

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA YSR (KADAPA) Dist 516 390, (A.P) INDIA

## COURSE STRUCTURE(R19) COMPUTER SCIENCE & ENGINEERING

	Semester - 0 (Theory - 8, Lab -7) Common for All Branches of Engineering						
S.No	Course No	Course Name	Category	L-T-P-C			
1		Physical Activities Sports, Yoga and Meditation, Plantation	MC	0-0-6-0			
2		Career Counseling	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	2-0-3-0			
5		Proficiency Modules & Productivity Tools	ES	2-1-2-0			
6		Assessment on basic aptitude and mathematical skills	MC	2-0-3-0			
7		Remedial Training in Foundation Courses	MC	2-1-2-0			
8		Human Values & Professional Ethics	MC	3-0-0-0			
9		Communication Skills focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0			
10		Concepts of Programming	ES	2-0-2-0			

Semester - 1			(Theory - 4, Lab - 3)		
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19ABS06	LINEAR ALGEBRA AND CALCULUS	BS	3-1-0	4
2.	19ABS03	CHEMISTRY	BS	3-0-0	3
3.	19ACS01	PROBLEM SOLVING &PROGRAMMING	ES	3-1-0	4
4.	19AME01	ENGINEERING GRAPHICS	ES	1-0-3	2.5
5.	19AME02	ENGINEERING WORKSHOP	LC	0-0-3	1.5
6.	19ABS04	CHEMISTRY LAB	BS	0-0-3	1.5
7.	19ACS02	PROBLEM SOLVING &PROGRAMMING LAB	ES	0-0-3	1.5
				Total	18

Sem	ester – 2			Theory - 5,	Lab - 5)
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19ABEE01	BASIC ELECTRICAL AND	ES	3-0-0	3
		ELECTRONICS ENGINEERING			
2.	19ABS07	DIFFERENTIAL EQUATIONS AND	BS	3-1-0	4
		VECTOR CALCULUS			
3.	19ABS09	APPLIED PHYSICS	BS	3-0-0	3
4.	19ACS05	DATA STRUCTURES	ES	3-0-0	3
5.	19AHS01	COMMUNICATIVE ENGLISH – I	HS	2-0-0	2
6.	19ACS07	COMPUTER SCIENCE AND	LC	0-0-2	1
		ENGINEERING WORKSHOP			
7.	19AHS02	COMMUNICATIVE ENGLISH - I LAB	HS	0-0-2	1
8.	19ABEE02	BASIC ELECTRICAL & ELECTRONICS	ES	0-0-3	1.5
		ENGINEERING LAB			
9.	19ABS10	APPLIED PHYSICS LAB	BS	0-0-3	1.5
10.	19ACS06	DATA STRUCTURES LAB	ES	0-0-3	1.5
				Total	21.5

Semester – 3 (Theory - 6, Lab					
S. No	Course No	Course Name	Category	L-T-P	Credits
1	19ABS13	DISCRETE MATHEMATICS	BS	3-0-0	3
2	19ACS08	DATABASE MANAGEMENT SYSTEMS	ES	3-0-0	3
3	19ACS10	FORMAL LANGUAGES AND AUTOMATA THEORY	ES	3-0-0	3
4	19ACS11	DESIGN AND ANALYSIS OF ALGORITHMS	PC	3-0-0	3
5	19ACS13	DIGITAL LOGIC DESIGN	PC	3-0-0	2
6	19ACS14	OBJECT ORIENTED PROGRAMMING CONCEPTS AND JAVA PROGRAMMING	PC	2-0-0	2
7	19ACS12	DESIGN THINKING & PRODUCT INNOVATION LAB	PC	0-0-3	1.5
8	19ACS09	DATABASE MANAGEMENT SYSTEMS LAB	ES	0-0-3	1.5
9	19ACS15	OBJECT ORIENTED PROGRAMMING LAB	PC	0-0-3	1.5
10	19ACS16	FREE AND OPEN-SOURCE SOFTWARE LAB	PC	0-0-2	1
11	19AHS04	CONSTITUTION OF INDIA	MC	3-0-0	0
			Т	otal	21.5

Semester – 4 (Theory - 6, Lab					5, Lab - 3)
S.No	Course No	Course Name	Category	L-T- P-C	Credits
1	19ABS15	NUMERICAL METHODS, PROBABILITY & STATISTICS	BS	3-0-0	3
2	19ACS20	COMPILER DESIGN	PC	3-0-0	3
3	19ACS21	COMPUTER ORGANIZATION	ES	3-0-0	3
4	19ACS25	OPERATING SYSTEMS	PC	3-0-0	3
5	19ACS23	SOFTWARE ENGINEERING	PC	3-0-0	3
6	19ACS26	COMPUTER NETWORKS	ES	3-0-0	3
7	19ACS27	COMPUTER NETWORKS AND OPERATING SYSTEMS LAB	PC	0-0-3	1.5
8	19ACS24	SOFTWARE ENGINEERING LAB	ES	0-0-2	1
9	19ACS22	COMPUTER ORGANIZATION LAB	ES	0-0-2	1
10	19ABS14	ENVIRONMENTAL SCIENCE	MC	3-0-0	0
11	19AHS03	UNIVERSAL HUMAN VALUES	MC	2-0-0	2
			Total		23.5

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

Subject Code	Title of the Subject	L	Т	Р	С
	Linear Algebra and	3	1	-	4
	Calculus				

	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 to 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- dimensional coordinate systems
CO5	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

## Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				- ~ -							1	
CO2				D.								
CO3												
CO4			1	Y	2						- 20	
CO5				39.1	2							

#### **SYLLABUS**

## Unit I: Matrix Operations and Solving Systems of Linear Equations

10 hrs

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations 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, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

## **Unit II: Mean Value Theorems**

### 06 hrs

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof);

PEr 6 M

## Unit III: Multivariable calculus

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: Double Integrals**

Double integrals, change of order of integration, change of variables, areas enclosed by plane curves

### Unit V: Multiple Integrals and Special Functions

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

#### **Textbooks:**

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

### **References:**

- 1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
- George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
- 3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

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

Subject Code	Title of the Subject	L	Т	Р	С
	Differential Equations	3	1	( <b>#</b> ):	4
	and Vector Calculus				

	COURSE OBJECTIVES				
1	To enlighten the learners in the concept of differential equations and multivariable				
	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 differential equations related to various engineering fields
CO2	Identify solution methods for partial differential equations that model physical processes
CO3	interpret the physical meaning of different operators such as gradient, curl and divergence
CO4	estimate the work done against a field, circulation and flux using vector calculus

## **Mapping between Course Outcomes and Programme Outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				1.1	-							
CO2	_									iy.		
CO3				1							1997 B	<u> </u>
CO4			S	1.0								
CO5												

