world applications.
CO4	**Demonstrate** soldering and brazing.
CO5	**Apply** basic electrical engineering knowledge for house wiring practice.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2								1
CO2	3	2	2	2								1
CO3	2	3	2	1								1
CO4	2	3	2	1	1	1						1
CO5	3	2	2	1	1	1						1

1. Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint
d) Wood Turning Operation

2. Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing & Riveting

3. Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fitting b) Dovetail fitting c) Contour Fitting
d) Bicycle tire puncture and change of two wheeler tyre.

4. Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light

e) Three phase motor f) Soldering of wires

Textbooks:

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

IT - Workshop

(CSE, CIVIL & MECH)

B. Tech – I Semester **L-T-P-C**
0-0-3-1.5

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (2 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer, Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Productivity tools (6 weeks)

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 5: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 7: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter

- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

References:

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – I Yr I Sem (R20)

L T P C
0 0 3 1.5

Chemistry Lab
(EEE, ECE and CSE)

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Conductometric titration of strong acid vs. strong base.
2. Conductometric titration of weak acid vs. strong base.
3. Determination of cell constant and conductance of solutions.
4. Potentiometry - determination of redox potentials and emfs.
5. Acid-base totration by pH metry.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of polymer- bakelite.
8. Verification Lambert-Beer's law.
9. Estimation of manganese by colorimetry.
10. Separation of organic mixtures by Thin layer chromatography.
11. Identification of simple organic compounds by IR.
12. Preparation of nanomaterials by precipitation.
13. Estimation of Ferrous Iron by Dichrometry.

Course Outcomes:

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

- **determine** the cell constant and conductance of solutions (L3)
- **find** conductivity of acid and base (L1)
- **prepare** polymer Bakelite materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR spectra of some organic compounds (L3)

Python Programming Laboratory

(CSE)

I B. Tech – I Semester **L-T-P-C**
0-0-3-1.5

1. Write a Python program to find GCD of two numbers.
2. Write a Python Program to find the square root of a number.
3. Write a Python program to find the exponentiation of a number.
4. Write a Python Program to find the maximum from a list of numbers.
5. Write a Python program to find first n prime numbers.
6. Write a Python program to find all prime numbers within a given range.
7. Write a Python program to print 'n terms of Fibonacci series using iteration.
8. Write a Python program demonstrate use of slicing in string.
9. Write a Python program that accepts a sequence of whitespace separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.
10. Write a Python program to demonstrate use of list & related functions.
11. Write a Python program to demonstrate use Dictionary& related functions.
12. Write a Python program to demonstrate use tuple, set & related functions.
13. Write a Python program to implement stack using list.
14. Write a Python program to implement queue using list.
15. Write a Python program to read and write from a file.
16. Write a Python program to demonstrate working of classes and objects.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

I B.Tech – II Sem (ME) CE Pulivendula

I B.Tech – I SEM (CSE)

L	T	P	C
0	0	3	1.5

(09A02201) Basic Electrical & Electronics Engineering Lab

(Civil, Mechanical, CSE, CSSE, IT and Food Technology)

Part A: Electrical Engineering Lab

Course Objectives:

1. To Verify Kirchoff's laws
2. To verify Superposition theorem.
3. To learn performance characteristics of DC Machines.
4. To perform open circuit & Short Circuit test on 1- Phase Transformer.
5. To Study the I – V Characteristics of Solar PV Cell

List of experiments: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

Course Outcomes: Able to

1. Verify Kirchoff's Laws & Superposition theorem.
2. Perform testing on AC and DC Machines.
3. Study I – V Characteristics of PV Cell

Part B: Electronics Engineering Lab

Course outcomes:

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers (L2)
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification (L2)
- Build different building blocks in digital electronics using logic gates (L3)
- Explain functionality of flip-flops, shift registers and counters for data processing applications (L2)
- Explain functioning of various communication systems (L2)

I B.Tech I Sem

COURSE NO. - Basic Electrical & Electronics Engineering Lab

(Common to Civil, Mechanical, CSE)

L	T	P	C
0	0	3	1.5

PART B: ELECTRONICS ENGINEERING LAB

Course outcomes:

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification
- Build different building blocks in digital electronics using logic gates
- Explain functionality of flip-flops, shift registers and counters for data processing applications
- Explain functioning of various communication systems

Any Six experiments to be done

LIST OF EXPERIMENTS:

1. Draw and study the characteristics of Semi-conductor diode and Zener Diode.
2. Draw and study the input and output characteristics of Transistor in Common Emitter configuration
3. Draw and study the static and transfer characteristics of FET in Common Source Configuration
4. Construct half wave and full wave rectifier circuits. Find ripple factor and plot their output waveforms with and without filters
5. Study the application of Op-amp as an Inverting amplifier, Non-inverting amplifier, Voltage follower, Summer and Subtractor
6. Realization of logic gates, AND, OR, NOT, NAND, NOR, XOR
7. Realization of Adders, Multiplexers and Decoders using logic gates.
8. Realization of flip-flops using logic gates.
9. D/A converter and A/D converter.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – II SEMESTER (R20)
(Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Differential Equations and Vector Calculus	3	0	-	3

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and vector calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES	
CO1	Solve the linear differential equations related to various engineering fields
CO2	Solve the differential equations reducible to linear, and finds the relevant applications.
CO3	Identify solution methods for partial differential equations that model physical processes
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence
CO5	Estimate the work done against a field, circulation and flux using vector calculus and also to establish the relations between them using vector integral theorems.

SYLLABUS

UNIT I: Differential Equations

First order and first degree differential equations – Formation, Exact, Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Non-homogeneous Linear Differential Equations of second Higher Order with constant coefficients with RHS terms of the type $e^{ax+b}, \sin(ax+b), \cos(ax+b)$, polynomials in x, $e^{ax}V(x), xV(x)$ where $V(x)$ is a function of x, Method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations with constant coefficients and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Applications: Mass spring system and L-C-R Circuit problems.

UNIT III: Partial Differential Equations

Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, Rules for finding the complementary function and the particular integral.

UNIT IV: Vector differential Calculus

Scalar and vector point functions, Del applied to scalar point functions: Gradient, Del applied to vector point functions: Divergent and Curl and their properties.

Del applied to twice to point functions and Del applied to products of point functions (Identities).

UNIT V: Vector integral Calculus

Line integral- Circulation -work done - potential function, Surface integral-flux, volume integral.

Vector integral theorems: Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem (all theorems without proof) and related problems.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::
PULIVENDULA
B. Tech. I Year Syllabus (R20 Regulation)
Applied Physics
(ECE, EEE & CSE)

L T P C
3 0 0 3

	COURSE OBJECTIVES
1	To make a bridge between the physics in school and engineering courses.
2	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
3	To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
4	To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5	To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
6.	Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Unit-I: Wave Optics **12hrs**

Interference- Principle of superposition – Interference of light –Interference by wavefront and amplitude division - Interference in thin films (Reflection Geometry) – Colours in thin films – Newton's Rings – Determination of wavelength of light source and refractive index of liquid.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit - Diffraction grating – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction (Qualitative) - Nicol's Prism - Half wave and Quarter wave plates with applications.

Unit Outcomes:

The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Analyze** the differences between interference and diffraction with applications (L4)
- **Illustrate** the concept of polarization of light and its applications (L2)
- **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit-II: Lasers and Fiber optics **8hrs**

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – CO_2 laser – Semi conductor Laser - Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Fiber optic communication system – Losses in optical fibers – Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **Explain** the working principle of optical fibers (L2)
- **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **Identify** the applications of optical fibers in various fields (L2)

Unit-III: Dielectric and Magnetic Materials **8hrs**

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Orientation polarizations (Qualitative), Ionic and Electronic Polarizations – Lorentz internal field – Clausius-Mossotti equation – Dielectric breakdown – Dielectric Loss – Piezoelectricity and Ferro electricity.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, Para, Ferro, Ferri & Antiferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Unit Outcomes:

The students will be able to

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2)
- **Apply** the concept of polarization to materials like piezoelectric and ferroelectrics (L3)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **Explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)

Unit IV: Quantum Mechanics, Free Electron Theory and Band theory of Solids **10hrs**

Quantum Mechanics- Dual nature of matter (de Broglie hypothesis) – Schrodinger's time independent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory – Quantum free electron theory – Equation for electrical conductivity – Fermi-Dirac distribution – Density of states (Qualitative) – Fermi energy.

Band theory of Solids- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs k diagram – Classification of crystalline solids – Effective mass of electron – m^* vs k diagram – Concept of hole.

Unit Outcomes:

The students will be able to

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)
- **Explain** the importance of K-P model
- **Classify** the materials based on band theory (L2)
- **Apply** the concept of effective mass of electron (L3)

Unit – V: Semiconductors and Superconductors **10hrs**

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Applications of semiconductors.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Unit Outcomes:

The students will be able to

- **Classify** the energy bands of semiconductors (L2)
- **Interpret** the direct and indirect band gap semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)
- **Identify** applications of semiconductors in electronic devices (L2)
- **Explain** how electrical resistivity of solids changes with temperature (L2)
- **Classify** superconductors based on Meissner's effect (L2)
- **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

Text books:

1. Engineering Physics by M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy S.Chand Publications, 11th Edition (2019).
2. Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2018).

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, (2018)
2. Introduction To Solid State Physics, Charles Kittel, 8th Ed.,Wiley India Edition.
3. Engineering Physics by M.R. Srinivasan, New Age international publishers (2014).
4. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers (2018).
5. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press (2016).
6. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill (2014).

COURSE OUTCOMES	
CO1	**Study** the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2)
CO2	**Identify** the wave properties of light and the interaction of energy with the matter (L3). **Asses** the electromagnetic wave propagation and its power in different media (L5).
CO3	**Understands** the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3)
CO4	**Study** the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory. (L2)
CO5	**Elaborate** the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5)

JNTUA COLLEGE OF ENGINEERING :(AUTONOMOUS), PULIVENDULA

I B.TECH

COMMUNICATIVE ENGLISH (R20)

(Common to All Branches of Engineering)

L	T	P	C
3	0	0	3

1. INTRODUCTION:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

2. COURSE OBJECTIVES

1	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
3	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

3. COURSE OUTCOMES

CO1	Retrieve the knowledge of basic grammatical concepts.
CO2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken and the improve the fluency of English..
CO3	Apply grammatical structures to formulate sentences and correct word forms
CO4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO6	Create a coherent paragraph interpreting a figure/graph/chart/table.

4. SYLLABUS:

UNIT –I

***Reading*: What Is My Name? —P Sathyavathi**

- ***Writing***: Paragraph writing
- ***Listening***: Listening for theme-main
- ***Functional English***: Greeting, taking leave and introducing oneself and others
- ***Grammar:*** Parts of speech- Nouns –classification-usages- Pronouns - classifications-usages-
- ***Vocabulary*:** Homonyms- Homophones- Homographs

Non Detailed Study: Listening Skills from **English and Soft Skills**

UNIT-II

***Reading* : The Kitchen — Vimala**

- ***Writing*** : Essay Writing –Descriptive Essays
- ***Listening*** : Listening for theme -1
- ***Functional English***: Making requests
- ***Grammar:*** Types of sentences- Question Tags
- ***Vocabulary*** : Synonyms - Antonyms

Non detailed Study: Teamwork Skills from **English and Soft Skills**

UNIT-III

***Reading* : Adivasis — Kancha Ilaiah**

- ***Writing*** : Statement of Purpose
- ***Listening:*** Listening for main ideas
- ***Functional English:*** Inviting -Apologizing
- ***Grammar:***– Kinds of verbs – Auxiliaries- Tenses,
- ***Vocabulary*** : Prefixes –Suffixes – One-word substitutes

Non detailed Study: Assertive Skills from **English and Soft Skills**

UNIT-IV

***Reading*: The Bet – Anton Chekhov**

- ***Writing:*** Letter Writing –Official letters-business Letters-Application Letters
- ***Listening***: Listening for details
- ***Functional English:*** Interrupting - Asking for and giving opinions
- ***Grammar:*** Adjectives- Conjunctions- Articles – Active & Passive Voice
- ***Vocabulary***: Phrasal verbs -Idioms

Non detailed Study: Learning Skills from **English and Soft Skills**

UNIT-V

Reading **: The Gift of the Magi - O. Henry**

- ***Writing:*** Information Transfer
- ***Listening*** : Listening for opinions
- ***Functional English*** : Asking for the time and directions
- ***Grammar:*** Prepositions- Reported Speech
- ***Vocabulary*** : Commonly confused words

Non detailed Study : Emotional Intelligence Skills from **English and Soft Skills**

5. Prescribed Text books:

[1] **Detailed text: English for Fluency**, K Purushottam, Orient Black Swan,2013.

[2] **Non detailed text: English and Soft Skills**, S P Dhanavel, Orient Black Swan 2013Edition.

6. REFERENCES:

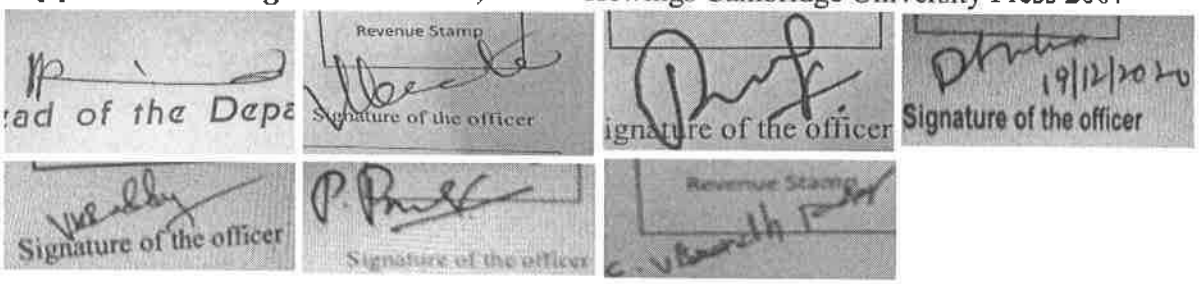
[1] **A Practical Course in Effective English Speaking Skills.** J.K.Gangal, PHI, New Delhi.2012

[2] **Fundamentals of Technical Communication,** Meenakshi Raman, Oxford University Press,2015.

[3] **Spoken English,** R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.

[4] **Murphy's English Grammar** with CD, Murphy, Cambridge University Press,3 Rd edition.

[5] **Advanced English Grammar** , Martin Hewings Cambridge University Press 2007



B.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS08 - C-Programming & Data Structures

(Common to CSE & EEE)

L	T	P	C
3	0	0	3

Course Objectives:

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

UNIT – I: Fundamentals of C **8hrs**

Fundamentals of C: Introduction to C Programming language, The Basic Data Types, Variables, Constants, Scope and life time of variables, Qualifiers, Storage Classes.

Operators: Arithmetic, Logic, and Relational operators

Statements and Expressions: Arithmetic, Conditional, Control, and Iterative Statements, Console I/O Statements

Learning Outcomes:

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

- To understand basics of C.(L1) **L1**
- To learn about statements and expressions.(L1) **L1**

UNIT – II: Arrays and Strings **8hrs**

Arrays and Strings: Single-Dimension Arrays, Generating a Pointer to an Array, Passing Single Dimension Arrays to Functions , Strings, Two-Dimensional Arrays, Multidimensional Arrays, Array Initialization, Working with arrays.

Functions: The General Form of a Function, Understanding the Scope of a Function, Function Arguments, Function Prototypes, Different ways of calling functions, return Statement, Recursion.

Learning Outcomes:

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

- To learn how to use Arrays and Strings.(L2) **L2**
- To learn how to use functions.(L2) **L2**

UNIT – III: Pointers, Structures, Unions, Enumerations, and typedef **8hrs**

Pointers: Pointer Variables, The Pointer Operators, Pointer Expressions, Pointer Assignments, Pointer Conversions, Pointer Arithmetic, Pointer Comparisons, Pointers and Arrays, Arrays of Pointers, Initializing Pointers, Pointers to Functions, Dynamically Allocated Arrays.

Structures, Unions, Enumerations, and typedef: Structures, Arrays of Structures, Passing Structures to Functions, Self Referential Structures, Arrays and Structures within Structures, Unions, typedef.

Learning Outcomes:

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

- To learn how to use pointers.(L3) **L3**
- To learn how to implement structures and unions.(L3) **L3**

UNIT – IV: Data Structures **7hrs**

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning Outcomes:

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

- To learn about Data Structures.(L3) **L3**
- To learn how to use data structures in C.(L3) **L3**

UNIT – V: Searching and Sorting Techniques

Searching and Sorting Techniques: Linear and Binary search, Insertion, selection, quick, merge, and bubble sort.

Trees: Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, AVL Trees. B-Trees: BTrees, B + Trees.

Learning Outcomes:

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

- To learn about sorting.(L4) **L4**
- To learn about searching(L4) **L4**
- Implement trees(L5) **L5**

Text Books:

1. **The Complete Reference C":** Fourth Edition Herbert Schildt Osborne/McGraw-Hill.
2. "C Programming and Data Structures", by E. Balaguruswamy, McGraw-Hill.
3. "Data Structures using C", by Reema Thareja, 2nd Edition, OXFORD Press.
4. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, 2nd Edition, 2011, Universities Press.

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education.
5. 5. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
6. 6. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
7. 7. Richard F.Gilberg, Behrouz A.Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

Course Outcomes:

At the end of this Course the student will be able to

- Ability to analyze algorithms and algorithm correctness.(L2) **L2**
- Ability to summarize searching and sorting techniques(L3) **L3**
- Ability to describe stack,queue and linked list operation.(L4) **L4**
- Ability to have knowledge of tree and graphs concepts(L5) **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA
DEPARTMENT OF MECHANICAL ENGINEERING
I YEAR I SEMESTER (CIVIL, MECH, CSE)

Subject Code	Title of the Subject	L	T	P	C
	Engineering Workshop	0	0	3	1.5

	COURSE OBJECTIVES
1	To bring awareness about workshop practices for Engineers.
2	To familiarize how wood working operations can be performed.
3	To teach the practices for sheet metal operations.
4	To develop the technical skills related to fitting and electrical wiring.

COURSE OUTCOMES	
CO1	**Apply** wood working skills in real world applications.
CO2	**Apply** fitting operations in various applications.
CO3	**Build** different parts with metal sheets in real world applications.
CO4	**Demonstrate** soldering and brazing.
CO5	**Apply** basic electrical engineering knowledge for house wiring practice.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2								1
CO2	3	2	2	2								1
CO3	2	3	2	1								1
CO4	2	3	2	1	1	1						1
CO5	3	2	2	1	1	1						1

1. Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint
d) Wood Turning Operation

2. Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing & Riveting

3. Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fitting b) Dovetail fitting c) Contour Fitting
d) Bicycle tire puncture and change of two wheeler tyre.

4. Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light

e) Three phase motor f) Soldering of wires

Textbooks:

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)
PULIVENDULA
B.Tech I Year Syllabus (R20 Regulation)
Engineering Physics Laboratory
(Civil & Mechanical Branches)

L T P C
0 0 3 1.5

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

Note: - In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.

List of Engineering Physics Experiments

1. Determination of the thickness of the wire using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's ring method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength of LASER light using diffraction grating.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size using LASER.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the Particles size using laser (L2)
   Identifies the application of laser (L2)
7. To determine the numerical aperture and acceptance angle of an optical fiber
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
   Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant by charging and discharging method.
   Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the dielectric constant of the given substance. (L2)
Identifies the significance of dielectric constant in various devices. (L2)

9. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic field along the axis of a circular coil carrying current. (L2)
Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic susceptibility of the given material. (L2)
Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. Study of B-H curve of Ferromagnetic material

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
Classifies the soft and hard magnetic material based on B-H curve. (L2)
Plots the magnetic field H and flux density B (L3)

12. Determination of ultrasonic velocity in liquid (Acoustic grating)

Experimental outcomes:
Operates various instruments. (L2)
Estimate the velocity of ultrasonic waves in liquids. (L2)
Illustrates the basic applications of ultrasonics. (L3)

13. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

Experimental outcomes:
Operates various instruments. (L2)
Estimate the rigidity modules of a given wire (L2)
Plots length of the pendulum (l) with time period T^2 (L3)

14. Sonometer: Verification of the three laws of stretched strings

Experimental outcomes:
Operates various instruments. (L2)
Estimate the linear density of a given wire (L2)
Identify the frequency of tuning fork (L3)

15. Determination of losses in optical fiber.

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
Identifies the significance of losses in optical fiber and its engineering applications. (L2)

Course Outcomes:

The students will be able to

- **Operate** various optical instruments (L2)
- **Estimate** wavelength of laser and particles size using laser(L2)
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **Estimate** the susceptibility and related magnetic parameters of magnetic materials (L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
- **Apply** the concepts of ultrasonics by acoustic grating (L2)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

JNTUA COLLEGE OF ENGINEERING :(AUTONOMOUS), PULIVENDULA
I B.TECH
COMMUNICATIVE ENGLISH LABORATORY (R20)
(Common to All Branches of Engineering)

L	T	P	C
0	0	3	1.5

Course Objectives

- students will be exposed to a variety of self-instructional, learner friendly modes of language learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes

- CO1: Listening and repeating the sounds of English Language
- CO2: Understand the different aspects of the English language proficiency with emphasis on LSRW skills
- CO3: Apply communication skills through various language learning activities
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO5: Evaluate and exhibit acceptable etiquette essential in social and professional settings
- CO6: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics-Importance -Introduction to Sounds of Speech
2. Vowels and Consonants Sounds
3. Phonetic Transcription

Learning Outcomes
At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. Word Stress & Intonation
2. Communication skills
3. Role Play & JAM

Learning Outcomes
At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Describing people/objects/places
2. Speeches for Special Occasions
3. Etiquettes of Telephonic Communication

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Group Discussions
2. Debates
3. Interviews Skills

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

1. Resume writing & Practicing
2. Oral Presentations
3. Writing Video Speeches as it is & Book reviews – oral and written

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

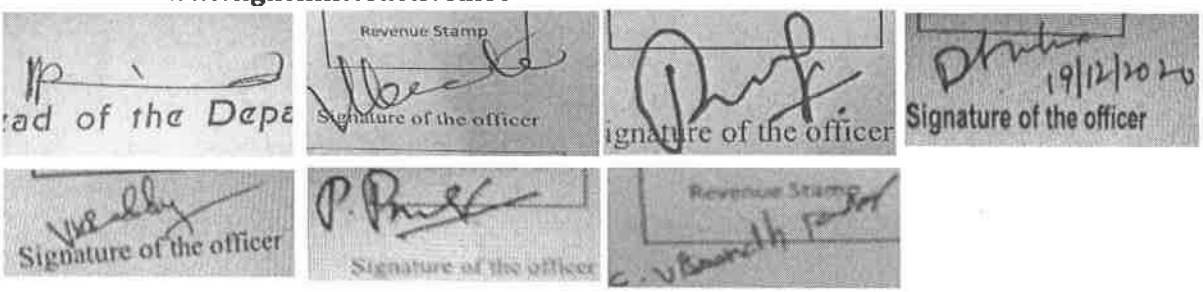
- Orell
- Walden Infotech
- Young India Films

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- www.esl-lab.com
- www.englishmedialab.com
- **www.englishinteractive.net**



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::
PULIVENDULA
B.Tech I Year Syllabus (R20 Regulation)
Applied Physics Laboratory
(ECE, EEE & CSE)

L T P C
0 0 3 1.5

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester

List of Applied Physics Experiments

1. Determination of the thickness of thin object using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's rings
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength using diffraction grating by laser source.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size by laser source.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the Particles size using laser (L2)
   Identifies the application of laser (L2)
7. Determination of numerical aperture and acceptance angle of an optical fiber
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
   Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant and Curie temperature of a ferroelectric material.
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate thedielectric constantof the given substance. (L2)
   Identifies the significance of dielectric constant in various devices. (L2)

9. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the magnetic field along the axis of a circular coil carrying current. (L2)

Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the magnetic susceptibility of the given material. (L2)

Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. Study of B-H curve of Ferromagnetic material

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)

Classifies the soft and hard magnetic material based on B-H curve. (L2)

Plots the magnetic field H and flux density B (L3)

12. Determination of the resistivity of semiconductor by four probe method

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the resistivity of a semiconductor. (L2)

Identifies the importance of four probe method in finding the resistivity of semiconductor. (L3)

13. Study of Energy gap of a material using p-n junction diode

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the energy gap of a semiconductor. (L2)

Illustrates the engineering applications of energy gap. (L3)

Plots 1/T with log R (L3)

14. Determination of mobility of charge carriers in semiconductor by Hall Effect.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the charge carrier concentration and mobility in a semiconductor. (L2)

Illustrates the applications of Hall Effect. (L3)

Plots the voltage with current and voltage with magnetic field (L3)

15. Determination of losses in optical fiber.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)

Identifies the significance of losses in optical fiber and its engineering applications. (L2)

Course Outcomes:

The students will be able to

- **Operate** optical instruments like microscope and spectrometer (L2)
- **Determine** thickness of a hair/paper with the concept of interference (L2)
- **Estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **Determine** the resistivity of the given semiconductor using four probe method (L3)
- **Identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **Calculate** the band gap of a given semiconductor (L3)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

C-Programming & Data Structures Laboratory

(CSE, EEE)

B. Tech – II Semester (R20) **L-T-P-C**

0-0-3-1.5

Week 1:

1. Write a program to perform arithmetic operations.
2. Write a program to exchange two numbers without using temporary variable
3. Write a program to exchange two numbers with temporary variable
4. Write a program to find the maximum of three numbers

Week 2:

1. Write a program to compute the factorial of a given number.
2. Write a program to check whether the number is prime or not
3. Write a program to check for number palindrome.
4. Write a program to generate Fibonacci numbers in the given range.

Week 3:

1. Write a program to find the sum of the digits of a number.
2. Write a program to find the sum of positive and negative numbers in a given set of numbers.
3. Write a program to find the sum of first and last digit numbers in a given number.

Week 4:

1. Write a program to read two matrices and print their sum and product in the matrix form.
2. Write a program to find the maximum of a set of numbers.
3. Write a program to read matrix and perform the following operations.
    a. Find the sum of Diagonal Elements of a matrix.
    b. Print Transpose of a matrix.
    c. Print sum of even and odd numbers in a given matrix.

Week 5:

1. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
2. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    a. String length determination b. Compare Two Strings
    c. Concatenate them, if they are not equal d. String reversing

Week 6:

1. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
2. Write a program to exchange two numbers using pointers.
3. Write a program to calculate the length of string using pointers.
4. Write a program to using pointers to read in an array of integers and print its elements in reverse order.

Week 7:

1. Write a C Program to implement Stack ADT Using arrays and linked lists.
2. Write a C Program to implement Queue ADT Using arrays and linked lists.

Week 8:

1. Write a c Program to convert infix expression to postfix expression
2. Write a c Program to evaluate postfix expression.