### SYLLABUS

## UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

## **UNIT II: Equations Reducible to Linear Differential Equations 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**

08 hrs

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

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### **UNIT IV: Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, gradient, divergent, curl and their properties (Identities and applications)

## UNIT V: Multivariable Calculus (Vector integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

### **Textbooks:**

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

#### **References:**

- 1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
- 2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
- 3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
- 4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
- 5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

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## JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA DEPARTMENT OF CHEMISTRY I B.TECH – II SEMESTER (common to EEE, ECE & CSE) (THEORY)

Subject Code	Title of the Subject	L	Τ	Р	C
19A53201	Chemistry	3	and and address	-	3

	COURSE OBJECTIVES						
1	To familiarize engineering chemistry and its applications						
2	To train the students on the principles and applications of electrochemistry and polymers						
3	To introduce instrumental methods, molecular machines and switches						

and the second	COURSE OUTCOMES
CO1	apply Schrodinger wave equation to hydrogen and particle in a box, illustrate the
1	molecular orbital energy level diagram of different molecular species, explain the
10 M 10 M	band theory of solids for conductors, semiconductors and insulators discuss the
	magnetic behaviour and colour of complexes.
CO2	apply Nernst equation for calculating electrode and cell potentials, differentiate
States Strange	between pH metry, potentiometric and conductometric titrations, explain the theory
i contante	of construction of battery and fuel cells, solve problems based on cell potential
CO3	explain the different types of polymers and their applications, explain the
	preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres,
	describe the mechanism of conduction in conducting polymers, discuss Buna-S and
	Buna-N elastomers and their applications
CO4	explain the different types of spectral series in electromagnetic spectrum,
	understand the principles of different analytical instruments, explain the different
	applications of analytical instruments
CO5	explain the band theory of solids for conductors, semiconductors and insulators,
	explainsupramolecular chemistry and self assembly, demonstrate the application of
1919	Rotaxanes and Catenanes as artificial molecular machines

## Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1100		1. A inte	anthei	e ne i	tiers of	0. 10	A	2017 04	Section-14	and so the	1.1
CO2												Setter Co
CO3												Sundali
CO4	natrial.	d A Basi	and is the	La PRIM	S. Maria	Shine CA	See man	Article	12 1117	128 yr dda	he hast	
CO5						un teni	14-15 M	HI NO	11.11	Mira day		a distanti

#### **SYLLABUS**

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

Planck's quantum theory, dual nature of matter, Schrodinger Wave equation, significance of  $\Psi$  and  $\Psi^2$ , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O<sub>2</sub> and CO, etc.  $\pi$ -molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – splitting in octahedral and tetrahedral geometry,

magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

## Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples.

Primary cells – Zinc-  $MnO_2$  battery (Laclanche cell), Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions. Fuel cells, hydrogen-oxygen, methanol – oxygen fuel cells – working of the cells- Applications.

#### Unit 3: 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 – Bakelite, carbon fibres, Biodegradable polymers, Conducting polymers – polyacetylene, polyaniline, mechanism of conduction and applications.

#### **Unt 4: Instrumental Methods and Applications: (10 hrs)**

Electromagnetic spectrum, Absorption of radiation: Principle and applications of UV-Visible, IR and Basic concepts of Chromatographic techniques and their applications. pH metry, potentiometry and conductometry,

### Unit 5: Advanced Engineering Materials:(10 hrs)

(i) Concepts and terms of supra molecular chemistry, complementarity, Basic Lock and Key principle, examples of Supramolecules, Applications of Supra molecules (sensors, catalysts, gas storage, medical and molecular switches)

ii) Semiconducting and Super Conducting materials-Principles and some examples

iii) Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators and applications of electrical insulating materials, Super capacitors.

(iv) Nanochemistry: Introduction, classification of nanomaterials properties and applications of Fullerenes, Carbon nano tubes and Graphines nanoparticles.

#### **Text Books:**

- 1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
- 2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

- 1. A Text book of Engineering Chemistry by K. Sesha Maheswaramma and Mridula Chugh, Pearson's Publications Pvt. Ltd., (PAN India Title)
- 2. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
- 3. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
- 4. A Text book of Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy and Subhendu Chakroborty, Cengage learning India Pvt.Ltd.
- 5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
- 6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

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## **Problem Solving and Programming**

(Common to All Branches of Engineering)

### B. Tech – I Semester

L-T-P-C 3-1-0-4

### **Course Objectives:**

- 1. Introduce the internal parts of a computer, and peripherals.
- 2. Introduce the Concept of Algorithm and use it to solve computational problems
- 3. Identify the computational and non-computational problems
- 4. Teach the syntax and semantics of a C Programming language
- 5. Demonstrate the use of Control structures of C Programming language
- 6. Illustrate the methodology for solving Computational problems

#### **Outcomes:**

Student should be able to

- 1. Identify the different peripherals, ports and connecting cables in a PC (L2)
- 2. Illustrate the working of a Computer (L3)
- 3. Select the components of a Computer in the market and assemble a computer (L4)
- 4. Solve complex problems using language independent notations (L3)

#### Unit 1:

**Computer Fundamentals:** What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

**Introduction to Programming, Algorithms and Flowcharts**: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

#### **Unit 2:**

**Introduction to problem solving:** Introduction, the problem-solving aspect, Design and implementation of algorithms – Topdown design, Analysis of Algorithms, the efficiency of algorithms, the analysis of algorithms.

**Fundamental algorithms:** Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Learning Outcomes: Student should be able to

- 1. Solve Computational problems (L3)
- 2. Apply Algorithmic approach to solving problems (L3)
- 3. Analyze the algorithms (L4)

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#### Unit 3:

**Types, Operators, and Expressions:** Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

**Input and output:** standard input and output, formatted output-Printf, formatted input-Scanf **Control Flow:** Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Dowhile, break and continue, goto and labels.

**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: Student should be able to

1. Recognize the programming elements of C Programming language (L1)

2. Select the control structure for solving the problem (L4)

3. Apply modular approach for solving the problem (L3)

#### Unit 4:

**Factoring methods:** Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

**Pointers and arrays:** Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multidimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

**Array Techniques:** Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k<sup>th</sup> smallest element.

#### Learning Outcomes: Student should be able to

- 1. Solve mathematical problems using C Programming language (L3)
- 2. Structure the individual data elements to simplify the solutions (L6)
- 3. Facilitate efficient memory utilization (L6)

#### Unit 5:

**Sorting and Searching:** Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

**Structures:** Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

#### Learning Outcomes: Student should be able to

- 1. Select sorting algorithm based on the type of the data (L4)
- 2. Organize heterogeneous data (L6)
- 3. Design a sorting algorithm (L6)

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## **Text Books:**

1. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.

2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

3. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University 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.

#### **Course Outcomes:**

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

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## JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA I YEAR I SEMESTER **ENGINEERING WORKSHOP (19AME02)**

### (Common to CE, MECH & CSE)

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### Course Objectives:

- To bring awareness about workshop practices for Engineers. •
- To familiarize how wood working operations can be performed. •
- To teach the practices for sheet metal operations. •
- To develop the technical skills related to fitting and electrical wiring. •

## Section 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

## **Section 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

## Section 3 : Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises a) V-fit b) Dovetail fit c) Semi-circular fit

d) Bicycle tire puncture and change of two wheeler tyre

## Section 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

## **Text Books:**

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

## **Course Outcomes:**

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

- Apply wood working skills in real world applications. (L6) •
- Apply fitting operations in various applications. (L6)
- Build different parts with metal sheets in real world applications. (L5)
- Demonstrate soldering and brazing. (L4)
- Apply basic electrical engineering knowledge for house wiring practice. (L6)

## JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA \*\*\*\* DEPARTMENT OF CHEMISTRY \*\*\*\* I B.TECH – II SEMESTER(common to EEE, ECE & CSE) (CHEMISTRY LAB)

Subject Code	Title of the Lab	L	Т	Р	С
19A53202	Chemistry lab	-	-	3	1.5

	COURSE OBJECTIVES
1	Verify the fundamental concepts with experiments

COURSE OUTCOMES					
CO1	determine the cell constant and conductance of solutions				
CO2	prepare advanced polymer materials				
CO3	measure the strength of an acid present in secondary batteries				
CO4	analyse the IR and NMR of some organic compounds				

## Mapping between Course Outcomes and Programme Outcomes

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

## 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 emf
- 5. Estimation of Ferrous Iron by Dichrometry.
- 6. Determination of strength of an acid in Pb-Acid battery
- 7. Preparation of a polymer
- 8. Verify Lambert-Beer's law
- 9. Thin layer chromatography
- 10. Identification of simple organic compounds by IR
- 11. Separation of Organic mixtures by paper chromatography.
- 12. Preparation of Copper/Silver colloidal Nano materials

## **TEXT BOOKS:**

- 1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition J. Mendham et al, Pearson Education.
- 2. Chemistry Practical Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

## **Problem Solving and Programming Laboratory**

(Common to All Branches of Engineering)

**B.Tech – I Semester** 

L-T-P-C 0-0-3-1.5

### Laboratory Experiments #

- 1. Assemble and disassemble parts of a Computer
- 2. Design a C program which reverses the number
- 3. Design a C program which finds the second maximum number among the given list of numbers.
- 4. Construct a program which finds the  $k^{th}$  smallest number among the given list of numbers.
- 5. Design an algorithm and implement using C language the following exchanges

 $a \leftarrow b \leftarrow c \leftarrow d$ 

- 6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
- 7. Implement the C program which computes the sum of the first n terms of the series Sum = 1 - 3 + 5 - 7 + 9
- 8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
- 9. Design an algorithm and implement using a C program which finds the sum of the Infinite series  $1 x^2/2! + x^4/4! x^6/6! + ....$
- 10 Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
- 11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
- 12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.
- 13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
- 14. Design a C program which reverses the elements of the array.

15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.

- 16. Implement the sorting algorithms
  - a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
- 17. Illustrate the use of auto, static, register and external variables.
- 18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
- 19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
- 20. Design a C program which sorts the strings using array of pointers.

# The above list is not exhaustive. Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

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Course outcomes: Student should be able to

- 1. Construct a Computer given its parts (L6)
- 2. Select the right control structure for solving the problem (L6)
- 3. Analyze different sorting algorithms (L4)
- 4. Design solutions for computational problems (L6)
- 5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

## **References:**

- 1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", Tata McGraw-Hill, 2nd edition, 2002.
- 2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

B.Tech – II Sem

LTPC

3003

## Basic Electrical & Electronics Engineering Part A: Basic Electrical Engineering (Civil, Mechanical, CSE), ECE

#### **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 DG motor

1.

#### **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 II Sem

## **COURSE NO. - Basic Electrical & Electronics Engineering**

(Common to Civil, Mechanical, CSE)

#### LTPC 3104

### **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: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor 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

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## 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 SYSTEMS

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).

## **Unit Outcomes:**

- Describe basic elements of a communication system
- Explain need for modulation and different modulation techniques
- Understand functioning of various communication 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.

Head of Electronics

NTU College of Er gineering SIII IVENDULA - 516 390

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

Subject Code	Title of the Subject	L	Т	Р	С
	Differential Equations	3	1	(#) <sup>1</sup>	4
	and Vector Calculus				

	COURSE OBJECTIVES						
1	To enlighten the learners in the concept of differential equations and multivariable						
	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 differential equations related to various engineering fields
CO2	Identify solution methods for partial differential equations that model physical processes
CO3	interpret the physical meaning of different operators such as gradient, curl and divergence
CO4	estimate the work done against a field, circulation and flux using vector calculus

## Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				1.1	-							
CO2										14		
CO3		-		1						-1.5	1997 B	<u> </u>
CO4			S	1.0								
CO5			14									

### SYLLABUS

## UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

## **UNIT II: Equations Reducible to Linear Differential Equations 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**

08 hrs

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Fin 1850

### **UNIT IV: Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, gradient, divergent, curl and their properties (Identities and applications)

## **UNIT V: Multivariable Calculus (Vector integration)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

### **Textbooks:**

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

#### **References:**

- 1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
- 2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
- 3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
- 4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
- 5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

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## JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA DEPARTMENT OF PHYSICS I B.TECH – II SEMESTER (common to EEE, ECE & CSE) (THEORY)

Subject Code	Title of the Subject	L	Т	Р	С
	Applied Physics	3	0	2 <u>4</u>	3

	COURSE OBJECTIVES
1	To identify the importance of the optical phenomenon i.e. interference, diffraction
	and polarization related to its Engineering applications
2	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.
3	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 semiconductors in the functioning of
	electronic devices.
4	To explain the significant concepts of dielectric and magnetic materials that leads to
	potential applications in the emerging micro devices
	To give an impetus on the subtle mechanism of superconductors using the concept of
5	BCS theory and their fascinating applications. Considering the significance of micro
	miniaturization of electronic devices and significance of low dimensional materials,
	the basic concepts of nanomaterials, their properties and applications in modern
	emerging technologies are to be elicited.