Week 9:

1. Write a C Program to implement List ADT.
2. Write a C Program to implement priority queues using arrays.

Week 10:

1. Write a C program to implement Linear Search Technique.
2. Write a C program to implement Binary Search Technique.

Week 11:

1. Write a C program to implement insertion and Selection sort algorithm.
2. Write a C program to implement Quick and Merge sort algorithm.
3. Write a C program to implement bubble sort algorithm.

Week 12:

1. Write a C program to construct Binary Tree and Binary Search Tree.
2. Write a C program to implement Binary Tree Traversal technique.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
II Year B.Tech. I-Sem (R20)
20ABS14- DISCRETE MATHEMATICS AND GRAPH THEORY
(CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- To describe logical sentences in terms of predicates, quantifiers, and logical connectives in theory of inference for the statement calculus. (L2)
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving. (L3)
- To explain about the Boolean Algebra, Graph theory and Recurrence relations. (L3)
- To reveal the concepts of graph theory which is applied in addressing the problems related to computer science. (L3)
- To introduce the mathematical concepts which will be useful to study advanced courses such as Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc. (L4)

UNIT – 1: Mathematical logic :

Statements and Notation, Connectives- Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.

Normal Forms: Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF), Ordering and Uniqueness of Normal Forms.

The Theory of Inference for the Statement Calculus: Rules of Inference, Consistency of Premises and Indirect Method of Proof.

The predicate Calculus, and Inference theory of the Predicate Calculus: Predicates, the statement function, variables and quantifiers, predicate formulas, free and bound variables, the universe of discourse, valid formulas and equivalences, some valid formulas over finite universe, special valid formulas involving quantifiers, theory of inference for the predicate calculus.

Learning Outcomes:

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

- Describe logical sentences in terms of predicates, quantifiers, and logical connectives. **L2**
- Evaluate basic logic statements using truth tables and the properties of logic . **L3**
- Apply rules of inference to test the consistency of premises and validity of arguments and verify the equivalence of two formulas and their duals. **L3**
- Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula. **L3**

UNIT – II: Set Theory:

Basic concepts of Set theory: Notation, inclusion and equality of sets, the power set, some operation on sets, Venn diagrams, some basic set identities, the principle of specification, ordered pairs and n-tuples, Cartesian products.

Relations and Ordering: Relations, properties of binary relations in a set, relation matrix and the graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, composition of binary relations, and partial ordering.

Functions: Definition and introduction, composition of functions, inverse functions, binary and n-ray operations, characteristic function of a set, Hashing functions.

Learning Outcomes:

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

- Describe the basic concepts of set theory. **L2**
- Describe equivalence, partial order and compatible relations. **L2**
- Describe functions and composition of functions. **L3**
- Describe binary and n-ray operations. **L3**

UNIT – III: Algebraic Structures, Lattices and Boolean algebra:

Algebraic Systems: Examples and General Properties, **Semi Groups and Monoids**: Definitions and examples, homomorphism of semi groups and monoids, subsemigroups and submonoids and **Groups**: Definition and examples, subgroups and homomorphisms, cosets and Lagrange's theorem, normal subgroups, algebraic systems with two binary operations.

Lattices and Boolean algebra: Lattices as Partially Ordered Sets, Boolean algebra, Boolean Functions.

Learning Outcomes:

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

- Describes the properties of Semi groups, Monoids and Groups **L2**
- Identify the properties of Lattices **L2**
- Evaluate Boolean functions and simplify expression using the properties of Boolean algebra **L3**

UNIT – IV: Recurrence Relations:

Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations.

Learning Outcomes:

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

- Find the generating functions for a sequence. **L3**
- Solve problems using recurrence relations and recursion to analyze complexity of algorithms. **L4**

UNIT – V: Graph Theory :

Graphs: Basic Concepts, Isomorphism and Sub graphs, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs.

Graph coloring: Chromatic Number, The Four-Color Problem.

Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees.

Algorithms to find a spanning tree in connected graph: Depth first search (DFS) algorithm , Breadth first search (BFS) algorithm and Kruskal's algorithm, minimum spanning tree.

Learning Outcomes:

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

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic or a cyclic. **L2**
- Apply the concepts of functions to identify the Isomorphic Graphs and Identify Euler Graphs, Hamilton Graph. **L2**
- Describes Graph coloring and chromatic number of a graph. **L2**
- Apply depth-first and breadth-first search algorithm. **L3**
- Apply Prim's and Kruskal's algorithms to find a minimum spanning tree. **L3**

Text Books:

1. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill, 2017(For Unit I&II).
2. Joe L. Mott. Abraham Kandel and Theodore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2nd Edition, Pearson, 2008. (for Units III to V).

Reference Books:

1. Kenneth H Rosen, "Discrete Mathematics and Its Applications (SIE)",7th Edition, MCGRAW-HILL.
2. Ralph P. Grimaldi and B.V. Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5th Edition, Pearson, 2016.
3. Narsingh Deo, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.

4. D.S. Malik and M.K. Sen, "Discrete Mathematics theory and Applications", I[st] Edition, Cenegage Learning, 2012.
5. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach", 4th edition, MCGRAW-HILL, 2018.

Course Outcomes:

At the end of this Course the student will be able to

- Remember elementary mathematical arguments and identify fallacious reasoning. **L1**
- Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Hassee Diagrams. **L2**
- Understand the general properties of Algebraic Systems, Semi Groups, Monoids and Groups and Solve the homogeneous and non-homogeneous recurrence relations. **L3**
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph and apply the concepts of functions to identify the Isomorphic Graphs.. **L4**
- Design solutions for problems using breadth first and depth first search techniques. **L3**

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B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS14 - COMPUTER ORGANIZATION

(CSE)

L	T	P	C
3	1	0	3

Course Objectives:

- To gain methodical understanding of the basic structure and operation of a digital computer.
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management.

UNIT – I: Binary Systems & Gate –Level Minimization

Binary Systems:

Digital Systems, Binary Numbers, Number Base Conversions, Octaland Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

Gate –Level Minimization: The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions.

Learning Outcomes:

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

- Identify the different peripherals, ports and connecting cables.
- Illustrate the working of a Computer

UNIT – II: Combinational Logic

Combinational Logic: Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

Learning Outcomes:

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

- Solve complex problems using language independent notations. **L3**
- Solve Computational problems. **L3**

UNIT – III: Synchronous Sequential Logic & Functions and Program Structure

Synchronous Sequential Logic: Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.

Registers &Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other counters.

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Learning Outcomes:

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

- Recognize the programming elements of C Programming language. **L1**
- Select the control structure for solving the problem. **L4**

UNIT – IV: Introduction to Computer Organization and Architecture:
Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture.

Learning Outcomes:
At the end of this unit, the student will be able to

- Solve mathematical problems using C Programming language. **L3**
- Structure the individual data elements to simplify the solutions. **L6**

UNIT – V: Sorting and Searching & Structures & Some other Features
Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction formats –Addressing Modes – Data Transfer and Manipulation – Program Control.
Computer Arithmetic: Addition and Subtraction – Multiplication Algorithms – Division Algorithms –Floating-Point Arithmetic Operations – Decimal Arithmetic unit.

Learning Outcomes:
At the end of this unit, the student will be able to

- Select sorting algorithm based on the type of the data. **L4**
- Organize heterogeneous data. **L6**

Text Books:

1. Digital Design, M.Morris Mano &Micheal D. Ciletti, Pearson, 5thEdition, 2013.
2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3rdReprinted Indian Edition, 2012.
3. ."Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.

Reference Books:

1. "Computer Organization", Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, MCG, 2002.
2. "Computer Organization and Architecture", 8/e, William Stallings, PEA, 2010.
3. "Computer Systems Architecture a Networking Approach", 2/e, Rob Williams.
4. "Computer Organization and Architecture" Ghoshal, Pearson Education, 2011
5. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier.

Course Outcomes:
At the end of this Course the student will be able to

- Recognize the importance of programming language independent constructs. **L2**
- Solve computational problems. **L3**
- Select the features of C language appropriate for solving a problem. **L4**
- Design computer programs for real world problems. **L6**
- Organize the data which is more appropriated for solving a problem. **L6**
- Construct his own computer using parts. **L6**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS16 - DATA BASE MANAGEMENT SYSTEMS

(CSE)

L	T	P	C
3	1	0	4

Course 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: The Worlds of Database Systems & The Entity-Relationship Model

The Worlds of Database Systems –file system VS a DBMS–Advantages of DBMS–Levels of abstraction in DBMS, Data Independency, Queries in DBMS

The Entity-Relationship Model –Database design and ER diagrams–Elements of ER models - Additional features ER models.

The Relational Data Model –Basics of the Relational Model–Integrity constraints overrelations, From E/R Diagrams to Relational Designs – Introduction to views.

Learning Outcomes:

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

- Identify the different peripherals, ports and connecting cables.

UNIT – II: Relational Algebra and Calculus & The Database Language SQL

Relational Algebra and Calculus –Preliminaries, Relational algebra: Selection and Projection,Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

The Database Language SQL –Simple Queries in SQL–UNION, INTERSECT, EXCEPT– Nested queries, Aggregate operators.

Learning Outcomes:

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

- Solve complex problems using language independent notations. **L3**

UNIT – III: Database Normalization & Index Structures:

Database Normalization – Rules about Functional Dependencies- Normal Forms based on FDs– 1NF, 2NF, 3NF, BCNF, Multivalve Dependencies, 4NF, 5NF.

Index Structures –Indexes on Sequential Files–Secondary Indexes–B-Trees, B+ Trees–Hash Based Indexing.

Learning Outcomes:

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

- Recognize the programming elements of C Programming language. **L1**

UNIT – IV: Transaction Management & Concurrency Control and Database Recovery:

Transaction Management: Transactions, ACID properties, Serializability, Other isolation levels.

Concurrency Control and Database Recovery – Serializability and Recoverability, Introduction to Lock management-Concurrency Control without Locking. Storage, Recovery and Atomicity, Recovery algorithm, Buffer management, Failure with loss of Non-Volatile storage.

Learning Outcomes:

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

- Solve mathematical problems using C Programming language. **L3**

UNIT – V: Query Processing and Optimization:

Query Processing and Optimization: Measures of Query cost, Selection operation, Sorting, Join operation, Evaluation of expressions, Query processing in memory. Transformation of Relational, Estimating Statistics of expression, Choice of evaluation plans.

Learning Outcomes:

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

- Select sorting algorithm based on the type of the data. **L4**
- Organize heterogeneous data. **L6**

Text Books:

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition,2003, McGraw Hill.

Reference Books:

1. "Fundamentals of Database Systems", ElmasriNavrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

Course Outcomes:

At the end of this Course the student will be able to

- Describe the fundamental elements of relational database management systems. **L2**
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. **L3**
- Design ER-models to represent simple database application scenarios. **L4**
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. **L6**
- Improve the database design by normalization. **L6**
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing. **L6**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS18 - OBJECT ORIENTED PROGRAMMING USING JAVA PROGRAMMING

(CSE)

L	T	P	C
3	1	0	4

Course Objectives:

- To understand the basic concepts and fundamentals of platform independent object oriented language.
- To demonstrate skills in writing programs using exception handling techniques and multithreading.
- To understand streams and efficient user interface design techniques.

UNIT – I: Object Oriented Programming Concepts & Introduction to JAVA Programming:

Object Oriented Programming Concepts: Object, Class, Abstraction, Encapsulation, Inheritance, Polymorphism.

Introduction to JAVA Programming: How Java changed the Internet, The Java Buzzwords, The evolution of Java, Simple Java Program

Learning Outcomes:

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

- Identify the different peripherals, ports and connecting cables.

UNIT – II: Introducing Classes:

Data Types, Variables, Operators, Control Structures, and Arrays.

Introducing Classes: Constructors, The this Keyword, The finalize( ) Method, A Stack Class. Using Objects as Parameters, A Closer Look at Argument Passing, Understanding static, Introducing final, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Var-args: Variable-Length Arguments, The Object Class.

Learning Outcomes:

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

- Solve complex problems using language independent notations. **L3**
- Solve Computational problems. **L3**

UNIT – III: Inheritance and Polymorphism, Packages and interfaces, Exception Handling:

Inheritance and Polymorphism: Types of Inheritance, Dynamic method dispatch, Static and Dynamic Polymorphism

Packages and interfaces: Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

Learning Outcomes:

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

- Recognize the programming elements of C Programming language. **L1**
- Select the control structure for solving the problem. **L4**

UNIT – IV: Multithreaded Programming:

Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming, and Stopping Threads. Obtaining a Thread's State, Using Multithreading.

Learning Outcomes:

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

- Solve mathematical problems using C Programming language. **L3**
- Structure the individual data elements to simplify the solutions. **L6**

UNIT – V: Advanced JAVA Concepts

Advanced JAVA Concepts: JDBC Inyroduction,JDBC Driver, DB Connectivity steps, Connectivity with oracle,Hibernate,Swing Oveviw,Swing Environment, Struts, JSP.

Learning Outcomes:

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

- Select sorting algorithm based on the type of the data. **L4**
- Organize heterogeneous data. **L6**

Text Books:

1. Java The Complete Reference 9th edition, Herbert Schildt, Mc Graw Hill Education, 2014.
2. Programming with Java, E. Balagurusamy.

Reference Books:

1. J2SE Core Java, A.R.Kishore Kumar.

Course Outcomes:

At the end of this Course the student will be able to

- Use the syntax and semantics of java programming language and basic concepts of OOP. **L2**
- Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages. **L3**
- Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes. **L4**
- Design computer programs for real world problems. **L6**
- Design event driven GUI and web related applications which mimic the real word scenarios. **L6**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS04 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

UNIT – I

Learning Outcomes:

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

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

UNIT – II

Theory of Production: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

Learning Outcomes:

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

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

UNIT – III

Introduction to Markets: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

Learning Outcomes:

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

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

UNIT – IV

Types of Industrial Organization: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Capital Budgeting: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

Learning Outcomes:

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

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

UNIT – V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

Learning Outcomes:

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

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

Text Books:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

Reference Books:

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS05 - ENTERPRENUARSHIP AND INNOVATION MANAGEMENT

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship - Opportunities & challenges.

Learning Outcomes:

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

- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

Case study: Business cases of OYO, Paytm and Flipkart/ Smartmart.

Activity: Idea generation in groups and CVP.

Learning Outcomes:

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

- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

UNIT – III: Business Organizations and Venture Establishment

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

Activity: Preparation of business plan (draft).

Learning Outcomes:

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

- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

UNIT – IV: Introduction to Innovation

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

Learning Outcomes:

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

- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**

UNIT – V: Promoting and managing innovation

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

Learning Outcomes:

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

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

Text Books:

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

Reference Books:

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS17 - DATABASE MANAGEMENT SYSTEMS LAB

(CSE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To create a database and query it using SQL.
- Understand the significance of integrity constraints.

List of Experiments :

1. **Practice session:** Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. A college consists of number of employees working in different departments. In this context,create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command.
- Basic column should not be null.
- Add constraint that basic should not be less than 5000.
- Calculate hra,da,gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
- The percentage of hra and da are to be stored separately.
- When the data becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.
- The default value for date-of-birth is 1 jan, 1970.
- When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- Display the information of the employees and departments with description of the fields.
- Display the average salary of all the departments.
- Display the average salary department wise.
- Display the maximum salary of each department and also all departments put together.

- Commit the changes whenever required and rollback if necessary.
- Use substitution variables to insert values repeatedly.
- Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
- Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- Find the employees whose name contains _en'.
- Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- Create alias for columns and use them in queries.
- List the employees according to ascending order of salary.
- List the employees according to ascending order of salary in each department.
- Use _&&' wherever necessary
- Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- The retirement age is 60 years. Display the retirement day of all the employees.
- If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- Find the employees who are born in leap year.
- Find the employees who are born on feb 29.
- Find the departments where the salary of atleast one employee is more than 20000.
- Find the departments where the salary of all the employees is less than 20000.
- On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.
- As a designer identify the views that may have to be supported and create views.
- As a designer identify the PL/SQL procedures necessary and create them using cursors.
- Use appropriate Visual programming tools like oracle forms and reports, visual basic etc to create user interface screens and generate reports.
- **Note**: As a designer, identify other operations that may be required and add to the above list. The
- above operations are not in order. Order them appropriately. Use SQL or PL/SQL depending on the requirement.

1. Build a Customer Journey Map (CJM) for any mock scenario or persona created during last experiment and frame 2-3 questions using HMW (How Might We) tool(CJM-Before-During-After).
2. Design service blueprint and identify touch points from previously designed CJM.
3. Story boarding design ideas: Consider a scenario and create user stories and storyboards to transform information about user needs into design concepts.
4. Take product/system to be designed from previously framed problem statement from experiment 1 and apply Combine, Rearrange and Enhance triggers in CREATE (Combine, Rearrange, Enhance, Adapt, Turnaround, Eliminate) tool. Draw product/system after applying triggers.
5. Develop a function map for persona designed from experiment 2 or any mock scenario. (Differently abled student: Enable him to move around campus on his own).

6. Identify the components to establish a banking system/new capital/company etc. through zap your logical brain and list the possible scenarios to analyze the components using what if tool.
7. Create an application prototype for product recommendation using Marvel POP Software or FIGMA.
8. Development of 3D prototype for kids' toys using tinker cad or fusion 360.

Reference Books:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy,"Prototyping for Designers: Developing the best Digital and Physical Products",O'Reilly,2017.
3. Michael G. Luchs, Scott Swan , Abbie Griffin, "Design Thinking – New Product Essentials from PDMA",Wiley,2015.
4. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

Course Outcomes:

At the end of this Course the student will be able to

- Investigate the requirements of a problem by conducting surveys. **L1**
- Create meaningful and actionable problem statements for creative problem solving. **L2**
- Construct blueprints to visualize user attitudes and behavior for gaining insights of customers. **L3**
- Design prototypes of innovative products or services for a customer base. **L4**
- Develop relevant products or services by choosing good design and applying empathy tools for experiencing user requirements. **L5**
- Work independently and communicate effectively in oral and written forms. **L6**
- Investigate the requirements of a problem by conducting surveys. **L6**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS19 - OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY

(CSE)

L	T	P	C
0	0	3	1.5

Software's for Lab:

- JDK and JRE 1.8
- Eclipse IDE (Integrated Development Environment)

Week-1 (Basics):

- Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
- Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx+c=0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.
- Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
- Write a Java program to search an element using binary search.

Course Outcome:

- To Understand basic OOPs concepts of Java programming.

Week-2 (Applets & Arrays):

- Write an applet program that displays a simple message
- Write an applet to display a simple message on a colored background.
- Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
- Write a Java program for sorting a given list of names in ascending order?

Course Outcome:

- To develop GUI using Applets and implement arrays.

Week-3(Strings & Command-line arguments):

- A palindrome is a string that is spelled the same way backward and forward. For example, mom, dad, radar, 727 are all examples of palindromes. Write a program that lets the user type a word and then detern1ines whether the string 1s a palindrome.
- Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?
- Write a program using command line argument to design an application to avail a ride of uber/ola cab using promo code. The user is required to provide current location address and destination address at command prompt?
- Write a program in Java which enters five numbers in an array using command line arguments and print sum and average of the numbers.

Course Outcome: To understand Strings and command-line arguments in Java.

Week-4 (Class, objects and constructors):

- Write a program in Java to create a class ' Box' which contains three data members for holding width, height and length of box and two methods 'area' and 'volume' to calculate and return the area and volume of box. Create another class named 'BoxDemo' which uses Box class.
- WAP that describes a class person. It should have instance variables to record name, age and salary. Create a person object. Set and display its instance variables.
- Write a Java program that displays Student details by using default and parameterized constructors.

Course Outcome:

- To create a class, objects and constructors in Java Programming.

Week-5 (methods and Inner classes):

- Create class point with following instance variable and methods.
  Instance variable: private int x,y Constructors : public Point(), Point(int x, int y)
  Methods : public void setX(int x), setY(int y), setXY(int x, int y)
- Write a Java program that creates Inner class.
- Create a class and access the static variables and static methods in another class.

Course Outcome:

- To Implement methods and Inner classes.

Week-6 (Inheritance):

- Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
- Write a java program that implements educational hierarchy using inheritance.
- Write a java program to find the details of the students eligible to enroll for the examination (Students, Department combined give the eligibility criteria for the enrollement class) using interfaces

• Teaching	Non-Teaching	Office	Salary:
• Designition	Designition	empno	getvalue()
• setvalue()	setvalue()	empname	

Course Outcome:

- To create Java program by using Inheritance.

Week-7 (Polymorphism and Interface):

- Write a Java program to implement method overloading and method overriding
- Write an application that creates an interface‘ and implements it.
- Define an interface using JAVA that contains a method to calculate the perimeter of an object. Define two classes circle and Rectangle with suitable fields and methods . Implement the interface "perimeter" in these classes.
- Write the appropriate main() method to create object of each class and test 'all the methods.

Course Outcome: To create Java program by using Polymorphism and Interface.

Week-8 (Packages):

- Write a JAVA program illustrate class path
- Write a case study on including in class path in your os environment of your package.
- Write an application that creates a package p1. Add some classes in it.
- Write a JAVA program that import and use the defined your package in the previous Problem.

Course Outcome:

- To create a package and understanding the classpath.

Week-9 (Exception handling mechanism):

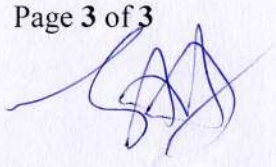
- Write a java program that implements Array Index out of bound Exception using built-in-Exception.
- An University has applied promotion criteria for students. According to criteria a student cannot promote to next academic year if he have less than 4.5 CGP A. A developer is trying to implement this situation using exception handling in JAVA. Write a correct Java code to help him.
- Write a java program to identify the significance of finally block in handling exceptions.
- Write a java program to generate multiple threads of creating clock pulses. (using runnable interface).

Course Outcome:

- To implement the Exception handling mechanism in Java.

Week-10 (Multi-threading):

- Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
- Write a program illustrating **isAlive** and **join ()**
- Write a Program illustrating Daemon Threads.
- Write a case study on thread Synchronization after solving the above producer consumer problem



B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS15 - COMPUTER ORGANIZATION LABORATORY

L	T	P	C
0	0	3	1.5

List of Experiments :

- Design the following adders
  A) Ripple Carry Adder
  B)Carry-Look-Ahead Adder
  C) Wallace Tree Adder
- Design the Synthesis of Flip Flops
- Simulate the Registers and Counters
- Simulate the Combinational Multipliers
- Design the Booth's Multiplier
- Implementation of the given Boolean function using logics in both SOP and POS forms.
- Verification of state tables of RS,JK,T and D flipflops using NAND and NOR gates.
- Implementation and verification of Decoder/De-multiplexer andEncoder using logic gates.
- Implementation of 4 X 1 multiplexer using logic gates.

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS20 - WEB DEVELOPMENT

(SKILL ORIENTED COURSE-I)

(CSE)

L	T	P	C
0	0	2	1

Course Objectives:

1. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com.

2. The website should consist the following, pages. Home page, Registration and user Login, User profile page, Books catalog, Shopping cart, Payment By credit card, order confirmation. , Validate the registration, user login, user profile and payment by credit.

3. Write an XML file which will display the Book information which includes the following:
   1) Title of the book.
   2) Author Name
   3) ISBN number
   4) Publisher name
   5) Edition
4. Display the XML file as follows.
   The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose.

5. Create a simple visual bean with a area filled with a color. The shape of 6 the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click.
   1) Install TOMCAT web server. While installation assign port number 8080. Make sure that these ports are available i.e., no other process is using this port
   2) 2) Access the above developed static web pages for books web site, using these servers by Putting the web pages developed in week-1 and week-2 in the document root. Access the pages by using the urls : http://localhost:8080/rama/books.html

6. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 And, pwd4 respectively. Write a servelet for doing 8 the following. 1. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".

7. Install a database(Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
   Practice 'JDBC' connectivity. Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

8. Write a JSP which does the following job: Insert the details of the 3 or 4 users who register with the web site 10 (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
II B.TECH – I/II SEMESTER Mandate Course (MC)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Environmental Science	3	0	-	0

COURSE OBJECTIVES	
1	To make the student understand multi disciplinary nature of environment and its components.
2	To investigate the relationship between human life and environment from scientific prospective.
3	To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity
4	Necessasity of analyzing regional, national and global environmental problems
5	To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

COURSE OUTCOMES	
CO1	Solve the environmental problems based fundamental concepts of Environmental Science.
CO2	Describe the structure and function of significant environmental systems
CO3	Differentiate Natural and Polluted environment and asses its impact different on the environmental components.
CO4	Apply the Pyramid of number, mass and Energy, Demonstrate about Renweable energy resources. Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity
CO5	Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

Bos Chairman
Chemistry

SYLLABUS

UNIT-I:

i) Multidisciplinary nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution:

Definition - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV:

BOS Chairman

BOS chemistry

Social Issues and the Environment

From Unsustainable to Sustainable development. Urban problems related to energy.
Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation.
Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.
Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.
- Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014
2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
4. Anubha Kaushik and C.P.Kaushik, Basics of Environment and Ecology, New Age International Publishers, 4th Edition, 2012.

BOS Chairman
Chemistry

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
II Year B.Tech. II-Sem (R20)
20ABS15 - NUMERICAL METHODS, PROBABILITY AND STATISTICS
(Common to CIVIL, ME, EEE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.

UNIT – 1: Solution to algebraic and transcendental equations& Interpolation:
Solution of algebraic and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Learning Outcomes:
At the end of this unit, the student will be able to

- find approximate roots of the an equation by using different numerical methods L2
- explain various discrete operators and find the relation among operators L2
- apply Newton forward and backward formulas for equal and unequal intervals L3

UNIT – II: Numerical differentiation, integration & Solution of Initial Value Problems to Ordinary Differential Equations of first order:
Numerical Differentiation and Numerical integration: Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.
Numerical Solutions of Ordinary differential equation: Solution by Taylor's series, Picard's method of successive approximations, Euler's method, modified Euler's method and Runge-Kutta method of fourth order.

Learning Outcomes:
At the end of this unit, the student will be able to

- find integration of a function by different numerical methods L3
- solve ordinary differential equations using different numerical schemes L3

UNIT – III: Probability & Random Variables:
Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem.
Random variables (discrete and continuous), probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties. (All concepts without proofs)

Learning Outcomes:
At the end of this unit, the student will be able to

- explains the basic concepts of probability theory and elementary theorems on probability. L2
- applies the knowledge of discrete random variable and continuous random variable and the respective probability distributions. L3

UNIT – IV: Testing of hypothesis:
Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

Learning Outcomes:

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

- explain the concept of testing of hypothesis L2
- apply the concept of hypothesis testing for large samples L3

UNIT – V: Small Sample Tests:

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for independence of attributes and goodness of fit.