COURSE OUTCOMES							
CO1	Explain the need of coherent sources and the conditions for sustained interference						
	(L2). Identify engineering applications of interference including homodyne and						
	heterodyne detection (L3). Analyze the differences between interference and						
	diffraction with applications (L4). <b>Illustrate</b> the concept of polarization of light and						
	its applications (L2). <b>Classify</b> ordinary polarized light and extraordinary polarized light (L2)						
CO2	<b>Explain</b> various types of emission of radiation (12) <b>Identify</b> the role of laser in						
002	engineering applications (L3). <b>Describe</b> the construction and working principles of						
	various types of lasers (L1). <b>Explain</b> 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 medical, communication and other						
	fields (L2). Apply the fiber optic concepts in various fields (L3).						
CO3	Describes the dual nature of matter (L1). Explains the significance of wave function						
	(L2). Identify the role of Schrodinger's time independent wave equation in studying						
	particle in one-dimensional infinite potential well (L3). Identify the role of classical						
	and quantum free electron theory in the study of electrical conductivity (L3).						
	Classify the energy bands of semiconductors (L2). Outline the properties of n-type						
	and p-type semiconductors and charge carriers (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)						
CO4	<b>Explain</b> 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). 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)
CO5	<b>Explain</b> 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). Identify the nano size dependent
	properties of nanomaterials (L2). Illustrate the methods for the synthesis and
	characterization of nanomaterials (L2). Apply the basic properties of nanomaterials
	in various Engineering branches (L3).

## Mapping between Course Outcomes and Programme Outcomes

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

## SYLLABUS OF APPLIED PHYSICS

## **Unit-I: Physical Optics**

**Interference**-Principle of superposition –Interference of light – Conditions for sustained interference- Interference in thin films (reflected light)- Newton's Rings: determination of wavelength - Engineering applications of Interference

**Diffraction**- Fraunhofer Diffraction-Single and Double slits - Diffraction Grating – Grating Spectrum - Engineering applications of diffraction.

**Polarization**-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plates-Engineering applications of polarization.

## Unit-II: Lasers and Fiber optics

**Lasers:** Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

**Fiber optics-** Introduction to Optical Fibers-Total Internal Reflection -Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index profile –Propagation of electromagnetic wave through optical fibers – Modes -Importance of V-number –Block diagram of fiber optic communication system– Applications

## Unit III: Quantum Mechanics, Free Electron Theory and Semiconductors

**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 – Sources of electrical resistance – Equation for electrical conductivity – Quantum free electron theory– Fermi-Dirac distribution- Band theory of Solids.

**Semiconductors:** Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors – Intrinsic carrier concentration-Fermi energy – Electrical conductivity - extrinsic semiconductors P-type & N-type - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient and its applications - Drift and Diffusion currents (Qualitative) - Continuity equation - Applications of Semiconductors.

## **Unit-IV: Dielectric and Magnetic Materials**

**Dielectric Materials** -Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) - Lorentz (internal) field- Clausius-Mossotti equation-Applications of dielectrics: Ferroelectricity and Piezoelectricity.

**Magnetic Materials** - Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment –Bohr Magneton, Classification of magnetic materials - Hysteresis - soft and hard magnetic materials-Applications

### **Unit – V: Superconductors and Nanomaterials**

**Superconductors**: Properties of superconductors – Meissner effect– Type I and Type II superconductors – ac and dc Josephson effects – BCS theory (qualitative treatment) – Applications of superconductors.

**Nanomaterials**: Introduction – Surface to volume ratio and quantum confinement – Physical properties: optical, mechanical, electrical and magnetic- Synthesis of nanomaterials: Top-down: Ball Milling, Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

#### Text books:

- 1. M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"- S.Chand Publications, 11<sup>th</sup> Edition 2019.
- 2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

### **Reference Books:**

- 1. K Thyagarajan "Engineering Physics", Mc Graw Hill Publishing Company Ltd., 2016
- 2. Fundamentals of Physics Halliday, Resnick and Walker, John Wiley & Sons
- 3. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Education, 2018
- 4. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc Graw Hill, 2013
- 5. Engineering Physics Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
- 6. Engineering Physics D K Pandey, S. Chaturvedi, Cengage Learning
- 7. Semiconductor physics and devices- Basic principle Donald A, Neamen, Mc Graw Hill
- 8. Introduction to Nanotechnology C P Poole and F J Owens, Wiley

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- 11. Study of Energy gap of a material using p-n junction diode
- 12. Study of variation of Magnetic field along the axis of a current carrying coil Stewart-Gee's Method
- 13. Determination of mobility of charge carriers in semiconductor by Hall effect.
- 14. Measurement of resistance of a semiconductor with varying temperature
- 15. Measurement of magnetic susceptibility by Kundt's tube method.

## **References:**

- 1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
- 2. R. Padma Suvarna, K. Thyagarajan "Engineering Physics Practicals" NU Age Publishing House.

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## Data Structures

#### (Common to All Branches of Engineering)

## B. Tech – II Semester

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#### **Course Objectives:**

1. To teach the representation of solution to the problem using algorithm

- 2. To explain the approach to algorithm analysis
- 3. To introduce different data structures for solving the problems
- 4. To demonstrate modeling of the given problem as a graph

5. To elucidate the existing hashing techniques

## Unit – 1: Introduction

Algorithm Specification, Performance analysis, Performance Measurement, Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions, Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort

## Learning Outcomes:

Student should be able to

1. Analyze the given algorithm to find the time and space complexities (L4)

2. Select appropriate sorting algorithm (L4)

3. Design a sorting algorithm (L6)

## Unit – 2: Stack, Queue and Linked lists

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, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

## Learning outcomes: Student should be able to

1. Evaluate expressions (L5)

2. Develop the applications using stacks and queues (L3)

3. Construct the linked lists for various applications (L6)

#### Unit – 3: Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, **Counting Binary Trees**, Optimal Binary search Trees, AVL Trees. B-Trees: BTrees, B + Trees.

### Learning outcomes

1. Explain the concept of a tree (L2)

2. Compare different tree structures (L4)

3. Apply trees for indexing (L3)

#### Unit – 4: Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.

Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

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## Learning outcomes:

Student should be able to

- 1. Recognize the importance of Graphs in solving real world problems (L2)
- 2. Apply various graph traversal methods to applications (L3)
- 3. Design a minimum cost solution for a problem using spanning trees (L6)
- 4. Select the appropriate hashing technique for a given application (L5)
- 5. Design a hashing technique (L6)

## Unit - 5: Files and Advanced Sorting & Searching

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting and searching: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

## Learning outcomes: Student should be able to

- 1. Organize data in the form of Files (L6)
- 2. Apply sorting on large amount of data (L3)

## **Text Books:**

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson Freed "Fundamentals of Data Structures in C", 2<sup>nd</sup> Edition, University Press, 2007.

2. Alan L. Tharp, "File Organization and Processing", Wiley and Sons, 1988.

## **Reference Books:**

- 1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2<sup>nd</sup> Edition, Pearson Education.
- 2. D. Samanta, "Classic Data Structures", 2<sup>nd</sup> Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
- 3. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
- 4. Richard F.Gilberg, Behrouz A.Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

## **Course Outcomes:**

Students should be able to

- 1. Select Appropriate Data Structure for solving a real world problem (L4)
- 2. Select appropriate file organization technique depending on the processing to be done (L4)
- 3. Construct Indexes for Databases (L6)
- 4. Analyze the Algorithms (L4)
- 5. Develop Algorithm for sorting large files of data (L3)

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA. HUMANITIES & SOCIAL SCIENCES DEPARTMENT

## **COMMUNICATIVE ENGLISH - 1**

Subject Code	Title of the Subject	L	Т	Р	С
	Communicative English - 1	2	0	0	2

COURSE OBJECTIVES						
1	Facilitates effective listening skills for better comprehension of academic lectures					
I	and English spoken by native speakers.					
2	Helps to improve speaking skills through participation in activities such as role					
2	plays, discussions and structured talks/oral presentations.					
2	Imparts effective strategies for good writing and demonstrate the same in					
3	summarizing, writing well organized essays, record and report useful information.					
4	Provides knowledge of grammatical structures and vocabulary and encourage					
4	their appropriate use in speech and writing.					

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

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#### 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*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability 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.

#### Unit 1

#### Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. Reading for Writing :Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

#### **Learning Outcomes**

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

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- > ask and answer general questions on familiar topics and introduce oneself/others
- > employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- ➢ form sentences using proper grammatical structures and correct word forms

## Unit 2 Lesson: The Brook: Alfred Tennyson

**Listening:** Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

#### Learning Outcomes

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

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- > understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- > identify basic errors of grammar/ usage and make necessary corrections in short texts

#### Unit 3

## Lesson: The Death Trap: Saki

**Listening:** Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

#### Learning Outcomes

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

- > comprehend short talks and summarize the content with clarity and precision
- > participate in informal discussions and report what is discussed
- > infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

#### Unit4

#### Lesson: Inspiration: Chindu Yellamma

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

#### Learning Outcomes

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

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- > interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- > use language appropriate for description and interpretation of graphical elements

## Unit 5 Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Reading: Reading for comprehension. Writing: Writing structured essays on specific topics using suitable claims and evidences. Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

### Learning Outcomes

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

- > take notes while listening to a talk/lecture and make use of them to answer questions
- > make formal oral presentations using effective strategies
- > comprehend, discuss and respond to academic texts orally and in writing
- > produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

#### Prescribed Text:

1. English All Round: Communication Skills for Undegurdation Learners Vol. I, Orient BlackSwan Publisers, First Edition 2019, Authored by Y.Prabhavathi, M.Lalitha Sridevi and Ruth Z Hauzel.

#### **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.
- Oxford Learners Dictionary, 12<sup>th</sup> Edition, 2011.

## I Year II Semester JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA 19ACS07-COMPUTER SCIENCE AND ENGINEERING WORKSHOP (Common to All Branches of Engineering)

L	Т	Р	С
0	0	2	1

### **Course Objectives:**

1. To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations

2. 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

3. Teach them how to connect two or more computers

4. Introduce to the Raspberry Pi board

5. Explain storytelling by creating Graphics, WebPages and Videos

## List of Experiments

### Laboratory Experiments:

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**: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

## **Productivity tools**

**Task 5: 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 color, including images and tables in the word file, making page setup, copy and paste block of 91 Page 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 6: 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 7: 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.

## Networking

**Task 8: Wired network**: Select a LAN cable, Identify the wires in the cable, Define the purpose of each wire, Study the RJ45 connecter, Use crimping tool to fix the cable to the connecter, Test the cable using LAN tester, Connect two or more computers using cross and straight cables, Configure the computers, share the data between the computers.

**Task 9: Wireless network** Connect the wireless LAN card or identify the built-in wireless LAN card, configure four computers using adhoc mode and share the data, connect four computers using infrastructure mode (Access point) and share the data.

## ΙоТ

## Task 10: Raspberry Pi

Study the architecture of Raspberry pi, configure software, Install SD card, Connect the cables, Install Raspbian (or any other) operating system, Configure Wi-Fi, Remotely connect to your Raspberry Pi.

## **Story Telling**

## Task 11: Storytelling

Use Adobe spark or any other tool to create Graphics, Webpages, and Videos.

## **Reference Books :**

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2nd edition, Tata McGraw-Hill, 2002.

2. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.

3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.

4. Rusen, "Networking your computers and devices", PHI

- 5. Bigelows, "Trouble shooting, Maintaining & Repairing PCs", TMH.
- 6. https://www.adobe.com
- 7. https://www.raspberrypi.org

## **Course Outcomes:**

•	Construct a computer from its parts and prepare it for use	L2
•	Develop Documents using Word processors	L3
•	Develop presentations using the presentation tool	L3
•	Perform computations using spreadsheet tool	L4
•	Connect computer using wired and wireless connections	1.5

- Connect computer using wired and wireless connections
  Design Graphics, Videos and Web pages
  L6
- Connect things to computers L5

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA. HUMANITIES AND SOCIAL SCIENCES DEPARTMENT

## **COMMUNICATIVE ENGLISH - 1 LAB**

Subject Code	Title of the Subject	L	Т	Р	С
	Communicative English -	0	0	2	1
	1 Lab				

COURSE OBJECTIVES	
1	To expose the students to variety of self-instructional, learner friendly modes of language learning.
2	To help the students cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3	To enable them to learn better pronunciation through stress, intonation and rhythm.
4	To train them to use language effectively to face interviews, group discussions, public speaking.
5	To initiate them into greater use of the computer in resume preparation, report writing, format making etc.

COURSE OUTCOMES	
CO1	To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2	To apply communication skills through various language learning activities.
CO3	To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	To evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5	To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

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#### Unit 1

- 1. Phonetics for listening comprehension of various accents
- 2. Reading comprehension
- 3. Describing objects/places/persons

#### **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. JAM
- 2. Small talks on general topics
- 3. Debates

#### 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. Situational dialogues Greeting and Introduction
- 2. Summarizing and Note making
- 3. Vocabulary Building

#### **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. Asking for Information and Giving Directions
- 2. Information Transfer
- 3. Non-verbal Communication Dumb Charade

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#### **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. Oral Presentations
- 2. Précis Writing and Paraphrasing
- 3. Reading Comprehension and spotting errors

#### **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**

- Young India Films
- Walden Infotech
- Orell

#### **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

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#### I B.Tech II Sem

# **COURSE NO. - Basic Electrical & Electronics Engineering Lab**

10.58

(Common to Civil, Mechanical, CSE)

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#### PART A: ELECTRICAL ENGINEERING LAB

#### **Course Objectives:**

- To Verify Kirchoff's laws
- To verify Superposition theorem.
- To learn performance characteristics of DC Machines.
- To perform open circuit & Short Circuit test on 1- Phase Transformer.
- 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**

- Verify Kirchoff's Laws & Superposition theorem.
- Perform testing on AC and DC Machines.
- 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
- 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

how

• Explain functioning of various communication systems

#### 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. Conduct an experiment on AM & FM modulation & demodulation, Plot the corresponding modulated and demodulated signals

# **Applied Physics Laboratory**

(Common to I B.Tech II Semester ECE, EEE & CSE)

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# **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.