Learning Outcomes:

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

- apply the concept of testing hypothesis for small samples L3
- apply the concept of hypothesis testing for large samples and estimate the goodness of fit L3

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.
4. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. P. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

Course Outcomes:

At the end of this Course the student will be able to

- apply different methods to find roots of the equations and find approximate the solutions of ordinary differential equations **L3**
- apply the Laplace transform for solving differential equations **L3**
- explain the concepts of probability and their applications **L3**
- apply discrete and continuous probability distributions in practical problems **L4**
- use the statistical inferential methods based on small and large sampling tests **L3**

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B.Tech II year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS22 - FORMAL LANUAGE AND AUTAMETA THEORY

(CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand formal definitions of machine models.
- Classify machines by their power to recognize languages.
- Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity .
- Understanding of un-decidable problems.

UNIT – I: Finite Automota **8hrs**

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Null-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

Learning Outcomes:

- Acquire a full understanding and mentality of Automata Theory as the basis of all computer science languages design. **L1**
- Be able to design sample automata. **L1**
- Be able to design FAs, NFAs, Grammars, languages modelling, small compilers basics. **L1**

Unit-II: Regular Expression **8hrs**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

Learning Outcomes:

- Understand the regular expressions. **L2**
- Understanding the Pumping Lemma. **L2**
- Understand the Finite Automata and Regular Grammars. **L2**

UNIT – III: Context Free Grammars **8hrs**

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Null-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

Learning Outcomes:

- Understanding the Context free languages and grammers, and also Normalising CFG. **L3**
- Understanding the minimization of deterministic and nondeterministic finite automata. **L4**
- Understand basic properties of Turing machines and computing with Turing machines. **L4**

UNIT – IV :Pushdown Automata

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata

Learning Outcomes:

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

- Understand the concept of Pushdown automata and its application. **L4**
- Understand the concept of Two Stack Pushdown Automata. **L4**

UNIT – V: Turing Machine

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

Decidable and Un-decidable Problems: NP, NP-Hard and NP-Complete Problems.

Learning Outcomes:

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

- Know the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem. **L5**
- Understand the challenges for Theoretical Computer Science and its contribution to other sciences. **L5**

Text Books:

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwaniand J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3rd Edition, PHI, 2007.

Reference Books:

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

Course Outcomes:

At the end of this Course the student will be able to

- Argue the correctness of algorithms using inductive proofs and invariants. **L2**
- Analyze worst-case running times of algorithms using asymptotic analysis. **L2**
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. **L3**
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them. **L3**
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. **L4**
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them. **L5**
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs. **L5**

B.Tech II-II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS23 - OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To understand Processes and Threads
- To understand the concept of Deadlocks
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

UNIT – I: OPERATING SYSTEM OVERVIEW **8hrs**

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

Learning Outcomes:

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

- Understand the Basics of Operating System **L1**
- To learn about the evaluation of operating system **L1**
- To learn about the Operating structure **L1**

UNIT – II: PROCESS MANAGEMENT **8hrs**

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

Learning Outcomes:

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

- Understand the process management **L2**
- To learn about the CPU Scheduling **L2**
- To learn how to overcome the dead locks **L3**

UNIT – III: STORAGE MANAGEMENT **8hrs**

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

Learning Outcomes:

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

- Understand The Memory Management **L3**
- To learn about the Page Replacement **L3**
- Understand the Demand paging **L3**

UNIT – IV: FILE SYSTEMS AND I/O SYSTEMS **7hrs**

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

Learning Outcomes:

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

- Understand the File Systems and I/O Systems **L2**
- To implement the file concepts **L4**
- To learn how to Recovery the data **L3**

UNIT – V: CASE STUDY

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

Learning Outcomes:

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

- To implement te Kernal models **L5**
- To implement the Mobile OS **L5**

Text Books:

1.Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, —Operating System Concepts‖, 9th Edition, John Wiley and Sons Inc., 2012.

Reference Books:

1. Ramaz Elmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approach‖, Tata McGraw Hill Edition, 2010.
2. Achyut S.Godbole, Atul Kahate, —Operating Systems‖, McGraw Hill Education, 2016
3. Andrew S. Tanenbaum, —Modern Operating Systems‖, Second Edition, Pearson
4. Gary Nutt, —Operating Systems‖, Third Edition, Pearson Education, 2004.
5. Harvey M. Deitel, —Operating Systems‖, Third Edition, Pearson Education, 2004.
6. Daniel P Bovet and Marco Cesati, —Understanding the Linux kernel‖, 3rd edition, O'Reilly, 2005.
7. Neil Smyth, —iPhone iOS 4 Development Essentials – Xcode‖, Fourth Edition, Payload media, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Analyze various scheduling algorithms. **L2**
- Understand deadlock, prevention and avoidance algorithms. **L3**
- Compare and contrast various memory management schemes. **L4**
- Understand the functionality of file systems. **L2**
- Perform administrative tasks on Linux Servers. **L3**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS25 - DESIGN AND ANALYSIS OF ALGORITHMS

(CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.

UNIT – I: **8hrs**

Introduction to Algorithm, Algorithm specification, performance analysis, Asymptotic Notations. **Divide and Conquer**: General Method, Binary search, finding the maximum and minimum, merge sort, Quick sort, Selection sort, Stressen's matrix multiplication , Analysis of Divide and Conquer run time, Recurrence Relations-Master's Method

Learning Outcomes:

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

- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. **L2**

UNIT – II: **8hrs**

Greedy Method: General Method ,Knapsack problem , job scheduling with deadlines, minimum cost spanning trees-Prim's and Krushkal's Algorithm, single source shortest paths- Dijkastra's ,Bell Man ford And Wars hall's Algorithm.

Dynamic Programming: General Method, Multi stage graphs , All-pairs shortest paths, 0/1 knapsack, the travelling sales person problem.

Learning Outcomes:

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

- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. **L3**
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them. **L3**

UNIT – III: **8hrs**

Basic Traversal and search techniques: Techniques for binary trees and Techniques for graphs, AND/OR graphs, connected components and spanning trees, Bi-Connected components and Dfs.

Back tracking: General Method,8-queens problem ,sum of subsets problem, graph coloring and Hamiltonian cycles, knapsack problem.

Learning Outcomes:

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

- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs. **L3**
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis. **L4**

UNIT – IV: **7 Hrs**

Branch and bound: LIFO and FIFO methods, Travelling salesperson, 0/1 knapsack problem, efficiency considerations.

Lower Bound Theory: Comparison trees of sorting and Searching, Lower bound through reductions-multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

Learning Outcomes:

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

- Explain what amortized running time is and what it is good for. Describe the different methods of amortized analysis (aggregate analysis, accounting, potential method). Perform amortized analysis. **L4**
- Explain what competitive analysis is and to which situations it applies. Perform competitive analysis. **L4**

UNIT – V:

Basic concepts: Non deterministic algorithm ,The classes NP-Hard and NP-Complete

NP-Hard and NP-Complete problems: Np Hardness, Scheduling Problems, NP-Completeness, Cook's theorem (without proof), Reductions for clique Decision problem, Chromatic number decision problem.

Learning Outcomes:

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

- Compare between different data structures. Pick an appropriate data structure for a design situation. **L4**
- Explain what an approximation algorithm is, and the benefit of using approximation algorithms. Be familiar with some approximation algorithms, including algorithms that are PTAS or FPTAS. Analyze the approximation factor of an algorithm. **L4**

Text Books:

1. "Fundamentals of computer Algorithms: EllisHorowitz,s.satrajsahani and raja sekharan,2nd edition,university press.
2. Algorithm design –Jon Kleinberg and Eva Tardos ,pearson.
3. "Introduction to the Design and Analysis of Algorithms", AnanyLevitin ,Third Edition, Pearson Education, 2012.

Reference Books:

1. Design and Analysis of algorithms",Aho,Ullman and Hopcroft,pearson education.
2. "Algorithms"-Richard Johnson baugh and Marcus Schaefer,pearson Education.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction toAlgorithms", Third Edition, PHI Learning Private Limited, 2012.
4. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Argue the correctness of algorithms using inductive proofs and invariants. **L2**
- Analyze worst-case running times of algorithms using asymptotic analysis. **L2**
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. **L3**
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them. **L3**
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. **L4**
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them. **L5**
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs. **L5**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS27 - SOFTWARE ENGINEERING

(CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing nd Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

UNIT – I: **8hrs**

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models.

Learning Outcomes:

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

- Understand the Nature of Software. **L1**
- Understand the process model. **L1**

UNIT – II: **8hrs**

Software Project Planning and Management: Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO-A Heuristic Estimation Technique, Halstead's Software Science-An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management.

Learning Outcomes:

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

- To learn about the COCOMO. **L2**
- To learn about the Organization and Team Structures. **L2**

UNIT – III: **8hrs**

Understanding Requirements: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Requirements Analysis, Structured Analysis, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, and Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.

Learning Outcomes:

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

- To learn about the Requirements. **L3**
- Understand the requirements. **L3**

UNIT – IV: **7 Hrs**

Design Concepts: Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.

Learning Outcomes:

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

- To learn about the Design Concepts. **L3**
- To learn about the Architectural Design. **L3**

UNIT – V:

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

Coding and Testing: Coding, Code Review, Software Documentation, Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Integration Testing.

Software Maintenance: Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, and Estimation of Maintenance cost.

Learning Outcomes:

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

- To learn about the User interface Design. **L3**
- To learn about the Coding and Testing. **L3**
- To learn about the Software Maintenance.

Text Books:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition, 2009, McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, 2009,PHI

Reference Books:

1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford UniversityPress.
5. Software
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition ,2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley &SonsLtd.
9. Software Engineering 3: Domains, Requirements,and Software Design, D.Bjorner, Springer InternationalEdition.
10. Introduction to Software Engineering, R.J.Leach, CRCPress.

Course Outcomes:

At the end of this Course the student will be able to

- Students will be able to decompose the given project in various phases of a lifecycle. Knowledge, Understand (Leve1, Level2) **L1 L2**
- Students will be able to choose appropriate process model depending on the user requirements. Apply, Create (Level 2) **L2**
- Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance. Evaluate(Level 3) **L3**
- Students will be able to know various processes used in all the phases of the product. Analyze(Level 3) **L3**
- Students can apply the knowledge, techniques, and skills in the development of a software product. **L3**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS29 - MOBILE APPLICATION DEVELOPMENT (MAD)

Skill Oriented Course – II

L	T	P	C
1	0	2	2

Course Objectives:

Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

List of Experiments:

Build your first app: Introduction to Android, Create Your First Android App, Layouts, Views and Resources, Text and Scrolling Views

Activities: Understanding Activities and Intents, The Activity Lifecycle and Managing State, Activities and Implicit Intents

Testing, debugging, and using support libraries: The Android Studio Debugger, Testing your App, The Android Support Library

User interaction: User Input Controls, Menus, Screen Navigation, RecyclerView

Delightful user experience: Drawables, Styles, and Themes, Material Design, Providing Resources for Adaptive Layouts

Testing your UI: Testing the User Interface

Background Tasks: AsyncTask and AsyncTaskLoader, Connect to the Internet, Broadcast Receivers, Services

Triggering, scheduling and optimizing background tasks: Notifications, Scheduling Alarms, Transferring Data Efficiently

Preferences and Settings: Storing Data, Shared Preferences, App Settings

Storing data using SQLite: SQLite Primer, SQLite Database

Sharing data with content providers: Share Data Through Content Providers

Loading data using loaders: Loaders

Permissions, Performance and Security, Firebase and AdMob, Publish!

Course Outcomes:

At the end of this Course the student will be able to

- By the end of the course, student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS24 - OPERATING SYSTEMS LABORATORY

(CSE)

L	T	P	C
0	0	3	1

Course Objectives:

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

List of Experiments

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
4. Shell Programming
5. Write C programs to implement the various CPU Scheduling Algorithms
6. Implementation of Semaphores
7. Implementation of Shared memory and IPC
8. Bankers Algorithm for Deadlock Avoidance
9. Implementation of Deadlock Detection Algorithm
10. Write C program to implement Threading & Synchronization Applications
11. Implementation of the following Memory Allocation Methods for fixed partition
12. First Fit b) Worst Fit c) Best Fit
13. Implementation of Paging Technique of Memory Management
14. Implementation of the following Page Replacement Algorithms **a)** FIFO **b)** LRU **c)** LFU

Course Outcomes:

At the end of this Course the student will be able to

- Analyze various scheduling algorithms. **L2**
- Understand deadlock, prevention and avoidance algorithms. **L3**
- Compare and contrast various memory management schemes. **L4**
- Understand the functionality of file systems. **L2**
- Perform administrative tasks on Linux Servers. **L3**
- Compare iOS and Android Operating Systems. **L4**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS26 - DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

(CSE)

L	T	P	C
0	0	3	1

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.

List of Experiments:

1.Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements

2.Sort a given set of elements using the quick sort method and determine the time required to sort the elements.

3.Sort a given set of elements using the Selection sort method and determine the time required to sort the elements

4.Implement Binary search method by Divide and Conquer.

5.Implement Knapsack problem using Greedy method.

6.Implement sum of subsets problem using Back Tracking.

7. Implement 0/1 Knapsack problem using Dynamic Programming.

8.Perform tree traversal algorithms for a given tree.

Preorder b) post order c) In order

9.Implement a) BFS and b) DFS methods of Graph.

10.Find Minimum Cost Spanning Tree of a given undirected graph using

a) Prim's algorithm

b) Krushkal's algorithm.

11. Implement All-Pairs Shortest Paths Problem

12. Implement N Queen's problem using Back Tracking.

Course Outcomes:

At the end of this Course the student will be able to

- Argue the correctness of algorithms using inductive proofs and invariants.(L2) **L2**
- Analyze worst-case running times of algorithms using asymptotic analysis.(L2) **L2**
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.(L3) **L3**

- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.(L3) **L3**
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.(L4) **L4**
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.(L5) **L5**
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.(L5) **L5**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS28 - SOFTWARE ENGINEERING LABORATORY

L	T	P	C
0	0	3	1

Course Objectives:

- To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

List of Experiments:

1. Identifying the Requirements from Problem Statements.
2. Estimation of Project Metrics.
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios.
4. E-R Modeling from the Problem Statements.
5. Identifying Domain Classes from the Problem Statements.
6. State chart and Activity Modeling.
7. Modeling UML Class Diagrams and Sequence diagrams.
8. Modeling Data Flow Diagrams.
9. Estimation of Test Coverage Metrics and Structural Complexity.
10. Designing Test Suites

Course Outcomes:

At the end of this Course the student will be able to

- 1. Students will be able to decompose the given project in various phases of a lifecycle. Knowledge, Understand (Leve1, Level2) **L1 L2**
- 2 .Students will be able to choose appropriate process model depending on the user requirements. Apply, Create (Level 2) **L2**
- 3 .Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance. Evaluate(Level 3) **L3**
- 4 .Students will be able to know various processes used in all the phases of the product. Analyze(Level 3) **L3**
- 5 .Students can apply the knowledge, techniques, and skills in the development of a software product. Apply (Level 3) **L3**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – IV / V Sem (R20)

L	T	P	C
3	0	0	0

APTITUDE AND REASONING SKILLS

(Common to CIVIL ,ME, EEE, ECE & CSE)

Course Objectives

- To equip students with aptitude and reasoning skills in order to help them succeed in competitive exams.
- To help students improve their knowledge of quantitative and reasoning skills, which in turn helps them comprehend and solve various mathematical problems in professional life.

UNIT 1: Quantitative Aptitude 1:

Number Systems - HCF and LCM - Square Roots and Cube Roots – Averages - Problems on ages – Allegations – Percentages - Profit and loss - Logarithms – Progressions - Decimal Fractions - Simplification.

UNIT 2: Reasoning 1:

Directions - Blood Relations - Series and Sequences - Odd man out.

UNIT 3: Quantitative Aptitude 2:

Permutation and Combination - Ratio and Proportion and variation –Inequalities - Time and Work - Time and Distance - Pipes and Cisterns - Simple interest and Compound interest – Calendar - Clocks.

UNIT 4: Quantitative Aptitude 3:

Mensuration : Area, Volume and Surface Areas
Data Interpretation : Tabulation, Line Graphs, Bar Graphs, Pie charts.

UNIT 5: Reasoning 2:

Coding and Decoding - Data sufficiency-Logical deductions.

Text Books:

1. Quantitative Aptitude, R.S. Agarwal, S. Chand Publishers, New Delhi, 2012.
2. Verbal and Non-Verbal Reasoning, R.S.Agarwal, S.Chand Publishers, New Delhi, 2012.

Reference Books:

1. How to Prepare for Quantitative Aptitude, Arun Sharma, TMH Publishers, New Delhi, 2003.
2. IrnK.Wolf, Barron's GRE, Sharon Weiner-Green, Galgotia Publications, New Delhi, 2006.
3. More Puzzles, Shakuntala Devi, OPB, New Delhi, 2006.
4. Brain Teasers, Ravi Narula,Jaico Publishing House, New Delhi, 2005.
5. Puzzles and Teasers, George J Summers, Jaico Publishing House, Mumbai, 2005
6. Puzzles to Puzzle you, Shakuntala Devi , Orient Paper Backs Publishers(OPB), New Delhi, 2005.

Course Outcomes:

The student will be able to

- apply the knowledge of general mathematical models discussed to solve a variety of problems.
- read between the lines and understand various mathematical and reasoning concepts.
- demonstrate various principles involved in solving mathematical problems pertain to Quantitative functions.
- crack puzzles, decode information from charts and interpret their logical thinking in the aspects.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS03 - UNIVERSAL HUMAN VALUES

(Common to all branches)

L	T	P	C
3	0	0	0

Course Objectives:

- Exposure to the value of life, society and harmony.
- Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
- Bringing transition from the present state to Universal Human Order.
- Instill commitment and courage to act.
- Know about appropriate technologies and management patterns.

UNIT –I : HUMAN VALUES **12 Hrs**

Importance of UHV- Morals-Values –Ethics- definitions and differences-Integrity-Work Ethic-Service learning –Respect for others –Caring and Sharing – Honesty – self confidence-Courage-Co Operation –Commitment – Empathy –Character-Spirituality- Moral dilemmas.

Learning Outcomes:

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

Understand the concept of morals, Ethics. **L1**

Able to analyse Moral dilemmas. **L2**

UNIT – II: PERSONALITY DEVELOPMENT **12 Hrs**

Concept Of Personality- Types-Determinants-Intrapersonal Skills-meaning-types- Techniques -Interpersonal Skills- meaning-types- Techniques-SWOT Analysis -Building Right Attitude.-Communication skills-Non Verbal Communication skills.

Learning Outcomes:

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

Analysing SWOT. **L1**

Knowing about self personality. **L2**

UNIT – III : ENGINEERING AS EXPERIMENTATION **12 Hrs**

Engineering as an Experimentation-Engineers as Responsible Experimenters -Codes Of Ethics and Industrial Standards-Case Study: The Challenger-Confidentiality-Conflicts of Interests-Risk and Analysis methods-Safety and Safety Measures.

Learning Outcomes:

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

Understand the concept of Ethics in industry. **L1**

Able to assesment safety standards. **L2**

UNIT – IV : FAMILY AND SCOCIETY **12 Hrs**

Family -Importance –Types-Functions-Influences and generation gap- Premarital counseling-Good family-Characteristics-Building a healthy family- Parents and Children -Honouring Parents-Society Definition—Types-Roles-Responsibilities-Social Evils-reasons-remedies.

Learning Outcomes:

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

Development of a holistic perspective based on self-exploration about themselves. **L1**

Strengthening of self-reflection. **L2**

UNIT – V : GLOBAL ISSUES **12 Hrs**

Globalization: Globalization-MNCs-Technology-Cross culture issues- Environmental Ethics-Disasters- global pandemics-Computer Ethics and Net Etiquettes -Human and Employee Rights-Weapons Development -Ethics and Research-Intellectual Property Rights(IPR).

Learning Outcomes:

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

Understand various cross culture issues. **L1**

Identifying Employee Rights. **L2**

Text Books:

1. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

2. Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.

3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGrawHill– 2003.

4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana Maruthi Publications.

5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.

Reference Books:

1. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.

2. "Professional Ethics and Human Values" by Prof.D.R.Kiran.

Course Outcomes:

At the end of this Course the student will be able to

- Define terms like Natural Acceptance, Happiness and Prosperity. **L1**
- Know about appropriate technologies and management patterns Understand awareness of oneself, and ones surroundings (family, society, nature). **L2**
- Apply what they have learnt to their own self in different day-to-day settings in real life. **L3**
- Relate human values with human relationship and human society. **L4**
- Justify the need for universal human values and harmonious existence. **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS51-Computer Networks

(CSE)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
Understand the basic concepts of Computer Networks.

Introduce the layered approach for design of computer networks.

Familiarize with the applications of Internet

Explore the network protocols used in Internet environment

Explain the format of headers of IP

UNIT – I: Computer Networks and the Internet
What is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet.

Learning Outcomes:
At the end of this unit, the student will be able to
Enumerate the hardware components of a computer network

List the layers of a Computer Network **L1**

Identify the performance metrics of a computer network **L1**

UNIT – II: Application Layer **L3**

Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications.

Learning Outcomes:
At the end of this unit, the student will be able to
Design new applications of a computer network

Analyze the application protocols **L6**

Extend the existing applications **L4**

L2

UNIT – III: Transport Layer
Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control.

Learning Outcomes:
At the end of this unit, the student will be able to
Design Congestion control algorithms

Select the appropriate transport protocol for an application **L6**

L3

Identify the transport layer services L3

UNIT – IV: The Network Layer
Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing.

Learning Outcomes:
At the end of this unit, the student will be able to
Compare routing algorithms L4

Design routing algorithms L6

Extend the existing routing protocols L2

UNIT – V: The Layer: Links, Access Networks, and LANs
Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request.

Learning Outcomes:
At the end of this unit, the student will be able to
Compare medium access protocols L4

Classify the computer networks L2

Design a Data Centre for an organization L6

Text Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

Reference Books:

1. . Forouzan, "Datacommunications and Networking", 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, "Computer Networks", 5th Edition, PEARSON.
3. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

Course Outcomes:
At the end of this Course the student will be able to

- Identify the software and hardware components of a Computer network L3
- Develop new routing, and congestion control algorithms L3
- Assess critically the existing routing protocols L5
- Explain the functionality of each layer of a computer network L2
- Choose the appropriate transport protocol based on the application requirements L3

B.Tech III Year I Semester
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
20ACS52--COMPILER DESIGN
(Common to CSE)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
Teach the concept tsrelatedtoassemblers,loaders,linkersandeditors
Introducethebasicprinciplesofthecompilerconstruction
ExplaintheConceptofContextFree Grammars,ParsingandvariousParsingTechniques.
Exposetheprocessofintermediatecodegeneration.
InstructtheprocessofCodeGenerationandvariousCodeoptimizationtechniques.
ExplainneedofProgramverification

UNIT – I: Overview of Compilation and Language:
processing:Preprocessor-Compiler-assembler-interpreters-pre-processors-linkers and loaders-structure of a compiler- Phases of Compilation-Lexical Analysis, Regular Grammar and regular expression for common programming languagefeatures,passandPhases oftranslation,interpretation, bootstrapping.

Learning Outcomes:
At the end of this unit, the student will be able to
To realize basics of compiler design and apply for real time applications. **L1**
To introduce different translation languages. **L2**

UNIT – II: Top down Parsing & Bottom up Parsing :
Top down Parsing: Context-free grammars, Top down parsing-Backtracking,LL(1) ,recursivedescentparsing,Predictiveparsing,Preprocessingstepsrequiredforpredictiveparsing.
Bottomup Parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing,handlingambiguousgrammar.

Learning Outcomes:
At the end of this unit, the student will be able to
To understand the importance of code optimization. **L2**
To know about compiler generation tools and techniques. **L3**

UNIT – III:Semantic analysis:
Intermediateforms of source Programs-abstract syntax tree, polishnotationand three address codes. Attributed grammars, Syntax directed translation, Conversion of popularProgramminglanguages,languageConstructsintoIntermediate codeforms,Typechecker.

Learning Outcomes:
At the end of this unit, the student will be able to
To learn working of compiler and non compiler applications. **L3**
Design a compiler for a simple programming language. **L4**

UNIT – IV: Symbol Tables & Intermediate code Generation & Code optimization

SymbolTables: Symboltableformat,organizationforblockstructureslanguages,hashing,treestructuresrepresentationofscopeinformation.
IntermediatecodeGeneration: Intermediatelanguages,Declarations,Assignmentstatements,Booleanexpressions,Backpatching.
Codeoptimization: Considerationfor Optimization,Scope of Optimization,localoptimization,loopoptimization,frequencyreduction,constantfolding,DAGrepresentation.
Learning Outcomes:
At the end of this unit, the student will be able to
Able to understand the symbol tables
Able to understand the intermediate code generation **L5**

UNIT – V: Data flow analysis & Object code generation **L5**
Dataflowanalysis: Flowgraph,dataflowequation,globaloptimization,redundantsubexpressionelimination,Inductionvariableelements,Live variableanalysis,Copypropagation.
Objectcodegeneration: Objectcodeforms,machinedependentcodeoptimization,registerallocationandassignment,DAGforregisterallocation.
Learning Outcomes:
At the end of this unit, the student will be able to
Ability to understand and data flow analysis.
Ability to understand the object code generation. **L5**

Text Books: **L6**

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2007), Compilers Principles, Techniques and Tools, 2nd edition, Pearson Education, New Delhi, India.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition, Pearson Education, New Delhi, India.
2. "Kenneth C. Louden (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.

Course Outcomes:
At the end of this Course the student will be able to
To realize basics of compiler design and apply for real time applications. **L1**
To introduce different translation languages. **L2**
To understand the importance of code optimization. **L3**
To know about compiler generation tools and techniques.. **L4**
To learn working of compiler and non compiler applications. **L5**
Design a compiler for a simple programming language. **L6**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS53-Artificial Intelligence

(CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- This course is designed to:
- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

UNIT – I:

What is AI, Foundations of AI, History of AI, The State of Art.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:

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

- Recognize the importance of Artificial Intelligence **L1**
- Identify how intelligent agent is related to its environment **L2**
- Build an Intelligent agent **L3**

UNIT – II

Solving Problems by searching: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

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

- Explain how an agent can formulate an appropriate view of the problem it faces. **L2**
- Solve the problems by systematically generating new states **L3**
- Derive new representations about the world using process of inference **L5**

UNIT – III: 8hrs

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

Learning Outcomes:

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

- Examine how an agent can learn from success and failure, reward and punishment. **L5**
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. **L6**

UNIT–IV:

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

Learning Outcomes:

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

- Develop programs that translate from one language to another, or recognize spoken words. **L6**
- Explain the techniques that provide robust object recognition in restricted context. **L2**
-

UNIT – V:

Robotics: Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

Learning Outcomes:

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

- Explain the role of Robot in various applications. . **L2**
- List the main philosophical issues in AI. **L1**

Text Books:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

Course Outcomes:

At the end of this Course the student will be able to

- Apply searching techniques for solving a problem (L3) **L3**
- Design Intelligent Agents (L6) **L6**
- Develop Natural Language Interface for Machines (L6) **L6**
- Design mini robots (L6) **L6**
- Summarize past, present and future of Artificial Intelligence (L5) **L5**

III B.Tech I SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
20ACS54A-BIG DATA ANALYTICS
(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:
1. Master the concepts of HDFS and Map Reduce framework.
2. Understand Hadoop Architecture.
3. Setup Hadoop Cluster and write Complex Map Reduce programs.
4. Perform Data Analytics using Hive.
5. Implement HBase and Map Reduce Integration.
6. Implement best Practices for Hadoop Development.
7. They will understood about R analytics Based on big data.