EXP No.1: Determination of the thickness of thin object using wedge shape method

# Learning Outcomes:

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

- **Operates** optical instrument like travelling microscope
- Estimate the thickness of the wire using wedge shape method
- Identifies the formation of interference fringes due to reflected light from nonuniform thin film.

EXP No. 2 : Determination of the radius of curvature of the lens by Newton's rings

# Learning Outcomes:

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

 Operates optical instrument like travelling microscope.
 Estimate the radius of curvature of the lens
 Identifies the formation of interference fringes due to reflected light from nonuniform thin film.
 Plots the square of the diameter of a ring with no. of rings
 L3

**EXP No. 3:** Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method

# **Learning Outcomes:**

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

٠	• <b>Operates</b> optical instrument like spectrometer.		
٠	Estimate the wavelength of the given source	L2	
•	<b>Identifies</b> the formation of grating spectrum due diffraction.	L2	
EX Co	<b>XP No. 4:</b> Determination of dispersive power of prism <b>ntent of the Unit – IV</b>		

# Learning Outcomes:

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

- **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.

**EXP No. 4:** Determination of dispersive power of prism.

#### **Learning Outcomes:**

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

**Operates** optical instrument like spectrometer. L2 • Estimate the refractive index and dispersive power of the given prism L2 •

L2

Identifies the formation of spectrum due to dispersion. •

**EXP No. 5:** Determination of wavelength using diffraction grating by laser source.

#### **Learning Outcomes:**

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

**Operates** various instrument L2 • L2 • **Estimate** the wavelength of laser source Identifies the formation of grating spectrum due diffraction. L2 •

EXP No. 6: Determination of particle size by laser source

#### **Learning Outcomes:**

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

• **Operates** various instrument L2 L2 • Estimate the Particles size using laser L2 • Identifies the application of laser

EXP No. 7: Determination of numerical aperture and acceptance angle of an optical fiber

#### **Learning Outcomes:**

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

- 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 L2 fiber in various engineering applications

EXP No. 8: Study of variation of Magnetic field along the axis of a current carrying coil - Stewart-Gee's Method.

#### **Learning Outcomes:**

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

- **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 L3 distance

EXP No. 9: Study of B-H curve of Ferromagnetic material.

#### **Learning Outcomes:**

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

- 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 L3
- Plots the magnetic field H and flux density B

EXP No. 10: Study of Energy gap of a material using p-n junction diode

# Learning Outcomes:

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

•	Operates various instruments and connect them as per the circuit.			
•	<b>Estimate</b> the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)	L2		
•	Classifies the soft and hard magnetic material based on B-H curve.			
•	Estimate the energy gap of a semiconductor.	L2		
•	<b>Illustrates</b> the engineering applications of energy gap.			
•	Plots 1/T with log R	L3		

### **Reference Books:**

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

#### **Course Outcomes:**

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

$\triangleright$	<b>Operate</b> optical instruments like microscope and spectrometer	L2
$\triangleright$	<b>Determine</b> thickness of a hair/paper with the concept of interference	L2
۶	Estimate the wavelength of different colors using diffraction grating and resolving	Т.2
	power	
$\triangleright$	Plot the intensity of the magnetic field of circular coil carrying current with	т 2
	distance	LJ
$\triangleright$	Evaluate the acceptance angle of an optical fiber and numerical aperture	L3
$\triangleright$	<b>Determine</b> the resistivity of the given semiconductor using four probe method	L3
$\triangleright$	<b>Identify</b> the type of semiconductor i.e., n-type or p-type using hall effect	L3
$\triangleright$	Calculate the band gap of a given semiconductor	L3

# Data Structures Lab

# (Common to All Branches of Engineering)

#### B. Tech – II Semester

# L-T-P-C 0-0-3-1.5

#### **Course Objectives:**

- 1. To introduce to the different data structures
- 2. To elucidate how the data structure selection influences the algorithm complexity
- 3. To explain the different operations that can be performed on different data structures
- 4. To introduce to the different search and sorting algorithms.

# Laboratory Experiments:

- 1. String operations using array of pointers
- 2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
- 3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
- 4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
- 5. Stack implementation using arrays
- 6. Stack implementation using linked lists
- 7. Queue implementation using arrays. Implement different forms of queue.

While implementing you should be able to store elements equal to the size of the queue.

No positions should be left blank.

- 8. Queue implementation using linked lists
- 9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
- 10. Breadth first search
- 11. Depth first search
- 12. Travelling sales man problem
- 13. File operations
- 14. Indexing of a file
- 15. Reversing the links (not just displaying) of a linked list.
- 16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
- 17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
- 18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table.

The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table.

User may like to remove row/column. Create table data type and support different operations on it.

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# **Course Outcomes:**

At the end of the course students should be able to

- 1. Select the data structure appropriate for solving the problem (L5)
- 2. Implement searching and sorting algorithms (L3)
- 3. Design new data types (L6)

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- 4. Illustrate the working of stack and queue (L4)
- 5. Organize the data in the form of files (L6)



# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA B.Tech – II-I SEM (R19) L T P C

3003

# DISCRETE MATHEMATICS (CSE)

# **Course Objectives**

- To explain about the Boolean Algebra, Graph theory and Recurrence relations.
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving.
- To elucidate solving mathematical problems from algorithmic perspective.
- To introduce the mathematical concepts which will be useful to study advanced courses
- Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc.
- To reveal how solutions of graph theory can be applied to computer science problems

# UNIT- I

**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, Inference theory of the Predicate Calculus. Unit Outcomes:

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

#### UNIT-II

Set Theory: Basic concepts of Set Theory, Representation of Discrete structures, Relations and Ordering, Functions, Recursion.

Algebraic Structures: Algebraic Systems: Examples and General Properties, Semi-Groups, Monoids and Groups.

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

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#### **Unit Outcomes:**

- Describe equivalence, partial order and compatible relations
- Compute Maximal Compatibility Blocks
- Identify the properties of Lattices
- Evaluate Boolean functions and simplify expression using the properties of Boolean algebra
- Infer Homomorphism and Isomorphism
- Describe the properties of Semi groups, Monoids and Groups

#### **UNIT-III**

**Elementary Combinatorics:** Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with repetitions, Enumerating Permutations and Combinations with constrained Representations, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion and Exclusion.

#### **Unit Outcomes:**

- Explain fundamental principle of counting.
- Examine the relation between permutation and combination.
- Solve counting problems by applying elementary counting techniques using the product and sum rules.
- Apply permutations, combinations, the pigeon-hole principle, and binomial expansion to solve counting problems.

### UNIT-IV:

**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.

# Unit Outcomes:

- Find the generating functions for a sequence.
- Design recurrence relations using the divide-and-conquer algorithm.
- Solve linear recurrence relations using method of Characteristic Roots.
- Outline the general solution of homogeneous or Inhomogeneous Recurrence Relations using substitution and method of generating functions.
- Solve problems using recurrence relations and recursion to analyze complexity of algorithms.

#### UNIT-V:

Alberto V. Alberto V.

**Graphs:** Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs, Chromatics Number, The Four-Color Problem.

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# Unit Outcomes:

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic ora cyclic.
- Describe complete graph and complete bipartite graphs.
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph.
- Apply the concepts of functions to identify the Isomorphic Graphs.
- Apply depth-first and breadth-first search.
- Apply Prim's and Kruskal's algorithms to find a minimum spanning tree.

# **Course Outcomes:**

After completion of this course the student would be able to

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

### **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).
- 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:**

- Kenneth H Rosen, "Discrete Mathematics and Its Applications (SIE)",7<sup>th</sup> 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<sup>st</sup> 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.

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITYANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. II Year – I Sem (C.S.E)

#### L T P C 3 0 0 3

# **Database Management Systems**

#### UNIT-1:

The Worlds of Database Systems –file system VS a DBMS–Advantages of DBMS–Levelsof 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.

# **UNIT II:**

**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.

#### UNIT III:

**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.

#### **UNIT IV:**

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.

#### UNIT V:

**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.

#### **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 7<sup>th</sup> Edition.

3. "Introduction to Database Systems", C.J.Date, Pearson Education.

4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITYANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. II Year – I Sem (C.S.E)

LT PC 3003

# **Formal Languages and Automata Theory**

#### **OBJECTIVE:**

This course is designed to:

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

#### UNIT – I: Finite Automata

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.

#### **UNIT – II: Regular Expressions**

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.

#### **UNIT – III: Context Free Grammars**

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.

#### **UNIT – IV: Pushdown Automata**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic

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and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

#### **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.

#### **TEXT BOOKS:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwaniand J.D.Ullman, 3<sup>rd</sup> Edition, Pearson, 2008.

2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3<sup>rd</sup> Edition, PHI, 2007.

#### **REFERENCE BOOKS:**

 Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
 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.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITYANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

# B.Tech. II Year – I Sem (C.S.E)

# LT PC 3003

# **Design and Analysis of Algorithms**

#### **Course Outcomes:**

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

- For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. Describe the dynamic-programming paradigm and explain when an algorithmic design• situation calls for it.
- For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
- For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
- Explain the ways to analyze randomized algorithms (expected running time, probability of error).
- Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

#### Unit-I:

**Introduction:** Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

#### Unit-II:

**Fundamental Algorithmic Strategies:** Brute-Force method Greedy, method Dynamic Programming, Branch-and-Bound method and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

#### Unit-III:

**Graph and Tree Algorithms:** Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

### Unit-IV:

**Tractable and Intractable Problems:** Computability of Algorithms, Computability classes – P, NP, NP complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

#### Unit-V:

Advanced Topics: Approximation Algorithms, Randomized Algorithms, Class of problem beyond NP-P SPACE

### **Text books:**

1. Introduction to Algorithms, 4<sup>th</sup> Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

2. Fundamentals of Algorithms – E. Horowitz et al.

#### **Reference** books:

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.

3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA. Approximation factor of an approximation algorithm (PTAS and FPTAS).

CAL

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. II Year – I Sem (C.S.E)

LT PC 3002

# **Digital Logic Design**

#### UNIT – I:

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

**Boolean Algebra And Logic Gates:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

#### UNIT – II:

**Gate –Level Minimization:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, EX-OR Function, Other Minimization Methods

#### UNIT – III:

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

#### UNIT – IV:

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.

#### UNIT – V:

**Memory and Programmable Logic:** Random access memory, memory decoding, Error Detection and Correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic.

#### **Text Books:**

- 1. Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5<sup>th</sup> Edition, 2013.
- 2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3<sup>rd</sup> Reprinted Indian Edition, 2012

#### **Reference Books:**

- 1. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier
- 2. Fundamentals of Logic Design, 5/e, Roth, Cengage
- 3. Switching and Finite Automata Theory, 3/e,Kohavi, Jha, Cambridge.
- 4. Digital Logic Design, Leach, Malvino, Saha, TMH
- 5. Modern Digital Electronics, R.P. Jain, TMH

SNL

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. II Year –I Sem (C.S.E)

L T P C 2 0 0 2

#### **Object Oriented Programming Concepts and Java Programming**

#### UNIT I:

**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

#### UNIT II:

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

**Introducing Classes:** Class Fundamentals, Declaring Objects, Introducing Methods, 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.

#### UNIT III:

**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.

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#### **UNIT IV:**

**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.

# UNIT V:

Advanced JAVA Concepts: JDBC, Hibernate, Struts, JSP

#### **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.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITYANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. II Year – I Sem (C.S.E)

LTPC

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# Design Thinking and Product Innovation Lab

#### **COURSE OBJECTIVES:**

- 1. To impart knowledge on analysis, design, implement in terms of design thinking process.
- **2.** Develop a basic understanding of the building blocks of design thinking such as empathize, ideate, prototyping, testing and validation.
- **3.** To provide skills on the applications of product design.

**COURSE OUTCOMES:** After successful completion of this course, the students will be able to:

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

#### List of Experiments:

- 1. Conduct survey and identify the problem by either individual or group and framea problem statement.
- 2. Identify demographic or focus group for problem statement and create persona and explicitly define the characteristics of persona.

- 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).
- 4. Design service blueprint and identify touch points from previously designed CJM.
- 5. Story boarding design ideas: Consider a scenario and create user stories and storyboards to transform information about user needs into design concepts.
- 6. 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.
- 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)
- 8. 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.
- 9. Create an application prototype for product recommendation using Marvel POP Software or FIGMA.
- 10. 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.
- 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.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

#### DATABASE MANAGEMENT SYSTEMS LAB

**B.TECH II Year I sem (C.S.E)** 

L T P C 0 0 3 1.5

#### Course Objective:

To create a database and query it using SQL, design forms and generate reports.
Understand the significance of integrity constraints, referential integrity constraints, triggers, assertions.
Learning Outcome:

Design databases
Retrieve information from data bases
Use procedures to program the data access and manipulation
Create user interfaces and generate reports

#### **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:

 $\Box$   $\Box$  Create tables department and employee with required constraints.

 $\Box$  Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command

 $\square$   $\square$  Basic column should not be null

 $\Box \Box$  Add constraint that basic should not be less than 5000.

 $\Box$   $\Box$  Calculate hra, da, gross and net by using PL/SQL program.