UNIT – 1: Introduction to Big Data
Hrs
What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux refresher; VMWare Installation of Hadoop.
Learning Outcomes:
At the end of this unit, the student will be able to
- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L2**

UNIT – II: The design of HDFS
Hrs
HDFS concepts. Command line interface to HDFS.Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.
Learning Outcomes:
At the end of this unit, the student will be able to
- Students will be able to learn the importance of Hadoop. **L2**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L3**

UNIT – III:
Hrs
Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API. Setting up the development environment. Managing configuration. Writing a unit test with MRUnit. Running a job in local job runner. Running on a cluster.Launching a job. The MapReduce WebUI.
Learning Outcomes:
At the end of this unit, the student will be able to
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L3**

- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L4**

UNIT – IV:

Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

Learning Outcomes:

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

- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L4**

UNIT – V: The Hive Shell

Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts. Implementation. Java and Map reduce clients. Loading data, web queries.

Learning Outcomes:

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

- Students will be able to know how to write a program in Hadoop **L4**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L5**

Text Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

Reference Books:

1. Hadoop for Dummies by Dirk deRoos ,Paul C.Zikopoulos,Roman B.MelnyK,Bruce Brown,Rafael Coss

Course Outcomes:

At the end of this Course the student will be able to

- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L3**
- Students will be able to learn the importance of Hadoop. **L3**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L4**
- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L5**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L6**

III B.Tech I SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
20ACS54B-DATA MINING
(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- Discuss classification algorithms learn how data is grouped using clustering techniques. To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining

To understand the strengths and limitations of various data mining models;.

UNIT – 1: Introduction to Data Mining

Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

Learning Outcomes:

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

- Understand what Is Data Mining, what kinds of data can be mined, what kinds of patterns can be mined, and what kinds of applications are targeted. **L2**
- Explain major Issues in data mining. **L2**

UNIT – II: Association Rules

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

Learning Outcomes:

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

- Apply Association rules in data mining applications. **L3**
- Ability to identify the association rules, classification and clusters in large data sets. **L2**

UNIT – III: Classification

Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

Learning Outcomes:

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

- Ability to classify web pages, extracting knowledge from the web **L1**
- Ability to classify the algorithms and Characteristics **L2**

UNIT – IV: Clustering

Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm,. Hierarchical Clustering-Agglomerative Methods and divisive methods, Density based Clustering.

Learning Outcomes:

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

- Ability to identify the problem definition L2
- Ability to use the clustering algorithms L3

UNIT – V: Web and Text Mining

Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

Learning Outcomes:

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

- Ability to classify web pages, extracting knowledge from the web L3
- Ability to solve real world problems in business and scientific information using data mining L3

Text Books:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers,Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
3. Data mining Techniques and Applications

Reference Books:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

Course Outcomes:

At the end of this Course the student will be able to

- Ability to identify the association rules, classification and clusters in large data sets. L2
- Ability to solve real world problems in business and scientific information using data mining L3
- Ability to classify web pages, extracting knowledge from the web L4

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS54C-Data Visualization with Python

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Learn the fundamentals of Python's Matplotlib library and its main features.
- Customize objects in Matplotlib.
- Understand the different plot types available.
- Create multiple plots in Matplotlib

UNIT – I: Python Introduction:

Python: Introduction to Python,Numbers, Strings, Lists, Tuples, Dictionary, Type Conversions- Control Flow,Functions,Modules, Packages,File Handling.

Learning Outcomes:

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

To realize basics of python. **L1**

To introduce different packages. **L2**

UNIT – II: Jupyter Notebook

How to Install, Introduction to Jupyter Notebook, Python scripting basics, Numpy and Pandas.

Learning Outcomes:

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

To understand the installation process. **L2**

To know about Python scripting basics. **L3**

UNIT – III:Data Visualization Tools in Python

Introduction to Matplotlib, Basic plots using matplotlib, Specialized Visualization Tools using Matplotlib, Advanced Visualization Tools using MatplotlibWaffle Charts, Word Clouds.

Learning Outcomes:

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

To know about the Matplotlib. **L6**

Gain knowledge on Word Clouds **L3**

UNIT – IV:Seabron

Introduction to Seaborn: Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

Learning Outcomes:

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

To know about Spatial Visualizations and Analysis in Python **L4**

Design a seabron **L6**

UNIT – V: Dashboard

Dashboard creation using the Plotly library. Create a dashboard with a theme US Domestic Airline Flights Performance, US airline reporting carrier on-time performance dataset, Plotly, and Dash concepts.

Learning Outcomes:

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

Design a Dash board **L4**

Classify the Data sets **L2**

Text Books:

1. Core Python Programming - Second Edition, R. Nageswara Rao, Dreamtech Press.

2. R Graphics Essentials for Great Data Visualization by Alboukadel Kassambara.

Reference Books:

. 1.https://www.coursera.org/learn/python-for-data-visualization#syllabus

Course Outcomes:

At the end of this Course the student will be able to

- Apply statistical methods for Data visualization **L3**
- Gain knowledge on Python **L3**
- Understand usage of various packages in Python. **L5**
- Demonstrate knowledge of Matplotlib, Seaborns and Dash board creation. **L2**
- Apply data visualization tools on various data sets. **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS50-Web Technologies

(Skill Oriented Course)

L	T	P	C
1	0	2	2

Experiments:

1. Introduction
2. Installation & Architecture
3. Creating a react application
4. JSX
5. Components
6. Styling
7. Properties(Prop)
8. Event Management
9. State Management
10. Http client programming
11. Routing
12. Redux
13. Animation
14. Testing

References

https://www.tutorialspoint.com/reactjs/index.htm

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS57-Computer Networks Lab

(CSE)

L	T	P	C
0	0	3	1.5

Experiments:

1. StudyofdifferenttypesofNetworkcablesandPracticallyimplementthecross-wiredcableandstraightthroughcableusingclampingtool.
2. Study of Network Devices in Detail.
3. Study of network IP.
4. Connect the computers in Local Area Network.
5. Study of basic network command and Network configuration commands.
6. Configure a Network topology using packet tracer software.
7. Configure a Network topology using packet tracer software.
8. Configure a Network using Distance Vector Routing protocol.
9. Configure Network using Link State Vector Routing protocol.
10. Configuring Static and Default Routes
11. Configuring RIP
12. Planning Network-based Firewalls
13. Configuring a Cisco Router as a DHCP Server

Course Outcomes:

At the end of this Course the student will be able to

- Identify various components of computer and their interconnection. L3
- Identify basic Networking IP. L3
- To know the networking topology commands . L5
- To know about the Configuring a Cisco Router as a DHCP Server. L2
- To know the Configuring RIP. L3

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS58-ARTIFICIAL INTELLIGENCE LABORATORY

(CSE)

L	T	P	C
0	0	3	1.5

Objectives:

Explore the methods of implementing algorithms using artificial intelligence techniques

Illustrate search algorithms

Demonstrate building of intelligent agents

Experiments:

1.Write a program to implement DFS and BFS
2.Write a Program to find the solution for travelling salesman Problem
3.Write a program to implement Simulated Annealing Algorithm
4.Write a program to find the solution for wampus world problem
5.Write a program to implement 8 puzzle problem
6.Write a program to implement Towers of Hanoi problem
7.Write a program to implement A* Algorithm
8.Write a program to implement Hill Climbing Algorithm
9.Build a Chatbot using AWS Lex, Pandora bots.
10.Build a bot which provides all the information related to your college.
11.Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
12.The following is a function that counts the number of times a string occurs in another string:

```
# Count the number of times string s1 is found in string s2
def countsubstring(s1,s2):
count = 0
for i in range(0,len(s2)-len(s1)+1):
 if s1 == s2[i:i+len(s1)]:
count += 1
return count
```

For instance, countsubstring('ab','cabalaba') returns 2.
Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).
13.Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count(lambda x: x>2, [1,2,3,4,5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function.

14.Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing N items that each have a unique name, a random size in the range 1 ..... 5 and a random value in the range 1 ..... 10.

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should peform atleast 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of 2:5 x N for each value problem size N. Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding. How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer? Try running the above tests again with a backpack size of 1 x N and with 4:0 x N.

15.Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitly large).

Write a function layout(N,C,L) that can give a table placement (ie. a number from 0 : : :C -1) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number 0 .....N-1 for each guest and that the list of restrictions is of the form [(X,Y), ...] denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

Reference Books:

1. 1.Tensorflow: https://www.tensorflow.org/
2. Pytorch: https://pytorch.org/ https://github.com/pytorch
3. Keras: https://keras.io/ https://github.com/keras-team
4. Theano: http://deeplearning.net/software/theano/ https://github.com/Theano/Theano
5. Cafee2: https://caffe2.ai/ https://github.com/caffe2
6. Deeplearning4j: https://deeplearning4j.org/
7. Scikit-learn:https://scikit-learn.org/stable/ https://github.com/scikit-learn/scikit-learn
8. Deep Learning.Ai: https://www.deeplearning.ai/
9. OpenCv: https://opencv.org/ https://github.com/qqwweee/keras-yolo3
10. YOLO: https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/ nVIDIA:CUDA https://developer.nvidia.com/cuda-math-library
11. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
12. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
13. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
14. Artificial Neural Networks, B. Yagna Narayana, PHI
15. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight, TMH.
16. Artificial Intelligence and Expert Systems, Patterson, PHI.

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L	T	P	C
3	0	0	0

Constitution of India

Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

Learning Outcomes:

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.

Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. V-Sem (R20)

FUZZY SET THEORY, ARITHMETIC AND LOGIC

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

UNIT – 1: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets: **9 Hrs**

Classical (Crisp) Sets To Fuzzy Sets:

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts.

Fuzzy Sets Versus Crisp Sets:

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets.

Learning Outcomes:

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

• The basic concepts of Sets and Fuzzy sets	L2
• Analyze the Fuzzy Sets Versus Crisp Sets	L3

UNIT – II: Operations On Fuzzy Sets:

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms.

Fuzzy Unions: t-Conorms ,Combinations of Operations, Aggregation Operations.

Learning Outcomes:

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

• Do some operations on Fuzzy sets	L2
• Assess t-Norms Fuzzy Unions	L3

UNIT – III: Fuzzy Arithmetic & Fuzzy Relations :

Fuzzy Arithmetic :

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations:

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations,

Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

Learning Outcomes:

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

• Perform arithmetic operations on Fuzzy numbers and equations.	L2
• Analyze Fuzzy Relations, Projections and Cylindric Extensions etc.	L3

UNIT – IV: Fuzzy Relation Equations & Possibility Theory:	
Fuzzy Relation Equations: General Discussion ,Problem Partitioning ,Solution Method. **Possibility Theory:** Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibilty Theory, Possibility Theory versus Probability Theory.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Solve Fuzzy relation equations.	L3
• Analyze Possibility Theory.	L4
UNIT – V: Fuzzy logic:	
Classical Logic: An Overview, Multi-valued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Understand the Fuzzy logic.	L1
• Analyze the Inferences from Conditional, Qualified, and Quantified Propositions.	L4
Text Books:	
1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan	
Reference Books:	
1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta	
2. Fuzzy Logic, Timothy J. Ross	
3. Fuzzy Set Theory, H.J. Zimmermann	
4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the basic concepts of Fuzzy sets and logic.	**L1**
• Do some operations of Fuzzy sets.	**L2**
• Solve Fuzzy relation equations.	**L3**
• Analyze the Inferences from Conditional, Qualified, and Quantified Propositions.	**L4**
• analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY)

FUNCTIONAL NANOMATERIALS FOR ENGINEERS
(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

- Be able to describe the terminology and basics of smart materials and smart systems
- Be able to understand the classification and applications of smart materials.
- Be able to understand the use of appropriate materials for energy applications.
- Be able to identify appropriate techniques for understanding the mechanisms of nanosensors
- Be able to explain the concepts of self-assembling monolayers and their applications

UNIT-I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS — 9 Hrs

Introduction:-Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, – (Hydrogels, Carbon nanotubes) and their Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Self-detection, Self-corrective, self-healing, Shock Absorbers)- Components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

Learning Outcomes:

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

• **Understand** the basic properties and functionalization of smart nanomaterials	**L1**
• **Explain** the need of functional/smart nanomaterials for advanced tecghnology	**L2**
• **Identify** engineering applications of sensors	**L3**
• **Analyze** the sensing, control and detection mechanism in smart nanomaterials	**L4**
• **Illustrate** the components of smart systems	**L2**

UNIT-II: CLASSIFICATION AND APPLICATIONS — 9 Hrs

Introduction, Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive and Electrochromic), Shape Memory Alloys and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics,Smart fabrics, Sporting goods and smart glass, Merits and de-merits of smart materials.

Learning Outcomes:

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

• **Classify** smart materials based on electrical, magnetic and thermal characteristics	**L1**
• **Understand** the basic concepts and working principle of memory alloys	**L2**
• **Identifies** the Engineering applications of smart materials	**L2**
• **Apply** the concepts to Aircrafts, Medicine and Robotic fields	**L3**
• **Identify** the Merits and demerits of smart materials in engineering field	**L2**

Unit-III NANOSENSORS — 9 Hrs

Introduction, Principle of nanosensors, Types of nanosensors (Physicalnanosensors – *Pressure, Force, Mass, Displacement*, Optical nanosensors – *Proximity, Ambient light*, Chemical nanosensors- *Chemical composition, Molecular concentration*).Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

Learning Outcomes:

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

• **Explain** the working principle and concept of nanosensors	L1
• **Classify** the nanosensors based on their working principle and application	L2
• **Summarize** various types of nanosensors	L2
• **Explain** the applications of nanosensors in various fields	L2
• **Apply** the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields	L3

UNIT-IV: SELF-ASSEMBLING MONO LAYERS **9Hrs**

Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Types of SAMs, Factors influencing Monolayer order, Methods of preparation of SAMs(Langmuir- Boldgett film :Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group).Applications (Self-cleaning and moisture repellent).

Learning Outcomes:

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

• **Explain** the concept of self-assembling	L1
• **Understand** the significance of molecular layers	L2
• **Explain** the concept of Langmuir- Boldgett film preparation	L2
• **Explain** the important factors influencing Monolayer order	L2
• **Classify** the materials based on patterning of SAMs	L2
• **Apply** the concept of Self-cleaning and moisture repellent	L3

UNIT-V: NANOMATERIALS FOR ENERGY APPLICATIONS **9Hrs**

Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages. **HydrogenFuel Cells** – Working Principle, Configuration, Assembly of fuel cell, Water **splitting** – H_2 Production, Photocatalytic process.

Learning Outcomes:

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

• **Explain** the concept of solar cell	L1
• **Classify** the solar cells based on manufacturing material	L2
• **Explain** the construction and working principle of solar cell	L2
• **Interpret** the efficiency and advantages in various solar cells	L2
• **Explain** the construction and working principle of hydrogen cells	L2
• **Identify** applications of water splitting for H_2 production	L2
• **Explain** the photocatalytic process	L2

Text Books:

1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

Reference Books:

1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials,-Vol (1&2), Nova Publishers, 2014.

Course Outcomes:	
At the end of this Course the student will be able to	
• **Identify** the various functional/smart nanomaterials materials	**L1**
• **Classify** the smart nanomaterials based their applications and properties	**L2**
• **Apply** the various functional nanomaterials in various applications	**L3**
• **Classify** the solar cells based on manufacturing material	**L4**
• `**Interpret** the efficiency and advantages in various solar cells	**L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech – III-I-Sem	L	T	P	C
	3	0	0	3
Chemistry of Energy Materials (OE.1) (common to all branches)				

Course Objectives:

- To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.
- Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

UNIT-I: **Electrochemical Systems**	9 Hrs

a) Introduction to Energy- Materials, Chemistry, Engineering and Technology.
b) Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, Batteries-Lead-acid and Lithium ion batteries.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Solve the problems based on electrode potential (L3)
- Describe the Galvanic Cell (L2)
- Differentiate between Lead acid and Lithium ion batteries(L2)
- Illustrate the electrical double layer(L2)

UNIT-II:**Fuel Cells**	7 Hrs

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the fuel cell(L2)
- Describe the working Principle of Fuel cell(L2)
- Explain the efficiency of the fuel cell (L2)
- Discuss about the Basic design of fuel cells(L3)

UNIT-III: **Hydrogen Storage**	9 Hrs

Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF) zinc-(3-aminotriazolato)-oxalate; MOF-74 (Zn_2 -(2,5-dihydroxy-1,4-benzenedicarboxylate), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods-liquefaction method

Learning Outcomes:

After completing the course, the student will be able to:

- Differentiate Chemical and Physical methods of hydrogen storage (L2)
- Discuss the metal organic frame work(L3)
- Illustrate the carbon and metal oxide porous structures (L2)
- Describe the liquification methods(L2)

UNIT-IV: **Solar Energy**	8 Hrs

Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages

Learning Outcomes:

After completing the course, the student will be able to:

- Apply the photo voltaic technology (L3)
- Demonstrate about solar energy and prospects(L2)
- Illustrate the Solar cells (L2).
- Discuss about concentrated solar power(L3)

UNIT-V: **Photochemical and Photo electrochemical Conversions**	7 Hrs

Photochemical cells and applications of photochemical reactions, photo electrochemical cell, advantages of photoelectro catalytic conversions.

Learning Outcomes:

- After completing the course, the student will be able to:
- Differentiate between Photo and Photo electrochemical Conversions(L2)
- Illustrate the photochemical cells(L2)
- Identify the applications of photochemical reactions(L3)
- Interpret advantages of photoelectron catalytic conversion(2)

Text Books:

1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020.
2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.

Reference Books:

1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009.
2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018
3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010

4. Klaus Jagar et.al.. Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

Course Outcomes:

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances(L1)
- Lists about various electrochemical and energy systems(L1)
- Classify solid, liquid and gaseous fuels(L3)
- Analyze the energy demand of world, nation and available resources to fulfill the demand(L3)
- Evaluate the conventional energy resources and their effective utilization(L3)
- To be able to understand and perform the various characterization techniques of fuels(L1)
- Explain knowledge of modern energy conversion technologies(L2)
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE55A- BASICS OF CIVIL ENGINEERING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To study the basic concept of Civil Engineering and instruction buildings.
- To understand the concept of planning of buildings and drawing of single stored building.
- To study the Basic principles of surveying and instruments used.
- To study about the various materials used for the construction of Buildings.
- To understand the construction of Structural Elements in buildings.

UNIT-I:

Introduction to Civil Engineering Building planning : Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings – office / factory / software development office / power house /electronic equipment service centre

UNIT-II:

Site plan, Orientation of a building, Open space requirements, Position of doorsand windows, Size of rooms; Preparation of a scaled sketch of the plan of asingle storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area/ built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.

UNIT-III

Surveying - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging(direct ranging only) Theodolite and Total station-Principles

UNIT-IV:

Building materials

Bricks, cement blocks - Properties and specifications.

Cement – OPC, properties, grades; other types of cement and its uses (inbrief).

Cement mortar – constituents, preparation.

Concrete – PCC and RCC – grades.

Steel - Use of steel in building construction, types and market forms.

UNIT-V:

Building construction – Foundations; Bearing capacity of soil (definitiononly); Functions of foundations, Types - shallow and deep (sketches only).

Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only).

Roofs – functions, types, roofing materials (brief discussion only).

Floors – functions, types; flooring materials (brief discussion only).

Decorative finishes – Plastering – Purpose, procedure.

Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).

Text Books:

- Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
- Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
- Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house
- Dr. K. R. Arora, "Surveying Volume-1", Standard book house, New Delhi, 13th Edition, 2012. 2. S. K.
- Duggal, "SurveyingVolume-2", Tata McGraw-Hill Education Private Limited, India,New Delhi, 3rd Edition, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- To learn the types of buildings and components of building.
- To get the knowledge of planning of single stored buildings.
- To understand Basic concepts of surveying and Basic uses of instruments in surveying.
- To know the materials used for the construction of Buildings.
- To get the knowledge about the construction methods of Buildings.

Annexure-I *R20*

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

BASICS OF NON-CONVENTIONAL ENERGY SOURCES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT – I: Solar Energy **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

Learning Outcomes:

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

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II: PV Energy Systems **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

Learning Outcomes:

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

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT – III: Wind Energy **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

Learning Outcomes:

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

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT – IV: Geothermal Energy **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

Learning Outcomes:

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

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT – V: Miscellaneous Energy Technologies **10 Hrs**

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

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

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

Reference Books:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME55a-3D PRINTING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering techniques.
- Explain different processes available in additive manufacturing.
- Bring awareness on mechanical properties of materials and geometric issues related to additive manufacturing applications.

UNIT – I: Introduction to 3D PRINTING Systems: **10 Hrs**

History and Development of 3D printing, Need of 3D Printing, Difference between 3D Printing and CNC, Classification of 3D Printing Processes: Based on Layering Techniques, Raw Materials and Energy Sources, 3D Printing Process Chain, Benefits and Applications of 3D Printing, Representation of 3D model in STL format, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

Learning Outcomes:

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

- Identify the applications for additive manufacturing processes. **L3**
- Explain the process of additive manufacturing. **L2**
- Represent a 3D model in STL format and other RP data formats to store and retrieve the geometric data of the object. **L3**

UNIT – II: CAD & Reverse Engineering: **8 Hrs**

Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology: MIMICS, MAGICS. Reverse Engineering (RE) –Meaning, Use, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

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

- Apply various digitalization techniques. **L3**
- Explain the concept of reverse engineering and scanning tools. **L2**

UNIT – III: Solid and Liquid Based AM Systems: **8 Hrs**

Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications.

Stereo lithography Apparatus (SLA): Principle, Process, Materials, Advantages, Limitations and Applications.

Learning Outcomes:

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

- Explain the principles, advantages, limitations and applications of solid and liquid based AM systems. **L2**
- Identify the materials for solid and liquid based AM systems. **L3**

UNIT – IV: Powder Based AM Systems: **8 Hrs**

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Learning Outcomes:

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

- Explain the principles, advantages, limitations and applications of powder based AM systems. **L2**
- Apply SLS, LENS and EBM 3D printing methods. **L3**

UNIT – V: Other Additive Manufacturing Systems: **8 Hrs**

Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

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

- Explain principles and limitation of 3D printing using BPM and SDM. **L2**
- Use BPM and SDM 3D printing methods. **L3**

Text Books:

1. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1/e Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e World Scientific Publishers, 2003.
3. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.

Reference Books:

1. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling, Springer, London 2001.
2. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
3. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.
4. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Demonstrate various additive manufacturing and rapid prototyping techniques applications. **L4**
- Describe different additive manufacturing processes. **L3**
- Apply methods in rapid prototyping. **L2**
- Use powder based AM system. **L3**
- Model 3D printing using SDM and BPM methods. **L6**

Online Learning Resources:

- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
- https://lecturenotes.in/subject/197
- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4

Head
Mechanical Engineering Department,
JNTUA College of Engineering,

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME55b-SMART MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

UNIT – I: Introduction to Smart Materials: **10 Hrs**

Introduction to Smart Materials: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

Learning Outcomes:

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

- Recall what intelligence is. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

UNIT – II: High bandwidth - Low strain generating (HBLS) Smart Materials: **8 Hrs**

High bandwidth - Low strain generating (HBLS) Smart Materials:

Piezoelectric Materials – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

Magnetostrictive Materials – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

Learning Outcomes:

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

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discus Galfenol and Metglas materials. **L6**

UNIT – III: Low bandwidth - High strain generating (LBHS) materials: **8 Hrs**

Low bandwidth - High strain generating (LBHS) materials: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures.

Learning Outcomes:

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

- List various types of LBHS smart materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain the concept of vibration control through shape memory alloys. **L2**
- Discus design considerations of shape memory alloy. **L6**

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UNIT – IV: Smart actuator: **8 Hrs**

Smart actuators:

Based on HBLS smart materials: Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.

Based on LBHS Smart Materials - Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation.

Learning Outcomes:

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

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discus the concepts of actuators based on HBLS and LBHS. **L6**

UNIT – V: Smart sensors: **8 Hrs**

Smart sensors:

Sensors based on HBLS Smart Materials - Piezoelectric Sensors, Magnetostrictive Sensors, Techniques of Self Sensing MEMS Sensors.

Sensors based on LBHS Smart Materials - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

Learning Outcomes:

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

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- discus EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

Text Books:

1. M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31.
2. A.V. Srinivasan, Smart Structures; Analysis and Design, Cambridge University Press, Cambridge; New York, 2001
3. K.Uchino, Kluwer, Piezoelectric Actuators and ultrasonic Motors Academic Publishers, Boston, 1997.

Reference Books:

1. Brian Culshaw, Smart Structures and Materials, Artech House, Boston,2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication.
4. A.J. Moulson and J.M-Herbert, Electro ceramics: Materials, Properties/ / Wiley/ 2/e.

Course Outcomes:

At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/112104251
- http://wwwcourses.sens.buffalo.edu/mae538/LecNotes.html
- http://ssdl.iitd.ac.in/vssdl/smart.pdf
- https://www.stem.org.uk/resources/elibrary/resource/33044/smart-materials-1

Head
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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC55a- FUNDAMENTALS OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Open Elective-I)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

UNIT I

Introduction to Electronics Engineering: Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn about the diode, bipolar junction transistor and field effect transistors.(L1)

UNIT II

Applications of semiconductor devices: Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

Learning Outcomes:

At the end of the unit, the student will be able to:

- To learn the real time applications of semiconductor devices.(L1)
- To understand the basic concepts of operational amplifier and their applications.(L2)

UNIT III

Introduction to digital systems: Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the binary number systems, Boolean algebra and working of logic gates.(L2)
- Know the working and applications of digital logic circuits.(L1)

UNIT IV

Introduction to Communication Systems: Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Identify the basic elements of a communication system.(L2)
- Understand various examples of telecommunication systems.(L2)

UNIT V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic working principle and applications of different sensors and transducers.(L2)
- Measure physical parameters using different types of sensors and transducers.(L3)

TEXT BOOKS

1. Millman J, Halkias C.C andJit S, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., "Digital Design", Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation",DhanpatRai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

REFERENCE BOOKS

1. Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. andNashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

Course outcomes:

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

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn the real time applications of semiconductor devices.(L1)
- Comprehend the binary number systems, logic gates and digital logic circuits.(L1)
- Understand the basic principles of communication systems and their applications.(L2)
- Measure the physical parameters using Sensors and Transducers.(L3)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC55b- TRANSDUCERS AND SENSORS

(Open Elective-I)

L – T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To study about the characteristics of instrumentation system and transducers.
- To know the operation of different types of Temperature Transducers.
- To learn the operation of different types of Flow Transducers.
- To understand the working and operation of different types of Pressure Transducers.
- To gain the knowledge on working of Force and Sound Transducers.

UNIT I

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the characteristics of instrumentation system and transducers.(L1)
- Measure motion using different motion transducers.(L3)

UNIT II

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the working principle of temperature transducers.(L2)
- Study about different types of bio sensors and smart sensors.(L1)

UNIT III

Flow Transducers: Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the Bernoulli's principle and continuity.(L2)
- Learn how to measure flow using different types of flow meters.(L1)

UNIT IV

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Work with different types of manometers.(L3)
- Use different types of pressure transducersto measure pressure.(L3)

UNIT V

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn how to measure force using force transducers.(L1)
- Understand the working and operation of sound transducers.(L2)

TEXT BOOKS

1. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", DhanpatRai& Co. 3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V, "Instrumentation Devices and Systems", TATA McGraw Hill publications, 2007.

REFERENCE BOOKS

1. Doebelin. E.O, "Measurement Systems Application and Design", McGraw Hill International, New York, 2004.
2. Nakra B.CandChaudharyK.K , "Instrumentation Measurement and Analysis", Second Edition, Tata McGraw-Hill Publication Ltd.2006.

Course outcomes:

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

- Understand the characteristics of instrumentation system and transducers.(L2)
- Know the operation of different types of Temperature Transducers.(L1)
- Compare the operation of different types of Flow Transducers.(L2).
- Correlate the working and operation of different types of Pressure Transducers.(L4)
- Gain the knowledge on working of Force and Sound Transducers.(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55A- Fundamentals of Internet of Things

(Open Elective-I)

L	T	P	C
3	0	0	3

Course objectives:

- To understand the fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario.

UNIT I : Fundamentals of IoT

Introduction – Characteristics-Physical Design – IoT Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

Learning Outcome:

At the end of this unit, students will able to

- Describe the IoT devices physical design and able to design IoT devices in various levels of IoT L1
- Explain the technologies enabling related to industry. L2

UNIT II: IOT and M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP, NETOPEER.

Learning Outcome:

At the end of this unit, students will able to

- Describe the Software defined networks and Network function virtualization with respect to the IoT systems. L2
- Explain the NETCONF protocol with YANG modeling language. L2

UNIT III: IoT Design Methodology

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

Learning Outcome:

At the end of this unit, students will able to

- Describe the IoT devices complete design methodology with all spectifications. L2
- Explain the system Integration and application development and deployment.L3 L3

UNIT IV: Sensors and Connectivity

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

Learning Outcome:

At the end of this unit, students will able to

- Describe various sensors usage with respect to the IoT systems and differentiation between IP address and MAC address L3
- Explain the benefits of application layer protocols. L4

UNIT V: IOT Industry Applications

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plant wide Ethernet Model (CPwE) – Power Utility Industry – Grid Blocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

Learning Outcome:

At the end of this unit, students will able to

- Describe the industry oriented IoT devices and its applications. L4

TEXT BOOKS:

2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

REFERENCES:

4. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
6. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
7. CharalamposDoukas,"Building Internet of Things With the Arduino", Second Edition, 2012.
8. Dr.John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models. L2
- Appraise the role of IoT protocols for efficient network communication. L3
- Illustrate different sensor technologies for sensing real world entities and identify the

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55B-E-Marketing
(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
I. Understand the legal and ethical issues in e-marketing.

II. Analyze online marketing and supply chain management.

III. Provides extensive theoretical and practical knowledge of online marketing.

IV. Develop marketing skills required for a continuously growing international business environment.

UNIT – I: E-BUSINESS OVERVIEW :

Traditional commerce vs. e-commerce, e-commerce and e-business categories of e-commerce development and growth of e-commerce advantages and disadvantages of e-commerce international nature of e-commerce..

Learning Outcomes:
At the end of this unit, the student will be able to
To realize basics of E-Marketing. **L1**

To introduce different E-Business Models . **L2**

UNIT – II: E-BUSINESS INFRASTRUCTURE :

E Commerce architectural framework, the internet and www-internet protocols, internet, intranet and extranets, internet connection options, security issues in e commerce environment, encryption techniques payment systems types of payments legal, ethical and tax issues in e-commerce.

Learning Outcomes:
At the end of this unit, the student will be able to
To understand the E-Marketing Plan. **L2**

To know about Online Expression . **L3**

UNIT – III: ONLINE MARKETING AND SUPPLY CHAIN MANAGEMENT

Online marketing, business models of e marketing, online advertisement, advertisement methods and strategies online retailing e-auctions.Supply chain management-procurement process and the supply chain types of procurement, multi-tier supply chains and trends in supply chain management.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the Data Drive Strategy . **L6**

Gain knowledge on Consumer Behavior Online **L3**

UNIT – IV: ONLINE SERVICES :

Online financial services, online banking and brokerage, online insurance services, online real estate services, travel services online, hospitality services online, recruitment services online, publishing services online entertainment, e-learning.

Learning Outcomes:

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

To know about Pricing Strategies L4

To know about Channel Management and Power. L6

UNIT – V: MOBILE COMMERCE :

Definition of mobile commerce, mobile commerce framework, growth of mobile commerce benefits and limitations of mobile commerce mobile network infrastructure, information distribution for mobile networks multimedia content, publishing, mobile payment models, mobile commerce applications.

Learning Outcomes:

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

To know how Browsing Behavior Model L4

To know about Ten rules for CRM Success. L2

Text Books:

1. Gary P. Schneider, "Ecommerce-Strategy, Technology and Implementation", Cengage Learning, India Edition

2. Kenneth C. Laudon, Carol GuercioTraver, "E-commerce–Business", Technology, Pearson, Low Price Edition.

3. Bharat Bhasker, "Electronic Commerce Framework, Technologies and Applications", 3rdn Edition.Tata McGraw, Hill.

Reference Books:

1. Efraim Turban, Tae Lee, David King and H. Micheal Chung, "Electronic Commerce, Managerial Perspective", Pearson Education Asia.

2. CSV Murthy, "E-commerce-Concepts, Models and Strategies", HPH.

3. . J. Christopher Westland and Theodore H K Clark, "Global Electronic Commerce ,Theory and Case Studies", Oxford Universities Press.

Course Outcomes:

At the end of this Course the student will be able to

- Analyse the confluence of marketing, operations, and human resources in real-time delivery. L3
- Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks. L3
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. L5
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. L2
- Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities. L3

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55C-Computer Architecture and Organization

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart basic concepts of computer architecture and organization.
- To explain key skills of constructing cost-effective computer systems.
- To familiarize the basic CPU organization.
- To help students in understanding various memory devices.

UNIT – I: STRUCTURE OF COMPUTERS:

Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes.

COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.

Learning Outcomes:

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

To realize basics of computer structure. **L1**

To know about the arithmetic operations. **L2**

UNIT – II: BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

Learning Outcomes:

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

To understand the organization of computer. **L2**

To know about design of the computer. **L3**

UNIT – III:REGISTER TRANSFER AND MICRO-OPERATIONS

REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.

MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the registers and its operations. L6

Gain knowledge on Micro operations. L3

UNIT – IV:MEMORY SYSTEM

MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about Semiconductor Memories L4

To know about the Cache Memory L6

UNIT – V: INPUT OUTPUT

INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.
MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the Input/Output operations L4

To know about the multiprocessors. L2

Text Books:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.

Reference Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

2.William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy

3.Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

4.John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

Course Outcomes:

At the end of this Course the student will be able to

- Identify various components of computer and their interconnection. **L3**
- Identify basic components and design of the CPU: the ALU and control unit. **L3**
- Compare and select various Memory devices as per requirement. **L5**
- Compare various types of IO mapping techniques. **L2**
- Critique the performance issues of cache memory and virtual memory. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS61- INTERNET OF THINGS

L	T	P	C
3	0	0	3

Course Objectives:

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

UNIT – I: Fundamentals of IoT

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

Learning Outcomes:

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

- Able to understand the application areas of IOT **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks **L2**
- Able to understand building blocks of Internet of Things and characteristics. **L3**

UNIT – II: IOT and M2M

M2M, IoT vs M2M, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

Learning Outcomes:

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

- Discuss the IOT and M2M **L3**
- Able to understand the IOT system Management with NETCONF-YANG **L3**

UNIT – III: IoT Design Methodology

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

Learning Outcomes:

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

- Able to understand the Specifications Integration and Application Development. **L4**
- Able to understand the IoT Design Methodology **L4**

UNIT-IV: Sensors and Connectivity

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols..

Learning Outcomes:

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

- Able to identify the sensors and its applications **L3**
- Able to use the sensors in different applications **L3**

UNIT – V: IOT Applications

IOT application for industry-Future factory concepts, Brownfield IoT, Smart objects, Smart applications, Study of existing IoT platforms/middleware, IoT- A, Hydra etc.

Learning Outcomes:

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

- Able to identify the IOT applications **L5**
- Able to identify the IOT platforms **L5**

Text Books:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.

Reference Books:

1. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.

2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
3. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
4. CharalamposDoukas, "Building Internet of Things With the Arduino", Second Edition, 2012.
5. Dr. John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

Course Outcomes:

At the end of this Course the student will be able to

- Able to understand the application areas of IOT · Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**
- Able to understand building blocks of Internet of Things and characteristics. **L4**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS62- DATA SCIENCE

L	T	P	C
3	0	0	3

Course Objectives:

- To study fundamental concepts in software testing
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To expose the advanced software testing topics, such as object--oriented software testing methods.

UNIT-I: Introduction: Objective, scope and outcome of the course

Toolboxes: Python, fundamental libraries for data Scientists. Integrated development environment (IDE). Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and ploting.

Learning Outcomes:

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

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characteristics of structural testing methods **L2**

UNIT-II: Data preparation

Descriptive statistics, data preparation. Exploratory Data Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score. Statistical Inference frequency approach, variability of estimates, hypothesis testing using confidence intervals, using p-values.

Learning Outcomes:

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

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

UNIT-III Supervised Learning

Supervised Learning: First step, learning curves, training-validation and test. Classification of Learning models generalities, support vector machines, random forest. Examples.

Learning Outcomes:

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

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

UNIT-IV: Regression

Regression analysis, Regression: linear regression simple linear regression, multiple & Polynomial regression, Sparse model. Unsupervied learning, clustering, similarity and distances, quality measures of clustering, case study.

Learning Outcomes:

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

- Distinguish characteristics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT-V: Network Analysis

What is Network Analysis, Graphs, Social Networks, centrality, drawing centrality of Graphs, PageRank, Ego-Networks, community Detection.

Learning Outcomes:

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

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. Desikan and G. Ramesh, "Introduction to Data Science", CRC Press[2].

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS63- CYBER SECURITY

L	T	P	C
3	0	0	3

Course Objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

UNIT-I: Introduction to Cyber Security

Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, Comprehensive Cyber Security Policy.

Learning Outcomes:

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

- Protect and defend computer systems and networks from cybersecurity attacks. **L2**
- Characterize privacy, legal and ethical issues of information security. **L3**
- Identify vulnerabilities critical to the information assets of an organization. **L2**

UNIT-II: Cyber Forensics

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics.

Learning Outcomes:

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

- Define the security controls sufficient to provide a required level of confidentiality, integrity, and availability in an organization's computer systems and networks **L2**
- Diagnose and investigate cyber security events or crimes related to computer systems and digital evidence. **L3**

UNIT-III Cybercrime: Mobile and Wireless Devices

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Attacks on Mobile/Cell Phones.

Learning Outcomes:

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

- Diagnose attacks on an organization's computer systems and networks. **L2**
- Propose solutions including development, modification and execution of incident response plans. **L3**

UNIT-IV: Cyber Security: Organizational Implications

Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Learning Outcomes:

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

- Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks. **L4**

UNIT-V: Privacy Issues: Basic Data Privacy Concepts

Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications

Learning Outcomes:

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

- Communication orally and in writing, proposed information security solutions to technical and non Apply business principles to analyze and interpret data for planning, decision **L4**

Text Books:

1. Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

Course Outcomes:

At the end of this Course the student will be able to

- To understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks. **L4**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS66- INTERNET OF THINGS LAB

L	T	P	C
0	0	3	1.5

Course Objectives:

- Understand the IoT using Arduino programming.
- Explain the interfacing of data, I/O devices with Arduino UNO.
- Describe the digital protection schemes in power system relays.

List of Experiments

1. Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.
2. Run some python programs on Pi like: Read your name and print Hello message with name.
   Read two numbers and print their sum, difference, product and division.
   Word and character count of a given string.
   Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from Standard input.
   Print a name 'n' times, where name and n are read from standard input, using for and while loops. Handle Divided by Zero Exception.
   Print current time for 10 times with an interval of 10 seconds.
   Read a file line by line and print the word count of each line.
3. Write a program to blink LED by using Switch.
4. Write a program to read the LDR values and based on the value control the intensity of LED
5. Get input from two switches and switch on corresponding LEDs
6. Write a program to toggle 2 LED's alternatively with a delay of 1 second.
7. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
8. Write a program to control the servo motor.

Learning Outcomes:

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

- List out the different IOT applications and importance of IOT in present scenario. **L2**
- List the application of Arduino and Node MCU **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS67- DATA SCIENCE LAB

L	T	P	C
0	0	3	1.5

Course Objectives:

- The main objective of the course is to inculcate the basic understanding of Data Science and it's practical implementation using Python.

List of Experiments

1. Creating a NumPy Array
   a. Basic ndarray
   b. Array of zeros
   c. Array of ones
   d. Random numbers in ndarray
   e. An array of your choice
   f. Imatrix in NumPy
   g. Evenly spaced ndarray
2. The Shape and Reshaping of NumPy Array a. Dimensions of NumPy array b. Shape of NumPy array c. Size of NumPy array d. Reshaping a NumPy array e. Flattening a NumPy array f. Transpose of a NumPy array
3. Expanding and Squeezing a NumPy Array a. Expanding a NumPy array b. Squeezing a NumPy array c. Sorting in NumPy Arrays
4. Indexing and Slicing of NumPy Array a. Slicing 1-D NumPy arrays b. Slicing 2-D NumPy arrays c. Slicing 3-D NumPy arrays d. Negative slicing of NumPy arrays
5. Stacking and Concatenating Numpy Arrays a. Stacking ndarrays b. Concatenating ndarrays c. Broadcasting in Numpy Arrays
6. Perform following operations using pandas a. Creating dataframe b. concat() c. Setting conditions d. Adding a new column
7. Perform following operations using pandas a. Filling NaN with string b. Sorting based on column values c. groupby()
8. Read the following file formats using pandas a. Text files b. CSV files c. Excel files d. JSON files
9. Read the following file formats a. Pickle files b. Image files using PIL c. Multiple files using Glob d. Importing data from database
10. Demonstrate web scraping using python
11. Perform following preprocessing techniques on loan prediction dataset a. Feature Scaling b. Feature Standardization c. Label Encoding d. One Hot Encoding
12. Perform following visualizations using matplotlib a. Bar Graph b. Pie Chart c. Box Plot d. Histogram e. Line Chart and Subplots f. Scatter Plot

Web References:

1. https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy-tutorial-for-data-science-beginners/
2. https://www.analyticsvidhya.com/blog/2021/07/data-science-with-pandas-2-minutes-guide-to-key-concepts/
3. https://www.analyticsvidhya.com/blog/2020/04/how-to-read-common-file-formats-python/
4. https://www.analyticsvidhya.com/blog/2016/07/practical-guide-data-preprocessing-python-scikit-learn/

Learning Outcomes:

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

- Perform various operations on numpy arrays **L2**
- Importing data from different file formats using pandas **L2**
- Draw different types of charts using matplotlib **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS68- CYBER SECURITY LAB

L	T	P	C
0	0	3	1.5

List of Experiments

1. TCP scanning using NMAP
2. Port scanning using NMAP
3. TCP / UDP connectivity using Netcat
4. Perform an experiment to demonstrate sniffing of router traffic by using the tool wireshark.
5. Perform an experiment how to use dumpsec.
6. Perform an experiment to sniff traffic using ARP Poisoning
7. Implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) network protocols
8. Setup a honey pot and monitor the honey pot on network.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

SOFT SKILLS

(Common to all branches)

L	T	P	C
1	0	2	2

Course Objectives:

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

UNIT – 1: SOFT SKILLS: INTRODUCTIUON

Soft Skills: Definition-Meaning--Importance- Why skill gap -Analysis--Personality Development vs. Soft Skills- Learning Methods.

Learning Outcomes:

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

• Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals.	**L1**
• Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict	**L2**

UNIT – II: PERSONAL SKILLS

Intra-Personal: Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

Inter-Personal: Definition-Meaning-Importance-Communications skills- Team Work-Negotiation Skills-Leadership skills.

Learning Outcomes:

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

• A commitment to ethics and integrity in academic and professional relationships, within the community and the environment.	**L1**
• Describe how good communication with other can influence our working relationships	**L2**

UNIT – III: VERBAL AND NON VERBAL SKILLS

Verbal Skills: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading- Writing Skills.

Non Verbal Skills: Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics- Haptics -Posture -Kinetics- Para Language.

Learning Outcomes:

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

• Compares verbal and nonverbal communication	**L1**
• Understand the functions of nonverbal communication	**L2**

UNIT – IV: FINISHING SCHOOL

Before Interview: Bridging between Campus and Corporate- Preparation of Resume-Cover Letter- Statement of Purpose-E-mail writing-Corporate Etiquettes.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Learner will be able to prepare his/ her own Resume and Cover letter.	L1
• Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general	L2

UNIT – V: DURING INTERVIEW

Interview Skills: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don'ts s of interview.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Learner will be able to face interview questions and effectively present his /her. skills	L1
• Learner will manage how to plan and organize personal and professional life.	L2

Reference Books:

1. Sherfield, M. Robert at al ***Cornerstone Developing Soft Skills***, 4th ed. Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, ***Life Skills for Success***, Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.
4. Gangadhar Joshi, ***From Campus to Corporate***, *Sage Text.*
5. Alex.K, ***Soft Skills***, 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, ***Technical Communication: Principle and Practice***, Oxford University Press. 2009.
7. Shalini Varma, ***Body Language for Your Success Mantra***, 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, ***Seven Habits of Highly Effective People***, JMD Book, 2013.

Course Outcomes:	
At the end of this Course the student will be able to	
• The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them.	L1
• The students will understand the significance of soft skills in the working environment for professional excellence.	L2
• The students will be prepared to undergo the placement process with confidence and clarity.	L3
• The students will be ready to face any situation in life and equip themselves to handle them effectively.	L4
• The students will understand and learn the importance of etiquettes in both professional and personal life	L5

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. VI /VII-Sem (R20)

NUMERICAL TECHNIQUES

(Open Elective -II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

UNIT – 1: Solution to System of Nonlinear Equations and Spline Functions: **9 Hrs**

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines: Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

Learning Outcomes:

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

• Solve the algebraic and transcendental equations.	L2
• Solve the system of nonlinear equations and spline functions.	L4

UNIT – II: Numerical Linear Algebra:

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems –Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – LU decomposition from Gauss elimination – solution of tridiagonal systems – III conditioned linear systems – Method for III- conditioned systems. – Solution of linear systems –Iterative methods.

Learning Outcomes:

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

• Understand the concepts of numerical linear algebra.	**L1**
• Apply the concepts of numerical linear algebra.	**L3**

UNIT – III: Initial and Boundary value problems:

Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

Learning Outcomes:

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

• Solve first order initial value problems.	L3
• Solve ssimultaneous and higher order equations and boundary value problems.	L4

UNIT – IV: Numerical solution of Laplace's equation and Poisson's equation:

Laplace's equation and Poisson's equation – Finite difference approximations to derivatives – solution of Laplace's equation and Poisson's equation: Jacobi's method – Gauss-Seidel method – Successive over

relaxation method – ADI method.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Solve Laplace's equation using finite difference technique.	L3
• Solve Poisson's equation through iterative methods.	L4
UNIT – V: One dimensional Heat equation & Wave equation:	
Heat equation in one dimension: Finite difference approximations-Bender-Schmidt recurrence formula-Crank-Nicolson formula ; Iterative methods for the solution of equations - Gauss-Seidel iteration formula and One dimensional Wave equation.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Apply numerical methods for solving one dimensional heat equation.	L3
• Apply numerical methods for solving one dimensional wave equation.	L4
Text Books:	
1. S. S. Sastry, Introductory Methods of Numerical Analysis(Fifth Edition 2012), PHI Learning Private Limited, New Delhi.	
Reference Books:	
1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi.	
2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981.	
3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996.	
4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992.	
5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the need of numerical methods in solving engineering problems of various fields.	**L1**
• Learn various numerical techniques to solve initial and boundary value problems.	**L2**
• Apply various methods in solving Laplace's equation.	**L3**
• Emphasizes the numerical solutions of one dimensional heat and wave equations .	**L4**
• Analyze the problems in engineering and technology using various techniques of Numerical methods.`	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – II SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

MATERIALS CHARACTERIZATION TECHNIQUES
(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

- The latest analysis techniques and material structure and property correlation
- The most advanced imaging instruments for investigating the modern materials at the highest topographic resolution
- The commonly used analytical tools for characterizing modern materials at highest sensitivity
- The latest advancement in spectroscopy for getting structural and elemental analysis of Materials

UNIT – 1: Structure analysis by Powder X-Ray Diffraction **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer equation, Small angle X-ray scattering (SAXS) (in brief).

Learning Outcomes:

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

• **Understand** the diffraction phenomenon in crystals	**L1**
• **Identify** the factors affecting diffraction pattern intensities	**L2**
• **Explain** the polycrystalline nature of the material	**L3**
• **Analyze** the crystal structure and crystallite size by various methods	**L4**
• **Illustrate** the Small angle X-ray scattering (SAXS)	**L2**

UNIT – II: Microscopy technique -1 –Scanning Electron Microscopy (SEM) **9 Hrs**

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Back scattered Electron), Energy Dispersive X-ray Analyzer (to provide elemental identification and quantitative compositional information), Advantages and limitations of SEM.

Learning Outcomes:

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

• **Explain** the basic concepts and working principle of Scanning Electron Microscope	**L1**
• **Classify** the different types of Scanning Electron Microscope modes used	**L2**
• **Identifies** the specimen preparation for Scanning Electron Microscope	**L2**
• **Analyze** the morphology of the sample by using Scanning Electron Microscope	**L4**
• **Understand** the advantages and limitations of Scanning Electron Microscope	**L2**

UNIT – III: Microscopy Technique -2 - Transmission Electron Microscopy (TEM) **9Hrs**

Principle, Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy,Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the basic principle and working principle of Transmission Electron Microscope	**L1**
• **Classify** the different types of Transmission Electron Microscope modes used	**L2**
• **Identifies** the specimen preparation for Transmission Electron Microscope	**L2**
• **Analyze** the morphology and crystal structure of the sample by using Transmission Electron Microscope	**L2**
• **Understand** the advantages and limitations of Transmission Electron Microscope	**L3**
UNIT – IV: Spectroscopy techniques	**9 Hrs**
Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy – quantitative analysis of elements and organic compounds, energy band gap determination – wood and Tauc and KubelkaMunk functions (ii) Raman Spectroscopy – Molecular analysis using vibrational modes (iv) X-ray photoelectron spectroscopy (XPS) for surface materials characterization and chemical analysis.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the principle and experimental arrangement of spectrometers	**L1**
• **Understand** the analysis and advantages of the spectroscopic techniques	**L2**
• **Explain** the concept of UV-Visible spectroscopy	**L2**
• **Explain** the principle and experimental arrangement of Raman Spectroscopy	**L2**
• **Explain** the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS)	**L2**
UNIT – V: Electrical & Magnetic Characterization techniques	
Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method,Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device)	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the various types of electrical properties analysis techniques	**L1**
• **Explain** the effect of magnetic field on the electrical properties	**L2**
• **Analyze** the magnetization by using induction method	**L2**
• **Explain** the construction and working principle of VSM	**L2**
• **Explain** the construction and working principle of SQUID	**L2**
Text Books:	
1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008	
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.	
Reference Books:	
1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine M. McCash, Tata McGraw-Hill, 2008.	
2. Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall , 2001 – Science.	

Course Outcomes:	
At the end of this Course the student will be able to	
• **Identify** the various characterization techniques	**L1**
• **Classify** the characterization techniques based on their applications and properties	**L2**
• Ilustates the various characterization techniques for materials characterization.	**L3**
• **Apply** suitability in Engineering Applications	**L4**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech – IV-I-Sem	L	T	P	C
	3	0	0	3

Polymers and their applications (OE.2)
(common to all branches)

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

UNIT-I: **Polymers-Basics and Characterization**	9 Hrs

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition.Molecularweight concepts: determination bynumber, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations(L2)
- Describe measurement of molecular weight of polymer(L2)

UNIT-II: **Synthetic Polymers**	8 Hrs

Polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Differentiate Bulk, solution, Suspension and emulsion polymerization(L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers(L3)

UNIT-III: Natural Polymers & Modified cellulosics	8 Hrs

Natural Polymers: Chemical & Physical structure, properties, source, important chemical

modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

Learning Outcomes:

After completing the course, the student will be able to:

- Describe the properties and applications of polymers(L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex (L2)
- Discuss the special plastics of PES, PAES, PEEK (L3)
- Explain modified cellulosics(L2)

UNIT-IV: Hydrogels of Polymer networks and Drug delivery	8 Hrs

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery.Introduction to drug systems including regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

After completing the course, the student will be able to:

- Identify types of polymer networks(L3)
- Describe methods involve in hydrogel preparation(L2)
- Explain applications of hydrogels in drug delivery(L2)
- Demonstrate the advanced drug delivery systems and controlled release(L2)

UNIT-V: **Advanced Polymers for engineering applications**	7Hrs

Importance of advance polymers examples-polymers in sensors,conducting and synthetic metals, photonics, thermoplastics. Applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides

Learning Outcomes:

After completing the course, the student will be able to:

- Demonstrate conducting polymers (L3)
- Explain Biodegradable polymers (L2)
- Discuss applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides (L3)

Text Books:

1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.

Reference Books:

1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials(L1)
- Understand the hydro gels preparation, properties and applications in drug delivery system (L2).
- Explain biodegradable polymers(L2)
- Discuss applications of Biodegradable polymers (L3)

B.Tech III Year II Sem & IV Year I Sem

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE65A- ENVIRONMENTAL IMPACT ASSESSMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same.
- The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

UNIT-I:

INTRODUCTION:-

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT-II:

EIA METHODOLOGIES:-

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT-III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT-IV:

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT-V:

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

- Environmental Impact Assessment Methodologies, byY. Anjaneyulu, B.S. Publication, Sultan Bazar,Hyderabad.
- Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice HallPublishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari& Sons Publication., NewDelhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Course Outcomes:

At the end of this Course the student will be able to

1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluateit.

Annexure-II *R20*

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

ENERGY CONSERVATION & MANAGEMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation Techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient Technologies.

UNIT – I: **09 Hrs**

Basic Principles of Energy Audit and management Energy audit – Definitions – Concept– Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Learning Outcomes:

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

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

UNIT – II: **09 Hrs**

Lighting Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures

Learning Outcomes:

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

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

UNIT – III: **09 Hrs**

Power Factor and energy instruments Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Learning Outcomes:

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

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

UNIT – IV: **09 Hrs**

Space Heating and Ventilation Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods

Learning Outcomes:

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

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

UNIT – V: **09 Hrs**

Economic Aspects and Analysis : Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).Computation of Economic Aspects Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

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

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John.C.Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1stedition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd, 2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaP art IISecI-37_25-08-2010.pdf

Course Outcomes:

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- Determination of the economic analysis **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME65a-PROGRAMMING OF ROBOTS AND CONTROL

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

UNIT – I: Fundamentals of Robots: **10 Hrs**

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

Learning Outcomes:

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

- outline the advantages, disadvantages and applications of robot. **L2**
- compare the types of robot manipulators based on applications. **L2**

UNIT – II: Robot Actuators And Feedback Components: **8 Hrs**

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

Learning Outcomes:

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

- Compare the types of actuators used in robot manipulator. **L2**
- List out the various types of robots and feedback components. **L1**

UNIT – III: Robot Programming: **8 Hrs**

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages - VAL, RAIL, AML, C, C++.

Learning Outcomes:

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

- List out the various methods of robot programming **L1**
- Explain the requirements and features of programming **L2**

UNIT – IV: Control of Manipulators **8 Hrs**

Open-loop and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

Learning Outcomes:

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

- Explain the basic concepts of robot controlling systems. **L2**
- Outline PD and PID control schemes. **L3**
- Use the force control strategies to determine the forces in robot. **L2**
- Explain the force control and torque control techniques. **L2**

UNIT – V: Robot Vision: **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

Learning Outcomes:

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

- Identify the components of robot vision system. **L3**
- Explain the concept of image enhancement, segmentation and transformation. **L2**

- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

Text Books:

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — McGraw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003.
3. S.R.DEB

Reference Books:

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2/e, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1/e, Wiley- Inter science, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence. Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

Course Outcomes:

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

Online Learning Resources:

- https://nptel.ac.in/courses/112105249
- https://onlinecourses.nptel.ac.in/noc20_de11/preview
- https://nptel.ac.in/courses/112104308
- https://nptel.ac.in/courses/112104288
- https://nptel.ac.in/courses/112101099
- https://www.iare.ac.in/sites/default/files/lecture_notes/ROBOTICS_LECURE_NOTES.pdf

Head
Mechanical Engineering Department.
JNTUA College of Engineering,

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME65b-NON-CONVENTIONAL SOURCES OF ENERGY

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT – I: Introduction **10 Hrs**

Introduction to energy resources: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Learning Outcomes:

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

- Explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

UNIT – II: Solar Energy Collection & Storage **8 Hrs**

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

Learning Outcomes:

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

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

UNIT – III: Wind Energy & Bio-Mass **8 Hrs**

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

Learning Outcomes:

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

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discus the principles of Bio-conversion. **L6**
- Explain combustion characterises of bio-gas. **L2**

UNIT – IV: Geothermal Energy & Ocean Energy **8 Hrs**

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. **Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

Learning Outcomes:

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

- Explain the concept of geothermal and ocean energy. **L2**
- Discus OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

UNIT – V: Direct Energy Conversion **8 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Learning Outcomes:

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

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

Text Books:

1. Tiwari and Ghosal, Renewable energy resources, Narosa Publishing House-2004.
2. G.D. Rai, Non-Conventional Energy Sources, Khanna Publications-1988.

Reference Books:

1. Twidell & Weir, Renewable Energy Sources, Routledge; 3/e, 2015.
2. Sukhatme S.P., Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
3. Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics, Springer Publications, 2006.
4. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press, 2010.
5. Wind Power, Revised Edition: Renewable Energy for Home, Farm, and Business, Paul Gipe, Chelsea Green Publishing, 2004.
6. S.S. Rao, B.B. Parulekar, Energy Technology (Non Conventional, Renewable and Conventional), Khanna publications, 1994.

Course Outcomes:

At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/103103206
- https://nptel.ac.in/courses/108108078
- https://onlinecourses.nptel.ac.in/noc21_ph33/preview
- https://nptel.ac.in/courses/121106014
- https://mrcet.com/downloads/digital_notes/EEE/31082020/IV-I%20SOLAR%20&%20WIND%20ELECTRICAL%20SYSTEMS%20DIGITAL%20NOTES%201.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf

Head
Mechanical Engineering Department
JNTUA College of Engineering

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC65a- INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS

(Open Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objective:

- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.
- To know the basic architecture and interfacing of ARM microcontroller.

UNIT I

Architecture of 8051: Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the architecture of 8051 microcontroller.(L2)
- Learn the functions of each block of 8051 microcontroller.(L1)

UNIT II

Instruction Set of 8051: Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

Assembler and Addressing Modes: Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051. **I/O:** Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know different instructions available in the Instruction set of 8051.(L1)
- Learn and use different types of addressing modes of 8051 microcontroller.(L1)

UNIT III

Timer: Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

Serial Communication: Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and I^2C implementation on 8051.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Write programs to use the 8051 Timers for a given application.(L6)
- Use different types of serial communication devices based on the application.(L3)

UNIT IV

Interrupt: 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

Interfacing Techniques: Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Interface memory and I/O devices for specific applications.(L4)
- Learn and apply Interrupts based on the application and usage.(L3)

UNIT V

ARM Cortex-M Microcontrollers: A Memory-centric System Model. Basics of Chip Design. The Arm Cortex-M Processor Architecture. Interconnects. The Advanced Microcontroller Bus Architecture (AMBA). Interfacing with the External World. Peripherals. Memory System. FPGA SoC Architecture.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the ARM based processor and its architecture.(L3)
- Interface ARM controllers for practical applications.(L3)

TEXT BOOKS

1. Muhammed Ali Mazidi, Janice GillispieMazidi andRolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

REFERENCE BOOKS

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010
3. Fundamentals of System-on-Chip Design on Arm Cortex-M Microcontrollers Paperback – 2 Aug. 2021by Rene Beuchat , Andrea Guerrieri , SahandKashani.

Course outcomes:

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

- Understand the basic concepts and architecture of 8051.(L2)
- Know the usage of various instructions and addressing modes in 8051(L1)
- Program 8051 Timers and implement serial communication for a given application.(L6)
- Interface memory, I/O devices and use Interrupts.(L4).
- Learn the basic architecture and interfacing of ARM microcontroller(L3).

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC65b- PRINCIPLES OF DIGITAL SIGNAL PROCESSING

(Open Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete fourierseries and fourier transforms.
- To design & analyze IIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

UNIT I

Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems. Review of Z-transforms.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze and process signals in the discrete domain.(L4)
- Determine time domain representations and frequency domain analysis of discrete-time signals and systems (L3)

UNIT II

Discrete Fourier Series and Fourier Transforms: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the pproperties of discrete fourier series.(L2)
- Describe DFT using FFT algorithms.(L1)

UNIT III

Design of IIR Digital Filters and Realizations: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Design IIR digital filters from analog filters.(L6)
- Construct IIR digital filters with different realization techniques.(L6)

UNIT IV

Design of FIR Digital Filters and Realizations: Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling technique, comparison of IIR & FIR filters, basic structures of FIR systems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Design FIR digital filters using window techniques.(L6)
- Construct the basic structures of FIR systems.(L6)

UNIT V

DSP Applications: Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Apply Interpolation and Decimation with help of sampling and filtering.(L3)
- Understand the principle and applications of Forward Linear Predictive filter.(L2)

Text Books:

1. John G. Proakis andDimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing",PHI.
3. B.Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

References:

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.

Course outcomes:

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

- Articulate the frequency domain analysis of discrete time signals.(L3)
- Understand the properties of discrete fourierseries and fourier transforms.(L2)
- Design& analyze IIR digital filters from analog filters.(L6)
- Design various structures used in implementation of FIR digital filters.(L6)
- Summarize the importance and applications of Multirate Digital signal processing.(L2)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65A- MACHINE LEARNING APPLICATIONS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT-I: INTRODUCTION

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Learning Outcomes:

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

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT-II: DECISION TREE LEARNING

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

Learning Outcomes:

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

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT-III SAMPLE COMPLEXITY AND OVER FITTING

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

Learning Outcomes:

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

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT-IV: INSTANCE-BASED TECHNIQUES

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

Learning Outcomes:

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

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT-V: Genetic Algorithms

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

Learning Outcomes:

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

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems. **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65B- OBJECT ORIENTED PROGRAMMING

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

UNIT-I: INTRODUCTION

Introduction to Java: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

Learning Outcomes:

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

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L3**

UNIT-II: CLASSES

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Learning Outcomes:

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

- Use of geometric transformations on graphics objects and their application in composite form. **L2**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

UNIT-III INHERITANCE

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Learning Outcomes:

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

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L3**
- Render projected objects to naturalize the scene in 2D view and use of illumination models for this **L4**

UNIT-IV: INTERFACES

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages – Defining, Finding, Member Access, Importing

Learning Outcomes:

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

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L5**
- Discuss various multimedia datastructures. **L5**

UNIT-V: EXCEPTION HANDLING

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting

try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

Learning Outcomes:

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

- Understand the basics of Multimedia Authoring systems **L4**
- Understand the how videos are placed **L5**

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

Course Outcomes:

At the end of this Course the student will be able to

Introduction to computer graphics

- Gain knowledge of client-side scripting, validation of forms and AJAX programming **L3**
- Understand server-side scripting with PHP language **L4**
- Understand what XML is and how to parse and use XML Data with Java **L5**
- To introduce Server-side programming with Java Servlets and JSP **L6**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65C- WEB DESIGN

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To Learn the basic concepts in HTML, CSS, JavaScript
- To Understand the responsive design and development
- To learn the web project management and maintenance process
- To Design a Website with HTML, JS, CSS / CMS - Word press

UNIT-I: WEB DESIGN - HTML MARKUP FOR STRUCTURE

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

Learning Outcomes:

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

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT-II: CSS AND JAVASCRIPT

CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

Learning Outcomes:

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

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT-III RESPONSIVE WEB DESIGN

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

Learning Outcomes:

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

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT-IV: WEB PROJECT MANAGEMENT

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

Learning Outcomes:

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

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT-V: PROJECT CASE STUDY

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Learning Outcomes:

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

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

Reference Books:

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the method of using layered approach for design . **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software. **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS71A- SOFTWARE PROJECT MANAGEMENT

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation and activity planning.

UNIT – I: Project Evaluation and Project Planning

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

Learning Outcomes:

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

- Develop the model from the conventional software product to the modern **L1**
- Analyze and design the software architecture **L1**

UNIT – II: Project Life Cycle and Effort Estimation

Software process and Process Models – Choice of Process models - mental delivery – Ràpid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

Learning Outcomes:

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

- Have an exposure for organizing and managing a software project. **L2**
- Apply, analyze, design and develop the software project. **L2**

UNIT – III: Activity Planning and Risk Management

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

Learning Outcomes:

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

- Design various estimation levels of cost and effort **L2**
- Acquire the knowledge of managing, economics for conventional, modern and future software projects **L3**

UNIT-IV: Project Management and Control

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

Learning Outcomes:

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

- Categorize various peer instruction levels **L3**
- Sketch various artifacts sets for better understanding of software development. **L4**

UNIT – V: Staffing in Software Projects

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

Learning Outcomes:

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

- Identify and describe the key phases of project management **L4**
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project. **L5**

Text Books:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

Reference Books:

1. Robert K. Wysocki "Effective Software Project Management" – Wiley Publication
2. Walker Royce: "Software Project Management"- Addison-Wesley
3. Gopalaswamy Ramesh

Course Outcomes:

At the end of this Course the student will be able to

- At the end of the course the students will be able to practice Project Management principles while developing a software. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS71B- SOFTWARE TESTING

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- To study fundamental concepts in software testing
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To expose the advanced software testing topics, such as object--oriented software testing methods.

UNIT – I: Introduction

Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and cor-rectness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

Learning Outcomes:

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

- List a range of different software testing techniques and statergies and be able to apply specific (automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L1**

UNIT – II: White Box and Black Box Testing

White box testing, static testing, static analysis tools, Structural testing: Module/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/ graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

Learning Outcomes:

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

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L2**
- Discuss about the functional and system testing methods **L2**

UNIT – III: Integration, System, and Acceptance Testing

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution.

Learning Outcomes:

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

- Discuss about the functional and system testing methods. **L2**
- Demonstrate various issues for object oriented testing. **L3**

UNIT-IV: Test Selection & Minimization for Regression Testing

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

Learning Outcomes:

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

- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT – V: Test Management and Automation

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems.

Learning Outcomes:

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

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.

Reference Books:

1. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
2. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L4**
- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods. **L2**
- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS71C- SOFTWARE ARCHITECTURE

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand architectural requirements
- Identify architectural structures
- Develop architectural documentation
- Generate architectural alternatives

UNIT – I: Basic Concepts

Concepts of Software Architecture, Models, Processes, Stakeholders.

Designing Architectures: The Design Process, Architectural Conception.

Refined Experience in Action: Styles and Architectural Patterns, Architectural Conception in Absence of Experience.

Learning Outcomes:

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

- Argue the importance and role of software architecture in large **L1**
- Design and motivate software architecture for large **L1**

UNIT – II: Modeling

Modeling Concepts, Ambiguity, Accuracy, and Precision, Complex Modeling: Mixed Content and Multiple Views, Evaluating Modeling Techniques, Specific Modeling Techniques.

Learning Outcomes:

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

- Design and motivate software architecture for large-scale software systems. **L2**
- Recognize major software architectural styles and frameworks. **L2**

UNIT – III: Analysis

Analysis- Analysis Goals, Scope of Analysis, Architectural Concern being Analyzed, Level of Formality of Architectural Models, Type of Analysis, Analysis Techniques.

Learning Outcomes:

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

- Recognize major software architectural styles and frameworks. **L2**
- Describe a software architecture using various documentation approaches and architectural description languages. **L3**

UNIT-IV: Implementation and Deployment

Implementation and Deployment- Concepts, Existing Frameworks, Software Architecture and Deployment, Software Architecture and Mobility

Conventional Architectural styles- Pipes and Filters, Event- based, Implicit Invocation, Layered systems, Repositories, Interpreters, Process control

Learning Outcomes:

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

- Describe a software architecture using various documentation approaches and architectural description languages. **L3**
- Generate architectural alternatives for a problem and selection among them. **L4**

UNIT – V: Applied Architectures and Styles

Applied Architectures and Styles-Distributed and Networked Architectures, Architectures for Network-Based Applications, Decentralized Architectures, Service-Oriented Architectures and Web Services.

Learning Outcomes:

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

- Use well-understood paradigms for designing new systems. **L4**
- Identify and assess the quality attributes of a system at the architectural level. **L5**

Text Books:

1. Software Architecture: Foundations, Theory, and Practice, by Richard N.Taylor, Nenad Medvidovic, Eric Dashofy, ISBN: 978-0-470-16774-8
2. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.
3. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson

Reference Books:

1. Pattern Oriented Software Architecture, By Frank Buchnanetal, Wiley India.
2. The Art of Software Architecture, By Stephen T. Albin

Course Outcomes:

At the end of this Course the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L4**
- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L2**
- Generate architectural alternatives for a problem and selection among them. **L5**
- Use well-understood paradigms for designing new systems. **L4**
- Identify and assess the quality attributes of a system at the architectural level. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS72A- MICRO SERVICES

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives:

- To study fundamental concepts in software testing
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To expose the advanced software testing topics, such as object--oriented software testing methods.

UNIT – I: Motivations for micro services

What are micro services, Benefits from micro services, What to avoid with micro services, How is this different than service-oriented architecture?, Case studies and most common architectural patterns.

Learning Outcomes:

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

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L1**

UNIT – II: Elements of a microservices architecture

Characteristics of micro services architecture, Designing micro services, REST API and messaging, The future of micro services.

Learning Outcomes:

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

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L2**
- Discuss about the functional and system testing methods **L2**

UNIT – III: Microservices and DevOps

Why you should use DevOps, DevOps capabilities for microservices architecture., Microservices governance, DevOps capabilities: Testing strategies for microservices.

Learning Outcomes:

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

- Discuss about the functional and system testing methods. **L2**
- Demonstrate various issues for object oriented testing. **L3**

UNIT-IV: Developing microservices in Bluemix

Bluemix introduction, Developing microservices using Bluemix DevOps, Deployment, testing, monitoring, and scaling services in Bluemix DevOps, Communication, session persistence, and logging in Bluemix, Considerations and opportunities.

Learning Outcomes:

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

- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT – V: Microservices Case Studies In Ibm

Microservices implementation in IBM DevOps Services, Microservices case study in Bluemix console, Microservices case study in IBM Watson services.

Learning Outcomes:

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

- Discuss about the functional and system testing methods. **L4**

- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. "Microservices from Theory to Practice: Creating Applications in IBM Bluemix Using the Microservices Approach", First Edition (August 2015).

Reference Books:

1. ALIGNING PRINCIPLES, PRACTICES, AND CULTURE, "Microservice Architecture", OREILLY.

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L4**
- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods. **L2**
- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS72B- CLOUD COMPUTING

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives:

- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance
- Analyze the problems and solutions to cloud application problems

UNIT – I: Introduction to Cloud Computing

Evolution of Cloud Computing –Principles of Parallel and Distributed Computing – Cloud Characteristics, Recent trends in Computing- Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Web services.

Learning Outcomes:

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

- Understand the fundamental principles of distributed computing. **L2**
- Understand how the distributed computing environments known as Grids can be built from lower level services. **L2**

UNIT – II: CLOUD ARCHITECTURE, SERVICES AND STORAGE

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture. Characteristics – Cloud Services –(IaaS, PaaS, SaaS) –Deployment Models- Public, Private, Hybrid and community Cloud.Advantages of Cloud Storage – Cloud Storage Providers – S3.

Learning Outcomes:

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

- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **L3**
- Analyze the performance of Cloud Computing **L3**

UNIT – III: CLOUD ENABLING TECHNOLOGIES

Basics of Virtualization – Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

Learning Outcomes:

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

- Understand the concept of Cloud Security. **L4**
- Learn the Concept of Cloud Infrastructure Model. **L4**

UNIT-IV: RESOURCE MANAGEMENT AND SECURITY IN CLOUD

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – IAM –Security Standards.

Learning Outcomes:

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

- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **L5**
- Understand the concept of Cloud Security. **L5**

UNIT – V: CLOUD TECHNOLOGIES AND ADVANCEMENTS

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Learning Outcomes:

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

- Analyze the performance of Cloud Computing. **L5**
- Learn the Concept of Cloud Infrastructure Model. **L5**

Text Books:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.
2. Essentials of Cloud Computing By K. Chandrasekaran-India © 2015 by Taylor & Francis Group, LLC.

Reference Books:

1. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy, Oreilly, 2009.
2. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2011
3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the fundamental principles of distributed computing. **L2**
- Analyze the performance of Cloud Computing. **L3**
- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing **L4**
- Understand how the distributed computing environments known as Grids can be built from lower level services. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS72C- ADHOC & SENSOR NETWORKS

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives:

- Identify and Distinguish between the notion of Wired and Wireless Networks.
- Analyze the basic concepts for designing a routing Protocol for MANETs.
- Learn the concepts of Security issues for designing a routing protocol for MANETs.
- Learn the Basic concepts of Sensor Networks for Communication in Mobile computing.
- Apply Fundamental principles Characteristics for designing Sensor Networks for Communications

UNIT – I: Introduction

Fundamentals of Wireless Communication Technology -The Electromagnetic Spectrum - Radio propagation Mechanisms - Characteristics of the Wireless channel mobile ad hoc networks (MANETs) - Wireless Sensor Networks (WSNs): concepts and architectures - Applications of Ad Hoc and Sensor Networks - Design Challenges in Ad hoc and Sensor Networks.

Learning Outcomes:

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

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks **L2**
- Describe the MAC protocol issues of ad hoc networks **L3**

UNIT – II: MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

Issues in designing a MAC Protocol - Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks - Design Goals of a MAC Protocol for Ad Hoc Wireless Networks - Classification of MAC Protocols -Contention based protocols - Contention based protocols with Reservation Mechanisms - Contention based protocols with Scheduling Mechanisms - Multi channel MAC - IEEE 802.11.

Learning Outcomes:

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

- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L3**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L3**

UNIT – III: ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS

Routing Protocol: Issues in designing a routing protocol for Ad hoc networks - Classification- proactive routing - reactive routing (on-demand) - hybrid routing - Transport Layer protocol for Ad hoc networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer solutions-TCP over Ad hoc wireless - Network Security - Security in Ad Hoc Wireless Networks - Network Security Requirements.

Learning Outcomes:

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

- Discuss the WSN routing issues by considering QoS measurements **L4**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**

UNIT-IV: WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

Single node architecture: hardware and software components of a sensor node -WSN Network architecture: typical network architectures -data relaying and aggregation strategies -MAC layer protocols: self-organizing - Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

Learning Outcomes:

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

- Describe the MAC protocol issues of ad hoc networks **L5**
- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L5**

UNIT – V: WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing –OLSR - Localization –Indoor and Sensor Network Localization - absolute and relative localization - triangulation - QOS in WSN - Energy Efficient Design – Synchronization.

Learning Outcomes:

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

- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**
- Discuss the WSN routing issues by considering QoS measurements **L5**

Text Books:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2. Labiod. H, "Wireless Adhoc and Sensor Networks", Wiley, 2008

Reference Books:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2nd edition, 2011.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication

Course Outcomes:

At the end of this Course the student will be able to

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks **L2**
- Describe the MAC protocol issues of ad hoc networks **L3**
- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L4**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**
- Discuss the WSN routing issues by considering QoS measurements **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS73A- BLOCK CHAIN TECHNOLOGIES

(Professional Elective-V)

L	T	P	C
3	0	0	3

Course Objectives:

- To give students the understanding of emerging abstract models for Block chain Technology and to familiarize with the functional/operational aspects of crypto currency eco-system.

UNIT – I: Introduction

Introduction: Types of Multimedia Information, Multimedia Database Applications, and Multimedia Objects: Characteristics, Multimedia Database Management System: Components.

MULTIMEDIA STORAGE AND RETRIEVAL: Multimedia Object Storage, File Retrieval Structures, Disk Scheduling, Server Admission Control, Concluding Remarks.

Learning Outcomes:

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

- Describe the basic concepts and technology used for block chain. **L1**
- Describe the primitives of the distributed computing and cryptography related to block chain. **L1**

UNIT – II: METADATA FOR MULTIMEDIA

Metadata: Classification, Metadata for Text, Metadata for Speech, Metadata for Images, Metadata for Video.

Learning Outcomes:

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

- Illustrate the concepts of Bitcoin and their usage. **L2**
- Implement Ethereum block chain contract **L2**

UNIT – III: MULTIMEDIA DATA ACCESS

Access to Text Data, Access to Speech Data, Access to Image Data, Access to Image Data.

Learning Outcomes:

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

- Apply security features in block chain technologies. **L2**
- Use smart contract in real world applications. **L3**

UNIT-IV: MULTIMEDIA INFORMATION MODELING

MULTIMEDIA INFORMATION MODELING: Object-Oriented Modeling, Temporal Models, Spatial Models, Multimedia Authoring.

QUERYING MULTIMEDIA DATABASES: Query Processing, Query Languages.

Learning Outcomes:

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

- Illustrate the concepts of Bitcoin and their usage. **L3**
- Implement Ethereum block chain contract. **L4**

UNIT – V: MULTIMEDIA COMMUNICATION

MULTIMEDIA COMMUNICATION: Retrieval Schedule Generation, Multimedia Server-Client Interaction, Network Support for Multimedia Communication.

MMDBMS ARCHITECTURE: Distributed MMDBMS Architecture, Implementation Considerations.

Learning Outcomes:

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

- Describe the basic concepts and technology used for block chain. **L4**
- Describe the primitives of the distributed computing and cryptography related to block chain. **L5**

Text Books:

1. **"Multimedia Database Management Systems"** by B. Prabhakaran, Springer Science+Business Media, LLC.

Reference Books:

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.
2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

Course Outcomes:

At the end of this Course the student will be able to

- Describe the basic concepts and technology used for blockchain. **L4**
- Describe the primitives of the distributed computing and cryptography related to blockchain. **L3**
- Illustrate the concepts of Bitcoin and their usage. **L3**
- Implement Ethereum block chain contract. **L2**
- Apply security features in blockchain technologies **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS73B- VIRTUAL REALITY

(Professional Elective-V)

L	T	P	C
3	0	0	3

Course Objectives:

- This course is designed to give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

UNIT – I: Introduction to Virtual Reality

Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.

Learning Outcomes:

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

- Describe the basic concepts of Human Physiology and Perception. **L1**
- Describe the primitives of Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays. **L1**

UNIT – II: Representing the Virtual World

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR.

Learning Outcomes:

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

- Illustrate the concepts of Visual Representation in VR. **L2**
- Implement Aural Representation in VR and Haptic Representation in VR **L2**

UNIT – III: The Geometry of Virtual Worlds &The Physiology of Human Vision

Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.

Learning Outcomes:

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

- Apply Axis-Angle Representations of Rotation. **L2**
- Able to understand the eye movements & implications for VR. **L3**

UNIT-IV: Visual Perception & Rendering

Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates.

Learning Outcomes:

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

- Illustrate the concepts of Perception of Motion. **L3**
- Implement Correcting Optical Distortions. **L4**

UNIT – V: Motion & Tracking

Motion in Real and Virtual Worlds- Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Tracking- Tracking 2D & 3D Orientation, Tracking Position and Orientation, Tracking Attached Bodies

Learning Outcomes:

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

- Describe the basic concepts of Velocities and Accelerations. **L4**
- Describe the Tracking 2D & 3D Orientation. **L5**

Text Books:

1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002.
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.

Reference Books:

1. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
2. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.
3. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005

http://lavalle.pl/vr/book.html

Course Outcomes:

At the end of this Course the student will be able to

- Describe how VR systems work and list the applications of VR. **L4**
- Understand the design and implementation of the hardware that enables VR systems tobe built. **L3**
- Understand the system of human vision and its implication on perception and rendering. **L3**
- Explain the concepts of motion and tracking in VR systems. **L2**
- Describe the importance of interaction and audio in VR systems. **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

MANAGEMENT SCIENCE

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

UNIT – 1

INTRODUCTION TO MANAGEMENT

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

Learning Outcomes:

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

• Understand the concept of management and organization.	**L1**
• Apply the concepts & principles of management in real life industry.	**L2**

UNIT – II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Learning Outcomes:

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

• Understand the core concepts of Management Science and Operations Management.	**L1**
• Evaluate Materials departments & Determine EOQ.	**L2**

UNIT – III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

Learning Outcomes:

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

• Understand the concepts of HRM in Recruitment, Selection, Training & Development.	**L1**

• Apply Managerial and operative Functions.	L2

UNIT – IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

Learning Outcomes:

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

• Understand Mission, Objectives, Goals & strategies for an enterprise.	L1
• Evaluate PERT and CPM Techniques.	L2

UNIT – V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Learning Outcomes:

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

• Analyze CRM, MRP, TQM.	L1
• Understand modern management techniques.	L2

Text Books:

1. **Management Science**,Aryasri: TMH, 2004.
2. **Management** ,Stoner, Freeman, Gilbert, 6th Ed, Pearson Education,New Delhi, 2004.

Reference Books:

1. **Marketing Mangement** , Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.

Course Outcomes:

At the end of this Course the student will be able to

• Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations.	L1
• Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate.	L2
• Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems.	L3
• Emphasizing quantitative analytic skills and an entrepreneurial spirit	L4
• Have an introductory understanding of global entrepreneurship concepts.	L5

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

BUSINESS ENVIRONMENT
(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

UNIT – 1: BUSINESS ENVIRONMENT

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

Learning Outcomes:

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

• Understand the concept of Business environment.	L1
• Explain various types of business environment.	L2

UNIT – II: FISCAL & MONETARY POLICY

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes:

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

• Understand the concept of public revenue and public Expenditure	L1
• Explain the functions of RBI and its role.	L2

UNIT – III: TRADE POLICY

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes:

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

• Understand the role of Indian international trade.	L1
• Analyze causes for Disequilibrium and correction measure.	L2

UNIT – IV: WORLD TRADE ORGANIZATION

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

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

• Understand the Dispute Settlement Mechanism.	L1
• Compare and contrast the Dumping and Anti-dumping Measures.	L2
UNIT – V: MARKETS	
MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Apply the knowledge in future investments.	L1
• Understand the role of SEBI in investor protection.	L2
Text Books:	
1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.	
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.	
Reference Books:	
1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.	
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.	
3. Chari. S. N (2009), International Business, Wiley India.	
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Apply the knowledge of Money markets in future investment.	L1
• Analyze India's Trade Policy.	L2
• Evaluate fiscal and monitory policy.	L3
• Develop a personal synthesis and approach for identifying business opportunities.	L4
• `Understand various types of business environment.	L5

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS70- ADVANCED WEB TECHNOLOGIES

(Skill Oriented Course-V)

L	T	P	C
1	0	2	2

Course Objectives:

- On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies To create fully functional website/web application with MVC architecture.

List of Experiments:

1. Create a simple webpage using HTML.
2. Use frames to Include Images and Videos.
3. Add a Cascading Style sheet for designing the web page.
4. Design a dynamic web page with validation using JavaScript.
5. Design an HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
    a. Factorial of that number
    b. Fibonacci series up to that number
    c. Prime numbers up to that number
    d. Is it palindrome or not
6. Write java script programs to demonstrate
    a. Math Object with at least five methods.
    b. String Object with at least five methods.
    c. Array Object with at least five methods.
    d. Date Object with at least five methods.
7. Write JavaScript programs on Event Handling
    a. Validation of registration form
    b. Open a Window from the current window
    c. Change color of background at each click of button or refresh of a page
    d. Display calendar for the month and year selected from combo box
    e. On Mouse over event

Course Outcomes:

At the end of this Course the student will be able to

- *Students are able to develop a dynamic webpage by the use of java script and DHTML.*
- *Students will be able to write a well formed / valid XML document.*
- *Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.*
- *Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.*
- *Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.*

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. VII-Sem (R20)

MATHEMATICAL MODELING

(Open Elective -III)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order : **9 Hrs**

Mathematical Modeling : Need, Techniques, Classifications and Simple illustrations.

Mathematical modeling Through Ordinary differential equations of First Order :

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

Learning Outcomes:

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

• Learn various mathematical techniques in modeling a problem.	**L2**
• Learn modeling in dynamics through ordinary differential equations of first order.	**L3**

UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

Learning Outcomes:

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

• Develop a modeling of Epidemics through system of ordinary differential equations of first order.	**L4**
• Analyze a modeling in dynamics through systems of ordinary differential equations of first order.	**L3**

UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:

Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

Learning Outcomes:

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

• Evaluate a mathematical modeling of Planetary motion.	**L5**
• Analyze a mathematical modeling of Circular motion and motion of satellites	**L3**

UNIT – IV: Mathematical modeling Through Difference equations :

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in

Probability theory.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Analyze mathematical modeling through difference equations in population dynamics and genetics.	**L4**
• Analyze mathematical modeling through difference equations in probability theory.	**L4**
UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :	
Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Analyze a mathematical modeling through functional equations and integral equations.	**L4**
• Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations	**L4**
Text Books:	
1. J. N. Kapoor. Mathematical Modeling , NEW AGE INTERNATIONAL PUBLISHERS.	
Reference Books:	
1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the basic concepts in mathematical modeling.	**L1**
• Have better insight of the real word problems through mathematical modeling .	**L2**
• Apply various concepts of mathematics in modeling.	**L3**
• Analyze the real word problems through the techniques of modeling.	**L4**
• Evaluate the real word problems through mathematical modeling.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
IV B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS

(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand basics of sensors, actuators and their operating principles.
2. To educate the students on different types of microfabrication techniques for designing and developing sensors.
3. To explain working of various types of electrochemical sensors and actuators.
4. To provide an understanding on characteristic parameters to evaluate sensor performance.

UNIT – 1: Introduction to Sensors and Actuators — 9 Hrs

Content of the Unit – I

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Materials used and their fabrication process: Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching.

Learning Outcomes:

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

- **Classify** different types of Sensors and their characteristics — **L2**
- **Explain** about different fabrication process of Sensors — **L1**
- **Illustrate** Dry and wet etching — **L2**

UNIT – II: Temperature and Mechanical Sensors — 9 Hrs

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo-resistive sensors: Thermistors, Resistance temperature sensors, Silicon resistive sensors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors,strain gauges, Pressure sensors: semiconductor, piezoresistive, capacitive, Variable reluctance pressure (VRP) sensors.

Learning Outcomes:

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

- **Summarize** various types of Temperature sensors — **L2**
- **Explain** basic working principle of different types mechanical sensors — **L1**
- **Summarize** various types of Mechanical sensors — **L2**
- **Explain** the working principle of different types mechanical sensors — **L1**

UNIT – III: Optical, Acoustic and Chemical Sensors — 9 Hrs

Content of the Unit – III

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo-resistors based sensors, Photomultipliers, Infrared sensors: thermal, PIR, thermopiles

Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones.

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working and principle of various optical sensors	**L1**
• **Explain** the working principle of different Acoustic sensors	**L1**
• **Explain** the working and principle of various chemical sensors	**L1**
UNIT – IV: Magnetic, Electromagnetic and Radiation Sensors	**9 Hrs**
Inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto-strictive sensors, **Radiation Sensors**: Principle and working of Ionization detectors, Scintillation detectors, Geiger-Mueller counters, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working principle of different magnetic and electromagnetic sensors	**L1**
• **Explain** the working principle of different radiation sensors	**L1**
• **Identifies** the applications Electronic sensors in various fields	**L1**
• **Identify** the various optical, solid state system components	**L1**
UNIT – V: Actuators Types, Principle, Magnetic, Electromagnetic actuators	**9 Hrs**
Introduction, Functional diagram of actuators, Types of actuators and their basic principle of working: Hydraulic, Pneumatic, Mechanical, Electrical, Magnetic, Electromagnetic, piezo-electric and piezo-resistive actuators, Simple applications of Actuators. Motors as actuators (linear, rotational, stepping motors),Magneto-strictive actuators, Voice coil actuators (speakers and speaker-like actuators).	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Illustrates** the different types of Actuators	**L2**
• **Explains** the basic principle of working of Actuators	**L1**
• **Identifies** the applications of Actuators sensors	**L1**
Text Books:	
1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015	
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999	
Reference Books:	
1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003	
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999	
3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley.	
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.	
5. Principles of Industrial Instrumentation By D. Patranabhis	
Course Outcomes:	
At the end of this Course the student will be able to	
➢ to identify the needs of sensors and actuators	**L1**
➢ to understand working principles of various sensors and actuators	**L2**
➢ to identify different type of sensors and actuators used in real life applications	**L1**
➢ to explore common methods for converting a physical parameter into an electrical quantity	**L3**
➢ to summaries use of sensors and actuators for different applications	**L2**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech – IV-I-Sem	L	T	P	C
	3	0	0	3

Chemistry of Nanomaterials and applications (OE.3)
(common to all branches)

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- Characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT-I: **Introduction to nanoscience**	7 Hrs

Introduction,importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties and scope of nanoscience and applicationsof nanotechnology.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the nanostructure materials(L2)
- Describe scope of nano science and technology(L2)
- Explain different synthetic methods of nano materials(L2)
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material(L3)

UNIT-II: **Synthesis of nanomaterials**	8Hrs

Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.
Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis,laser ablation, chemical vapour deposition method, electrodeposition method, and high energy ball milling

Learning Outcomes:
At the end of this unit, the student will be able to:

- Describe the top down approach(L2)
- Explain aerosol synthesis and plasma arc technique(L2)
- Differentiate chemical vapour deposition method and electrodeposition method(L2)
- Discuss about high energy ball milling(L3)

UNIT-III: Characterization of nanomaterials	7 Hrs

Techniques for characterization:Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques, BET method for surface area analysis.

Learning Outcomes:
After completing the course, the student will be able to:

- Discuss different technique for characterization of nanomaterial(L3)

- Explain electron microscopy techniques for characterization of nanomaterial(L3)
- Describe BET method for surface area analysis (L2)
- Apply different spectroscopic techniques for characterization(L3)

UNIT-IV: Structural studies of nanomaterials	8 Hrs

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

Learning Outcomes:

After completing the course, the student will be able to:

- Explain synthesis and properties and applications of nanaomaterials(L2)
- Discuss about fullerenes and carbon nanotubes(L3)
- Differentiate nanomagnetic materials and thermoelectric materials(L2)
- Describe liquid crystals(L2)

UNIT-V: **Applications of Nanomaterials**	7Hrs

Engineering, medicine. aerospace applications of nanomaterials. Technologies based on nano materials.

Learning Outcomes:

After completing the course, the student will be able to:

- Illustrate applications of nanaomaterials(L2)
- Discuss the magnetic applications of nanomaterials(L3)
- List the applications of non-linear optical materials(L1)
- Describe the applications fullerenes, carbon nanotubes(L2)

Text Books:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012

Reference Books:

1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications:, Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials(L1)
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry(L2)
- Analyze nanoscale structure in metals, polymers and ceramics(L3)
- Analyze structure-property relationship in coarser scale structures(L3)

- Understand structures of carbon nano tubes(L1)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE75A- DISASTER MANAGEMENT AND MITIGATION

(OPEN ELECTIVE-III)

L	T	P	C
3	0	0	3

Course Objectives:

- The objectives of this are to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types ofhazardas.

UNIT-I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT-II:

Classification of hazards & Disasters: Natural hazards and Disasters - Man Made hazards & Disasters - Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

UNIT-III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT-IV:

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation-Biological hazards/ disasters:- Population Explosion.

UNIT-V:

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage(preparedness)-HVRA Atlas
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text Books:

1. Disaster Management by Rajib Shah, Universities Press, India,2003
2. Disaster Mitigation: Experiences And Reflections by PardeepSahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning
4. National Disaster Management Authority-Guidelines

Reference Books:

1. Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994
5. Dr.Satender,Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003

Course Outcomes:

At the end of this Course the student will be able to

- Understand the nature, cause and effects of disasters
- Comprehend the importance of Disaster Management and the need of awareness
- Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions

Annexure-III *R20*

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

IOT APPLICATIONS IN ELECTRICAL ENGINEERING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT – I: SENSORS **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

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

- To know about basic principles of sensors and their classification **L1**
- To learn about various motion less sensors **L2**

UNIT – II: Occupancy and Motion detectors **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

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

- To know about Capacitive occupancy **L1**
- To understand about Motion detectors **L2**

UNIT – III: MEMS **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

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

- To understand about the basic concept of MEMS **L1**
- To know about electrostatic actuation **L2**

UNIT – IV: IOT FOR SMART GRID **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

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

- To get exposure fundamental applications of IoT to Smart grid **L1**
- To learn about driving factors of IoT in Generation level **L2**

UNIT – V: IOE - Internet of Energy **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

Learning Outcomes:

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

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

Text Books:

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

Reference Books:

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

Course Outcomes:

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME75a-INTRODUCTION TO COMPOSITE MATERIALS

(Open Elective-III)

L	T	P	C
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Course Objectives: The objectives of the course are to make the students learn about

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – I: Introduction to composites: **10 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

Learning Outcomes:

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

- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials. **L2**

UNIT – II: Polymer matrix composites **8 Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup processes – spray up processes – resin transfer moulding – Pultrusion – Filament winding – Auto clave - Injection moulding – sheet moulding compound – properties and applications of PMCs.

Learning Outcomes:

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

- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites. **L2**
- Discuss the auto clave based methods. **L6**

UNIT – III: Metal matrix composites: **8 Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMCs.

Learning Outcomes:

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

- Outline the various types of metal matrix composite. **L2**
- Explain liquid state processes and solid state processes in MMCs preparation. **L2**
- Demonstrate In-situ processes. **L2**
- Identify the properties and applications of MMCs. **L2**

UNIT – IV: Ceramic matrix composites: **8 Hrs**

Ceramic matrix materials – properties – processing of CMCs –Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – solgel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

Learning Outcomes:

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

- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process. **L3**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L2**

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UNIT – V: Advances & Applications of composites: **8 Hrs**

Advantages and Limitations of carbon matrix composites – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications. Bio degradability - introduction to bio composites, classification, processing and, applications of bio composites - Mechanical, Biomedical, automobile Engineering.

Learning Outcomes:

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

- Explain the advantages and disadvantages of carbon matrix. **L2**
- Identify composites for aerospace applications. **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform. **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites. **L3**

Text Books:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong , Fundamentals of Composite Manufacturing, SME Publications, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bio plastics & Bio composites for Engineering applications, John Wiley publications, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/112104229
- https://nptel.ac.in/courses/112104168
- https://nptel.ac.in/courses/101104010
- https://nptel.ac.in/courses/105108124
- https://nptel.ac.in/courses/112104221

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME75b-CUSTOMER RELATIONSHIP MANAGEMENT

(Open Elective-III)

L	T	P	C
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Course Objectives: The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

UNIT – I: CRM concepts **10 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

Learning Outcomes:

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

- Explain the concepts of customer relationship management. **L2**
- Define customer relationship management (CRM). **L1**
- Illustrate the service level agreements (SLAs). **L2**

UNIT – II: CRM in Marketing : **8 Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Learning Outcomes:

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

- Explain the concept of one-to-one relationship marketing. **L2**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service. **L2**

UNIT – III: Sales Force Automation **8 Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM). - Case studies.

Learning Outcomes:

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

- Explain the concept of CRM links in e-Business. **L1**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**

UNIT – IV: Analytical CRM **8 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

Learning Outcomes:

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

- Explain how to manage and sharing the customer data. **L2**

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- List the various ethics and legalities of customer database use. **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA). **L6**

UNIT – V: CRM Implementation **8 Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

Learning Outcomes:

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

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

Text Books:

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

Reference Books:

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Relationship Management.
3. V. Kumar & Werner J., Customer Relationship Management, Willey India, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discuss about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/110105145
- https://onlinecourses.swayam2.ac.in/imb19_mg10/preview
- https://www.classcentral.com/course/swayam-customer-relationship-management-13977
- https://www.edx.org/course/customer-relationship-management

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC75a- FUNDAMENTALSTO IMAGE PROCESSING

(Open Elective-III)

L – T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the fundamentals of Image Processing and learn the different types of image transforms.
- To study different types of filtering techniques for image enhancement.
- To understand various types of image segmentation and thresholding techniques.
- To gain knowledge on wavelets and multi resolution image processing techniques.
- To comprehend various types of image compression and colour image processing methods.

UNIT I

Digital Image Fundamentals: Fundamental steps of digital image processing, Components of Digital Image processing, image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures. Applications of Digital Image Processing.

Image Transforms: Fourier Transform and its properties in one dimensional and Two dimensional, Discrete Fourier Transform, Discrete Cosine Transform, Discrete Sine transform, Walsh transform, Hadamard transform, Slant transform, KL Transforms and its properties.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the fundamentals of digital image processing.(L2)
- Analyze the image transforms in one and two dimensions.(L4)

UNIT II

Image Enhancements and Filtering: Gray level transformations, Histogram processing, histogram equalization, Enhancement of Frequency domain, Homomorphic filtering, Filtering in the frequency domain. Image Restoration: A Model of the Image Degradation \ Restoration Process, Noise Models, Inverse filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained least squares filtering.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze the filters in spatial and frequency domains. (L4)
- Understand the image restoration model and various types of noises in image restoration.(L2)

UNIT III

Image Segmentation: Detection of Discontinuities: Point detection, Line detection, Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the concept of image segmentation.(L1)
- Analyze various types of thresholding techniques.(L4)

UNIT IV

Wavelets and Multi-resolution image processing: Back ground, Image Pyramids, Sub band coding, The HaarTransform.Multi resolution Expansions: Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transform in One dimension: The wavelet series expansions, The Discrete wavelet transform, The Continuous Wavelet Transform, The Fast wavelet Transform, Wavelet transform in two dimensions, Wavelet Packets.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the wavelets in one dimension and two dimensions.(L2)
- Explain the multi-resolution expansions and fast wavelet transform.(L1)

UNIT V:

Image Compression: Redundancy, coding, inter-pixel and psycho-visual: Loss less compression Huffmann coding, predictive coding: Lossy Image compression- predictive and transform coding: Image compression standards.

Color Image Processing: Color Fundamentals, Color models–RGB, CMY, HSI; Pseudo color Image Processing, Basics of Full color Image Processing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the need for image compression and its types.(L2)
- Learn the color image processing and various types of color models. (L1)

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Second Edition, Pearson Education, 2008.
2. Anil Kumar Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2nd edition 2004.

REFERENCES:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

Course outcomes:

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

- Understand the fundamentals of Image Processing and apply different types of image transforms. (L2)
- Correlate different types of filtering techniques for image enhancement. (L4)
- Understand various types of image segmentation and thresholding techniques.(L2)
- Gain knowledge on wavelets and multi resolution image processing techniques.(L1)
- Summarize different types of image compression and colour image processing methods.(L2)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC75b- BASICS OF VLSI DESIGN

(Open Elective-III)

L – T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

UNIT I

MOS Technology: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

Basic Electrical Properties of MOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different steps involved in the fabrication of ICs and electrical properties of MOSdevices.(L2).
- Analyze the operation of NMOS, CMOS and BiCMOS inverters.(L4)

UNIT II

MOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know the VLSI design flow and stick diagrams.(L1)
- Understand the design rules in drawing the layout of any logic circuit.(L2)

UNIT III

Basic Circuit Concepts: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different types of logics in gate level design.(L2)
- Learn and compare different performance parameters in gate level design.(L1)

UNIT IV

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

Sub System Design and Layout: Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, grey to binary code converter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Appreciate the importance, models and limitations of scaling.(L1)
- Explain the building blocks of data path of any system using gates.(L1)

UNIT V

Programmable Logic Devices: Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain different programmable logic devices.(L1)
- Compare the performance parameters and applications of different programmable logic devices.(L2)

TEXTBOOKS:

1. Kamran Eshraghian. Douglas, A. Pucknell and SholehEshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David HarrisandAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

REFERENCES:

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chandand Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

Course Outcomes:

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

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. (L2)
- Know the design rules in drawing the layout of any logic circuit.(L1)
- Compare different types of logic gates using CMOS inverter and their transfer characteristics.(L2)
- Learn the concepts to design building blocks of data path of any system using gates.(L1)
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits.(L1)

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS75A- APPLICATIONAS OF AI

(Open Elective-III)

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3	0	0	3

Course Objectives:

- Define Artificial Intelligence and establish the cultural background for study Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

UNIT – I: Introduction

What is AI, Foundations of AI, History of AI, The State of Art. Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:

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

- Recognize the importance of Artificial Intelligence **L1**
- Identify how intelligent agent is related to its environment **L2**

UNIT – II: Solving Problems by searching:

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

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

- Explain how an agent can formulate an appropriate view of the problem it faces. **L2**
- Solve the problems by systematically generating new states **L2**

UNIT – III: Reinforcement Learning:

Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction..

Learning Outcomes:

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

- Examine how an agent can learn from success and failure, reward and punishment. **L5**
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. **L6**

UNIT-IV: Natural Language for Communication

Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

Learning Outcomes:

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

- Develop programs that translate from one language to another, or recognize spoken words. **L6**
- Explain the techniques that provide robust object recognition in restricted context. **L2**

UNIT – V: Robotics:

Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right

direction, What if AI does succeed.

Learning Outcomes:

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

- Explain the role of Robot in various applications.
- List the main philosophical issues in AI.

Text Books:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

Course Outcomes:

At the end of this Course the student will be able to

- Apply searching techniques for solving a problem **L3**
- Design Intelligent Agents **L6**
- Develop Natural Language Interface for Machines **L6**
- Design mini robots **L6**
- Summarize past, present and future of Artificial Intelligence **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS75B- MOBILE APPLICATION DEVELOPMENT

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

UNIT – I:

Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

Learning Outcomes:

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

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

UNIT – II:

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

Learning Outcomes:

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

- demonstrate their ability to develop software with reasonable complexity on mobile platform **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

UNIT – III:

Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Learning Outcomes:

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

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

UNIT-IV:

Displaying pictures and menus with views and Data Persistence: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

Learning Outcomes:

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

- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

UNIT – V:

Content Providers: Sharing data in android, using a content provider, creating your own content providers.

Messaging and Networking: SMS Messaging, Sending E-Mail, Networking

Location-Based Services: Displaying Maps, Getting Location Data.

Learning Outcomes:

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

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

Text Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

Course Outcomes:

At the end of this Course the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L3**
- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Network Security and cyber Laws

(Honor-Network Security)

L	T	P	C
3	1	0	4

Course Objectives:

- Explain the concepts of Cyber security
- Illustrate key management issues and solutions.
- Familiarize with Cryptography and very essential algorithms
- Introduce cyber Law and ethics to be followed.

UNIT – 1: Introduction **9 Hrs**

Cyber Attacks, Defense Strategies and Techniques, Guiding Principles, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Secret Key Cryptography – Product Ciphers, DES Construction .

Learning Outcomes:

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

Able to understand the Guiding Principles. **L1**

Able to understand the Elementary Transport Ciphers. **L2**

UNIT – II: Introducing RSA

Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack..

Learning Outcomes:

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

Able to understand the Public Key Cryptography Standard (PKCS). **L3**

Able to understand the Cryptographic Hash. **L4**

UNIT – III: Digital Certificates

Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity–based Encryption, Authentication–I - One way Authentication, Mutual Authentication, Dictionary Attacks.

Learning Outcomes:

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

- Able to understand the One way Authentication. **L4**
- Able to understand the Dictionary Attacks. **L5**

UNIT – IV: Authentication:

Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Instruction Detection Systems, DDoS Attacks Prevention/Detection.

Learning Outcomes:

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

- Able to understand the DDoS Attacks Prevention/Detection. **L5**
- Able to understand the Prevention Versus Detection. **L5**

UNIT – V: IT act aim and objectives

IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures.

Learning Outcomes:

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

Able to understand the IT act aim and objectives. **L5**

Able to understand the Secure electronic records and secure digital signatures. **L6**

Text Books:

1. Cryptography, Network Security and Cyber Laws – Ber nard Menezes, Cengage Learning, 2010 edition (Chapters1,3,4,5,6,7,8,9,10,11,12,13,14,15,19(19.1-19.5),21(21.1-21.2),22(22.1-22.4),25.
1. Programming with Java, E. Balagurusamy.

Reference Books:

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2015.
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition
3. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint , 2013
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning.

Course Outcomes:

At the end of this Course the student will be able to

describe the hardware, software, and services that comprise an enterprise network, and be able to articulate how these components integrate to form a network solution. **L1**

build multiple host and network architectures, given business requirements and constraints; student will configure operating systems, network specific services, routing, switching, and remote access solutions. **L2**

describe the components of a computer, their role and function, and discuss how cpu, memory, storage, and network resources are leveraged by systems software; articulate the various forms of virtualization. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Social Networking

L	T	P	C
3	1	0	4

Course Objectives:

. Understand social media fundamentals

- Understand basic social media etiquette
- Create a social media campaign
- Publish social media updates and engage with a community
- 5. Apply social media best practices to enhance their personal brand

UNIT – I: Social Networking:

Definition, Overview of Social Networking Sites, **Types of Social Networking Sites:** General purpose, Niche Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features And Need of Social Networking, Security Issues with Social Networking Sites,

.

Learning Outcomes:

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

Describe the basic concepts of **Social Networking**. **L1**

UNIT – II: Enterprise Content Management

ECM Introduction, Definition, Process, Types of Content, Examples Content Management System(CMS) Overview and examples, **Electronic Document Management(EDM)** : introduction, Need,

Learning Outcomes:

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

Illustrate the concepts of **Enterprise Content Management**. **L2**

UNIT – III: e-Learning

Definition, Introduction, Types of e-Learning: 1.Learner-led eLearning 2.facilitated e-Learning 3.Instructor-led e-Learning 4. Embedded e-Learning Telemonitoring And e-Coaching **e-Learning Models:** 1. WBT 2.CBT 3.LMS 4.LCMS 5.Virtual School Systems **e-Learning Tools And Technologies:**EMail,Online Discussion, Chat and Instant Messaging,Voting,Whiteboard, Application Sharing,Conferencing, Online Meeting Tools Standards for e-Learning Case Study .

Learning Outcomes:

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

Apply security features **e-Learning**. **L2**

Use smart contract in **e-Learning Tools And Technologies**. **L3**

UNIT – IV: Popular social medias

Facebook , Twitter , LinkedIN

Learning Outcomes:

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

Illustrate the concepts of Facebook , Twitter , LinkedIN **L3**

UNIT – V: e/m-Commerce:

e-Commerce definition, Models of eCommerce, **Electronic Payment Systems**: Credit/Debit Cards, Smart Cards, Paypal, e-Billing,eMicropayments **Point Of Sales System(POS):** Meaning, Uses **m-Commerce**: Overview of mobileCommerce, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Security issues, Mobile ATM(ICICI Bank Case Study) **Applications of m-Commerce:** 1.Mobile Financial Applications, m-wallet 2.Mobile Shopping 3.Advertising And Content provision Case-Study 10 20 3,4.

Learning Outcomes:
At the end of this unit, the student will be able to
Describe the basic concepts of **e/m-Commerce.** **L4**

To know about the **Applications of m-Commerce.** **L5**

Text Books:

- E-Learning Tools and Technologies William Hortan, Katherine Hortan,Wiley Pub.
- Cloud Computing Bible Barrie Sosinsky,Wiley India pub
- E-Commerce C.S.V. Murthy,Himalaya Pub.
- E-World (Excel Publications) Arpita Gopal and Chandrani Singh
- Electronic Commerce A Managerial Perspective Efraim Turban, Pearson Pub.

Reference Books:

- Decision Support Systems and Intelligent Systems Efraim Turban, Jay Aronson, Pearson,7th Ed .
- Cloud computing Michael Miller, Pearson Pub. 8. Internet (Use of Search Engines Google & yahoo etc).

Course Outcomes:
At the end of this Course the student will be able to

- Drive traffic to their blog using social media **L4**
- Create a content calendar **L3**
- Understand social media advertising **L3**
- Measure site traffic using Google Analytics **L2**
- Create and follow a social media policy **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

STORAGE AREA NETWORKS

L	T	P	C
3	1	0	4

Course Objectives:

- Evaluate storage architectures,
- Define backup, recovery, disaster recovery, business continuity, and replication
- Examine emerging technologies including IP-SAN
- Understand logical and physical components of a storage infrastructure
- Identify components of managing and monitoring the data center
- Define information security and identify different storage virtualization technologies

UNIT – I: Storage System

Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing. Data Center Environment: Application, Host (Compute), Connectivity, Storage.

Learning Outcomes:

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

Describe the basic concepts of storage. **L1**

Describe the primitives of the cloud computing. **L1**

UNIT – II: Data Protection:

Data Protection: RAID: RAID Implementation Methods, RAID Techniques, RAID Levels, RAID Impact on Disk Performance. Intelligent Storage Systems: Components of Intelligent Storage System, Storage Provisioning.

Learning Outcomes:

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

Illustrate the concepts of RAID techniques. **L2**

Implement The storage systems. **L2**

UNIT – III: Storage Networking Technologies

Fibre Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fibre Channel Architecture, Zoning, FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP, FCoE.

Learning Outcomes:

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

Apply security features Fibre Channel Storage Area Networks. **L2**

Use smart contract in FCIP. **L3**

UNIT – IV: Network Attached Storage

Network Attached Storage: Components of NAS, NAS I/O Operation, NAS File-Sharing Protocols, File-Level Virtualization, Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage, Unified Storage.

Learning Outcomes:
At the end of this unit, the student will be able to
Illustrate the concepts of NAS, NAS I/O Operation. **L3**
Describe the Unified Storage. **L4**

UNIT – V: Securing and Managing Storage Infrastructure
Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments.

Learning Outcomes:
At the end of this unit, the student will be able to
Describe the basic concepts of Information Security Framework. **L4**

To know about the Cloud Environments. **L5**

Text Books:
1. EMC Education Services, Information Storage and Management, Wiley India Publications, 2009. ISBN: 9781118094839

Reference Books:
1.. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN : 9780321262516 Reference Books: NIL.

Course Outcomes:
At the end of this Course the student will be able to
- Identify key challenges in managing information and analyze different storage networking technologies and virtualization **L4**
- Explain components and the implementation of NAS **L3**
- Describe CAS architecture and types of archives and forms of virtualization **L3**
- Ilustrate the storage infrastructure and management activities **L2**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

High Performance Computing

L	T	P	C
3	1	0	4

Course Objectives:

- To Study various computing technology architecture.
- To know Emerging trends in computing technology.
- To highlight the advantage of deploying computing technology.

UNIT – I: Cluster Computing

Introduction to Cluster Computing, Scalable Parallel Computer Architectures, Cluster Computer and its Architecture, Classifications, Components for Clusters, Cluster Middleware and Single System Image, Resource Management and Scheduling, Programming Environments and Tools, Applications.

Learning Outcomes:

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

Describe the basic concepts of Cluster Computing. **L1**

Describe the Applications. **L1**

UNIT – II: Load Sharing and Balancing

Evolution, Job and Resource Management Systems, State-of-the-Art in RMS and Job, Rigid Jobs with Process Migration, Communication-Based Scheduling, Batch Scheduling, Fault Tolerance, Scheduling Problem for Network Computing.

Learning Outcomes:

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

Illustrate the concepts of Fault Tolerance. **L2**

Implement The Job and Resource Management Systems. **L2**

UNIT – III: Grid Computing

Introduction to Grid Computing, Virtual Organizations, Architecture, Applications, Computational, Data, Desktop and Enterprise Grids, Data-intensive Applications, High-Performance Commodity Computing, High-Performance Schedulers, Grid Middleware: Connectivity, Resource and Collective Layer, Globus Toolkit.

Learning Outcomes:

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

Apply security features Virtual Organizations. **L2**

Use smart contract in Grid Middleware. **L3**

UNIT – IV: Cloud Computing

Introduction to Cloud Computing, Types: Deployment and Service Models, Characteristics, Applications, Service-Level Agreement, Virtualization, High-Throughput Computing: Task Computing and Task-based Application Models, Market-Based Management of Clouds, Energy-Efficient and Green Cloud Computing Architecture, Resource Allocation.

Learning Outcomes:
At the end of this unit, the student will be able to
Illustrate the concepts of Service-Level Agreement. **L3**
Implement Market-Based Managementof Clouds. **L4**

UNIT – V: Task Scheduling
, CLS and CMMS, Workflow Scheduling, Montage, Epigenomics, SIPHT, LIGO, CyberShake, Task Consolidation, Introduction to CloudSim, Cloudlet, Virtual Machine and its Provisioning, Time and Space-shared Provisioning.

Learning Outcomes:
At the end of this unit, the student will be able to
Describe the basic concepts of Cloudlet. **L4**

To know about the Virtual Machine and its Provisioning. **L5**

Text Books:

1. R. Buyya, High Performance Cluster Computing: Architectures and Systems, Volume 1, Pearson Education, 2008.
2. (Edited By) I. Foster and C. Kesselman, The Grid: Blueprint for a New Computing Infrastructure, Morgan Kaufmann, Elsevier, 2004.
3. D. Janakiram, Grid Computing, Tata McGraw-Hill, 2005.
4. R. Buyya, C. Vecchiola and S. T. Selvi, Mastering Cloud Computing Foundations and Applications Programming, Morgan Kaufmann, Elsevier, 2013.

Reference Books:

1. A. Chakrabarti, Grid Computing Security, Springer, 2007.
2. B. Wilkinson, Grid Computing: Techniques and Applications, CRC Press, 2009.
3. C. S. R. Prabhu, Grid and Cluster Computing, PHI, 2008.
4. B. Sosinsky, Cloud Computing Bible, Wiley, 2011.

Course Outcomes:
At the end of this Course the student will be able to
Describe the basic concepts of Cloudlet. **L4**
To know about the Secure electronic. **L3**

To know about the Virtual Machine and its Provisioning. **L3**

Implement Market-Based Managementof Clouds. **L2**

III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

User Interface Design

(Minor-Web Development)

L	T	P	C
3	1	0	4

Course Objectives:

To explain different interaction style and their use.

To explain when to use graphical and textual information presentation

To explain the practical activities in the user interface design process

UNIT – 1: The User Interface **9 Hrs**

The User Interface-Introduction, Overview, The importance of user interface – Defining the user interface, The importance of Good design, Characteristics of graphical and web user interfaces, Principles of user interface design.

Learning Outcomes:

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

Able to understand the Characteristics of graphical and web user interfaces. **L1**

Able to understand The importance of Good design. **L2**

UNIT – II: The User Interface Design process

The User Interface Design process- Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Business functions-Business definition and requirement analysis, Basic business functions, Design standards.

Learning Outcomes:

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

Able to understand the Human characteristics in Design. **L3**

Able to understand the Business functions-Business definition and requirement analysis. **L4**

UNIT – III: System menus and navigation schemes:

System menus and navigation schemes- Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus.

Learning Outcomes:

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

- Able to understand the Phrasing the menu. **L4**
- Able to understand the Navigating menus. **L5**

UNIT – IV: Windows:

Windows - Characteristics, Components of window, Window presentation styles, Types of window, Window management, Organizing window functions, Window operations, Web systems, Characteristics of device based controls.

Learning Outcomes:

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

- Able to understand the Organizing window functions. **L5**
- Able to understand the Window operations. **L5**

UNIT – V: Screen based controls

Screen based controls- Operable control, Text control, Selection control, Custom control, Presentation control, Windows Tests-prototypes, kinds of tests.

Learning Outcomes:

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

Able to understand the Selection control. **L5**

Able to understand the Windows Tests-prototypes. **L6**

Text Books:

1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", John Wiley & Sons, Second Edition 2002.

Reference Books:

1. Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.

2. Alan Cooper, "The Essential of User Interface Design", Wiley- Dream Tech Ltd.,2002.

Course Outcomes:

At the end of this Course the student will be able to

- Design the User Interface, design, menu creation ,windows creation and connection between menus and windows. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Advanced Java Script(Minor-Degree)

L	T	P	C
3	1	0	4

Course Objectives:

- Understand the JavaScript language & the Document Object Model.
- Alter, show, hide and move objects on a web page.
- Check information inputted into a form.
- Javascript allows programming to be performed without server interaction.
- Javascript can respond to events, such as button clicks.
- Javascript can validate data before sending out a request.

UNIT – I: Introduction to JavaScript:

Core JavaScript, Client-Side JavaScript, Lexical Structure: Character Set, Comments, Literals, Identifiers and Reserved Words, Optional Semicolons, Types, Values, and Variables: Numbers, Text, Boolean Values, null and undefined, The Global Object, Wrapper Objects, Type Conversions, Variable Declaration, Variable Scope.

Learning Outcomes:

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

- Describe a Type Conversions. **L1**
- Design and motivate Wrapper Objects **L1**

UNIT – II: Expressions and Operators:

Primary Expressions, Object and Array Initializers, Function Definition Expressions, Property Access Expressions, Invocation Expressions, Object Creation Expressions, Operator Overview, Arithmetic Expressions, Relational Expressions, Logical Expressions, Assignment Expressions, Evaluation Expressions, Miscellaneous Operators.

Learning Outcomes:

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

- Able to understand the Object Creation Expressions. **L2**
- Able to understand the Assignment Expressions. **L2**

UNIT – III: Statements

Expression Statements, Compound and Empty Statements, Declaration Statements, Conditionals, Loops, Jumps, Miscellaneous Statements, Objects: Creating Objects, Querying and Setting Properties, Deleting Properties, Testing Properties, Enumerating Properties.

Learning Outcomes:

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

- Describe a Compound and Empty Statements. **L2**
- Describe a Testing Properties. **L3**

UNIT – IV: Objects & Arrays

Creating Objects, Querying and Setting Properties, Deleting Properties, Testing Properties, Enumerating Properties, Creating Arrays, Reading and Writing Array Elements, Sparse Arrays, Array Length, Adding and Deleting Array Elements, Iterating Arrays.

Learning Outcomes:
At the end of this unit, the student will be able to

- Describe a Deleting Properties, Testing Properties. **L3**
- Describe a Iterating Arrays. **L4**

UNIT – V: Functions:

Defining Functions, Invoking Functions, Function Arguments and Parameters, Functions As Values, Functions As Namespaces, Closures, Function Properties, Methods, and Constructor, Functional Programming.

Learning Outcomes:
At the end of this unit, the student will be able to

- Use well-understood paradigms for Function Arguments and Parameters. **L4**
- Identify and assess the quality attributes of a Functional Programming. **L5**

Text Books:

1. JAVA SCRIPT,6th edition,David Flanagan,O'REILY.

Course Outcomes:

At the end of this Course the student will be able to

Create SVG Graphics. • **L4**

Create CSS stylesheets. **L3**

Lay out HTML elements using CSS margin and padding. **L3**

Implement program logic using JavaScript. **L2**

Implement HTML5 APIs using JavaScript. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Advanced Web Technologies(Minor-Degree)

L	T	P	C
3	1	0	4

Course Objectives:

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

UNIT – I: XML and Ajax:

XML – Declaration, Root Element, Child Elements, Element Attributes, Entity References, Comments, Ajax – XML HttpRequest Object, Sending Ajax requests, Handling Ajax Responses, Adding Ajax Functionality in JavaScript, Adding Ajax Functionality to a Web Page

Learning Outcomes:

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

- Argue the importance and role of Root Element, Child Elements. **L1**
- Design and motivate Handling Ajax Responses. **L1**

UNIT – II: Installation:

Apache & MySQL: Software Prerequisites, Installing Apache and PHP, Starting and Testing Apache, Testing PHP with phpinfo(), Installing MySQL, Starting and Testing MySQL, 125-145 Installing the php-mysql Module, Checking the php-mysql Module.

Learning Outcomes:

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

- Design and motivate Installing Apache and PHP, Starting and Testing Apache. **L2**
- Recognize major Starting and Testing MySQL, 125-145 Installing the php-mysql Module. **L2**

UNIT – III: PHP:

Hypertext Preprocessor: Getting Started with PHP - Basic PHP Syntax, Data Types, Variables, Constants, Operators, Control Structures, Functions, Connecting to MySQL using PHP, Building a Web Page using PHP.

Learning Outcomes:

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

- Recognize major Getting Started with PHP - Basic PHP Syntax. **L2**
- Describe a Connecting to MySQL using PHP. **L3**

UNIT – IV: Web Application Creation:

Creating a Web Application – putting it all together, The MVC Design Pattern – Basic Web Architecture, MVC Architecture, Coding Considerations, Setting up our Development Environment, Building our MVC Framework, Building a PHP Application on our MVC framework.

Learning Outcomes:

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

- Describe a Coding Considerations **L3**
- Generate a PHP Application on our MVC framework. **L4**

UNIT – V: HTML 5:
Introduction, Common Infrastructure, Semantics, structure, and APIs of HTML documents, Elements, links, Tabular data, Forms & Script elements, Web Application APIs, The XHTML syntax, User Interaction & Loading web pages.

Learning Outcomes:
At the end of this unit, the student will be able to

- Able to understand the Common Infrastructure. **L4**
- Identify and assess the quality attributes of a Web Application APIs. **L5**

Text Books:
1. Advanced web technologies Vardhman Mahaveer Open University, Kota.

Course Outcomes:

At the end of this Course the student will be able to

- Students are able to develop a dynamic webpage by the use of java script and DHTML. **L4**
- Students will be able to write a well formed / valid XML document. **L3**
- Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table **L3**
- Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database. **L2**
- Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

MongoDB(Minor-Degree)

L	T	P	C
3	1	0	4

Course Objectives:

- This course elucidates concepts related to Mongodb. The students will get hands- on experience in working with NoSQL and Mongodb.

UNIT – I: MongoDB Overview

Database, Collection, Document, Sample document, MongoDB Advantages, Advantages of MongoDB over RDBMS, Why should use MongoDB, Where should use MongoDB?, MongoDB Environment, Install MongoDB On Windows,Install MongoDB on Ubuntu.

Learning Outcomes:

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

- Argue the importance and role of MongoDB. **L1**
- Design and motivate MongoDB Environment. **L1**

UNIT – II: MongoDB DataBase

MongoDB Create Database, MongoDB Drop Database MongoDB Drop Database, The dropDatabase () Method, MongoDB Create Collection, The createCollection() Method, MongoDB Drop Collection, The drop() Method.

Learning Outcomes:

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

- Design and motivate MongoDB Create Collection. **L2**
- Recognize major MongoDB Create Collection. **L2**

UNIT – III: MongoDB Datatypes

Data types, MongoDB - Insert Document, MongoDB - Query Document, The find() Method, The pretty() Method, RDBMS Where Clause Equivalents in MongoDB, AND in MongoDB, OR in MongoDB, Using AND and OR together, MongoDB Update() method, MongoDB Save() Method. MongoDB Delete Document, Remove only one, Remove All documents.

Learning Outcomes:

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

- Recognize major The find() Method. **L2**
- Describe a MongoDB Update() method. **L3**

UNIT – IV: Implementation and Deployment

MongoDB Limit Records, MongoDB Skip() Method, MongoDB Sort Documents, MongoDB Indexing, MongoDB Aggregation, Pipeline Concept, MongoDB Replication, How replication works in MongoDB, Replica set features, Set up a replica set, Add members to replica set.

Learning Outcomes:

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

- Describe a Pipeline Concept. **L3**
- Generate Set up a replica set. **L4**

UNIT – V: Applied Architectures and Styles

MongoDB Sharding, Sharding in MongoDB, MongoDB Create Backup, Dump MongoDB Data, MongoDB Deployment, mongostat, mongotop, MongoDB Java, Installation, Connect to database, Create a collection,, Getting/ selecting a collection, Insert a document, Retrieve all documents.

Learning Outcomes:

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

- Use well-understood paradigms for MongoDB Java. **L4**
- Identify and assess the quality attributes of a Connect to database. **L5**

Text Books:

1. http://mdslab.unime.it/sites/default/files/mongodb_tutorial.pdf

Course Outcomes:

At the end of this Course the student will be able to

- the students will be able to understand the working of NoSQL, Mongodb, its features **L4**

III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Data Analytics with Python

(Minor-Data Science)

L	T	P	C
3	1	0	4

Course Objectives:

This course is designed to teach students how to analyze different types of data using Python. Students will learn how to prepare data for analysis, perform simple statistical analysis, create meaningful data visualizations and predict future trends from data.

UNIT – 1: Introduction to data analytics and Python fundamentals **9 Hrs**

Python Fundamentals: Language features of python, Data types, data structures, Control of flow, functions, loading a simple delimited data file, subsetting rows and columns.

Learning Outcomes:

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

Able to understand the sub setting rows and columns. **L1**

Able to understand the data structures. **L2**

UNIT – II: Basics of Data Analytics

Fundamentals to Data Analytics: data and its importance, types of data analytics, Interrelation between statistics, analytics and data science, four different levels of data

Central tendency: Mean, Median, Percentile

Dispersion: Skewness, Kurtosis, Range, Interquartile range, Variance, Standard score, Coefficient of variation.

Learning Outcomes:

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

Able to understand the Variance. **L3**

Able to understand the Coefficient of variation. **L4**

UNIT – III: Probability, Probability distributions:

Introduction to probability: Different ways of assigning probabilities, apply marginal, union, joint, and conditional probabilities, laws of probabilities, Bayes' rule.

Probability Distributions: Discrete Distribution, Cumulative Distribution Function, Covariance, Continuous distribution, Binomial distribution, Poisson distribution, Uniform distribution, Normal Distribution.

Learning Outcomes:

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

- Able to understand the Poisson distribution. **L4**
- Able to understand the Normal Distribution. **L5**

UNIT – IV: Sampling and sampling distribution:

Sampling, random sampling, descriptive and inferential statistics, Distribution of sample means, population and variance, Confidence interval estimation.

Learning Outcomes:

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

- Able to understand the Confidence interval estimation. **L5**
- Able to understand the Distribution of sample means. **L5**

UNIT – V: Hypothesis testing and ANOVA

Hypothesis testing, Null and Alternative hypotheses, Errors in hypothesis testing, Population mean and proportion, Examples of hypothesis sampling.

ANOVA: Sample size calculation, one way Anova.

Learning Outcomes:

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

Able to understand the ANOVA **L5**

Able to understand the Null and Alternative hypotheses. **L6**

Text Books:

1. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".

2.Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.

3.Ken Black, sixth Editing. Business Statistics for Contemporary Decision Making. "John Wiley & Sons, Inc".

Reference Books:

1. Data Science from Scratch: First Principles with Python, Joel Grus O'Reilly Media (2015).

2. Anderson Sweeney Williams (2011). Statistics for Business and Economics. "Cengage Learning".

3. Douglas C. Montgomery, George C. Runger (2002). Applied Statistics & Probability for Engineering. "John Wiley & Sons, Inc"

4. Jay L. Devore (2011). Probability and Statistics for Engineering and the Sciences. "Cengage Learning".

Course Outcomes:

At the end of this Course the student will be able to

1 Understanding basics of python for performing data analysis. **L1**

2. Understanding the data, performing preprocessing, processing and data visualization to get insights from data. **L2**

3.Use different python packages for mathematical, scientific applications and for web data analysis. **L3**

4.Develop the model for data analysis and evaluate the model performance. **L4**

III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

DATA SCIENCE

(Minor-Data Science)

L	T	P	C
3	1	0	4

Course Objectives:

This course is designed to analyse the data and to understanding the key technologies of data science and apply algorithms to build machine intelligence.

UNIT – 1: Introduction to data science **9 Hrs**

Fundamental of data science, Integrated development environment (IDE), Tools used for data science: Introduction to Jupiter and spyder and R Programming, libraries for data Science.

Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and plotting.

Learning Outcomes:

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

Identify the Tools used for data science. **L1**

Illustrate the working of a manipulating. **L2**

UNIT – II: Statistics and Data analysis

Descriptive statistics, data preparation. Exploratory Data, Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score.

Learning Outcomes:

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

Able to understand the Analysis data summarization **L3**

Able to understand the Sample and estimated mean. **L4**

UNIT – III: Supervised Learning:

First step, learning curves, training-validation and test.

Regression and classification, Regression: linear regression simple linear regression, Logistic regression multiple & Polynomial regression

Algorithms: Linear regression, Logistics regression, Decision trees, KNN, Support vector machine, random forest. Examples.

Learning Outcomes:

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

- Able to understand the KNN. **L4**
- Able to understand the Support vector machine. **L5**

UNIT – IV: Unsupervised Learning:

Unsupervised learning, clustering, similarity and distances, quality measures of clustering

Algorithms: K-means clustering, Hierarchical clustering, Aprior Algorithm.

Learning Outcomes:

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

- Able to understand the K-means clustering. **L5**
- Able to understand the Hierarchical clustering. **L5**

UNIT – V: Network Analysis:

Advanced JAVA Concepts: Graphs, social networks, centrality, drawing centrality of Graphs,

Page Rank, Ego-Networks, community Detection.

Learning Outcomes:

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

Able to understand the centrality. **L5**

Able to understand the Ego-Networks. **L6**

Text Books:

1. Data Science from Scratch: First Principles with Python, Joel Grus O'Reilly Media (2015).
2. Desikan and G. Ramesh, "Introduction to Data Science", CRC Press[2]..

Reference Books:

1. David W. Hosmer, Stanley Lemeshow (2000). Applied logistic regression (Wiley Series in probability and statistics). "Wiley-Interscience Publication".

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic data science tools. **L1**
- Understand the preparation and analysis of data **L2**
- Execute stasticial analysis by using tools / software **L3**
- Use of the supervised and unsupervised learning algorithms **L4**
- Designing the graphs and social networks **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

DATA VISUALIZATION

L	T	P	C
3	1	0	4

Course Objectives:

To learn basics of R and Python.

- To learn usage of Watson studio.
- To learn about packages Numpy, pandas and matplotlib.
- To learn functionalities and usages of Seaborn.

UNIT – I: Introduction to Statistics:

Introduction to Statistics, Difference between inferential statistics and descriptive statistics, Inferential Statistics- Drawing Inferences from Data, Random Variables, Normal Probability Distribution, Sampling, Sample Statistics and Sampling Distributions.

R overview and Installation- Overview and About R, R and R studio Installation, Descriptive Data analysis using R, Description of basic functions used to describe data in R.

Learning Outcomes:

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

- Argue the importance and role of Drawing Inferences from Data. **L1**
- Design and motivate R and R studio Installation. **L1**

UNIT – II: Data manipulation with R:

Data manipulation packages, Data visualization with R . Data visualization in Watson Studio: Adding data to data refinery, Visualization of Data on Watson Studio.

Learning Outcomes:

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

- Design and motivate Data visualization with R. **L2**
- Recognize major Data visualization in Watson Studio. **L2**

UNIT – III: Python:

Introduction to Python, How to Install, Introduction to Jupyter Notebook, Python scripting basics, Numpy and Pandas.

Learning Outcomes:

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

- Recognize major How to Install, Introduction to Jupyter Notebook. **L2**
- Describe a Connecting to Python scripting basics. **L3**

UNIT – IV: Data Visualization Tools in Python:

Introduction to Matplotlib, Basic plots using matplotlib, Specialized Visualization Tools using Matplotlib, Advanced Visualization Tools using MatplotlibWaffle Charts, Word Clouds.

Learning Outcomes:

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

- Describe a Word Clouds. L3
- Generate a Specialized Visualization Tools using Matplotlib. L4

UNIT – V: Introduction to Seaborn:
Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

Learning Outcomes:
At the end of this unit, the student will be able to
- Able to understand the Spatial Visualizations and Analysis in Python with Folium. L4
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Text Books:
1. Core Python Programming - Second Edition, R. Nageswara Rao, Dreamtech Press.
2. R Graphics Essentials for Great Data Visualization by Alboukadel Kassambara

Course Outcomes:

At the end of this Course the student will be able to
- Gain knowledge on R and Python L4
- Understand usage of various packages in R and Python. L3
- Demonstrate knowledge of Watson studio. L3
- Apply data visualization tools on various data sets. L2

III B.Tech II SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
MACHINE LEARNING

L	T	P	C
3	1	0	4

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT – 1: INTRODUCTION

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Learning Outcomes:

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

- Argue the importance and role of software architecture in large-scale software systems. L2
- Design and motivate software architecture for large-scale software systems. L3

UNIT – II: DECISION TREE LEARNING

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

Learning Outcomes:

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

- Design and motivate software architecture for large-scale software systems. L3
- Recognize major software architectural styles and frameworks. L4

UNIT – III: SAMPLE COMPLEXITY AND OVER FITTING

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

Learning Outcomes:

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

- Recognize major software architectural styles and frameworks. L3
- Describe a software architecture using various documentation approaches and architectural description languages. L4

UNIT – IV: INSTANCE-BASED TECHNIQUES

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

Learning Outcomes:

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

- Describe a software architecture using various documentation approaches and architectural description languages. L5
- Generate architectural alternatives for a problem and selection among them. L3

UNIT – V: Genetic Algorithms

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

Learning Outcomes:

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

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems. **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**