 $\Box$   $\Box$  Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.

 $\Box$   $\Box$  The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.

 $\Box$   $\Box$  The percentage of hra and da are to be stored separately.

 $\Box$   $\Box$  When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.

 $\Box$   $\Box$  Empno should be unique and has to be generated automatically.

 $\Box \Box$  If the employee is going to retire in a particular month, automatically a message has to be generated.

 $\Box$   $\Box$  The default value for date-of-birth is 1 jan, 1970.

 $\Box$   $\Box$  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.

 $\Box$   $\Box$  Display the information of the employees and departments with description of the fields.

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 $\Box \Box D$  is play the average salary of all the departments.

 $\Box$   $\Box$  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.

 $\Box$   $\Box$  Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.

 $\Box$  Find the employees whose salary is between 5000 and 10000 but not exactly 7500.

 $\Box$   $\Box$  Find the employees whose name contains \_en'.

 $\Box$   $\Box$  Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.

 $\Box \Box$  Create alias for columns and use them in queries.

 $\Box$   $\Box$  List the employees according to ascending order of salary.

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□ □ Basic column should not be null

 $\Box \Box$  Add constraint that basic should not be less than 5000.

 $\Box$   $\Box$  Calculate hra, da, gross and net by using PL/SQL program.

 $\Box$   $\Box$  Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.

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58

 $\Box$   $\Box$  Display the average salary of all the departments.

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 $\Box$   $\Box$  Use substitution variables to insert values repeatedly.

 $\Box$   $\Box$  Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.

 $\Box$   $\Box$  Find the employees whose salary is between 5000 and 10000 but not exactly 7500.

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 $\Box$   $\Box$  Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.

 $\Box$   $\Box$  Create alias for columns and use them in queries.

 $\Box$   $\Box$  List the employees according to ascending order of salary.

SAL

□ □ Postal system

□ □ Banking system

□ □ Courier system

 $\Box$   $\Box$  Publishing house system

4. Design of user interfaces and generation of reports

# References:

- 1. "Learning Oracle SQL and PL/SQL", Rajeeb C. Chatterjee, PHI.
- 2. "Oracle Database 11g PL/SQL Programming", M.Mc Laughlin, TMH.
- 3. "Introduction to SQL", Rick F. Vander Lans, Pearson education.
- 4. "Oracle PL/SQL", B.Rosenzweig and E.Silvestrova, Pearson education

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTHAPURAMU COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. II Year –I Sem (C.S.E)

L T P C 0 0 3 1.5

### **Object Oriented Programming Lab**

#### Software's for Lab:

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

#### Week-1 (Basics)

- 1. 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.
- 2. 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.
- 3. 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.
- 4. 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)

- 1. Write an applet program that displays a simple message
- 2. Write an applet to display a simple message on a colored background.
- 3. 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.
- 4. 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)

1. 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.

- 2. Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?
- 3. 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?
- 4. 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)

- 1. 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.
- 2. 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.
- 3. 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)
- 2. Write a Java program that creates Inner class.
- 3. 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)

- 1. 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.
- 2. Write a java program that implements educational hierarchy using inheritance.
- 3. 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

TeachingNon-Teaching Office Salary:DesignitionDesignitionempnosetvalue()setvalue()empname

getvalue()

**Course Outcome:** To create Java program by using Inheritance

#### Week-7 (Polymorphism and Interface)

- 1. Write a Java program to implement method overloading and method overriding
- 2. Write an application that creates an interface' and implements it.
- 3. 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)

- 1. Write a JAVA program illustrate class path
- 2. Write a case study on including in class path in your os environment of your package.
- 3. Write an application that creates a package p1. Add some classes in it.
- 4. 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)

- 1. Write a java program that implements Array Index out of bound Exception using builtin-Exception.
- 2. 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.
- 3. Write a java program to identify the significance of finally block in handling exceptions.
- 4. 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

-41M

## Week-10 (Multi-threading)

- 1. 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)
- 2. Write a program illustrating isAlive and join ()
- 3. Write a Program illustrating Daemon Threads.
- 4. Write a case study on thread Synchronization after solving the above producer consumer problem

Course Outcome: To implement and understanding the working of threads in Java

# B.Tech II Year I Semester JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA 19ACS15-FREE AND OPEN SOURCE LAB (Common to CSE)

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#### List of Experiments:

- 1. Linux Installation
- 2. MySQL Installation
- 3. Apache Installation
- 4. PHP and MySQL Connectivity
- 5. Python Programming
  - 5.1 Download and install the python
  - 5.2 redirection, pipes, filters and job control
  - 5.3 file ownership, file permissions, links and file system hierarchy
  - 5.4 Python and learn the basic types and control flow statements

5.5.1 Learn about functions - definition, default arguments, multiple return values, variable arguments.

5.5.2 Learn Python's data structures - lists, dictionaries, and tuples, in detail.

- 6. PERL and CGI Script
- 7. NS2 Installation

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR College of Engineering (Autonomous), Pulivendula - 516390, A.P, INDIA.

#### 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.



# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA B.Tech – II-II Sem (R19)

L T P C 3 0 0 3

# Numerical Methods, Probability and Statistics (Common to CIVIL, ME, EEE& CSE)

## **Course Objectives:**

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

# Unit I: 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:

After completion of this unit student able to

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

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<sup>rd</sup> and 3/8<sup>th</sup> 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:**

After completion of this unit student able to

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

# 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

- explain the terms sample space, random variable, expected value
- apply probability theory via Baye's theorem
- identify the notations of discrete and continuous distribution functions
- evaluate Binomial and Poisson distributions
- explain the properties of normal distribution

#### 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
- apply the concept of hypothesis testing for large samples

# **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
- estimate the goodness of fit

# **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", 5<sup>th</sup> edition, PHI, 2012.

# **References:**

- 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.
- P. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

# **Course Outcomes:**

Students will be able to

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

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# **Compiler Design**

#### Semester- IV (R19) (CSE)

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

#### **COURSE OBJECTIVES:**

Course is designed to:

- 1. Teach the concepts related to assemblers, loaders, linkers and editors
- 2. Introduce the basic principles of the compiler construction
- 3. Explain the Concept of Context Free Grammars, Parsing and various Parsing Techniques.
- 4. Expose the process of intermediate code generation.
- 5. Instruct the process of Code Generation and various Code optimization techniques.
- 6. Explain need of Program verification

#### UNIT – I

**Overview of Compilation and Language processing**:Preprocessor-Compiler-assemblerinterpreters-pre-processors-linkers and loaders-structure of a compiler- Phases of Compilation– Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping.

#### UNIT – II

**Top down Parsing:** Context-free grammars, Top down parsing–Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.

Bottom up Parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar.

#### UNIT – III

**Semantic analysis:** Intermediate forms of source Programs–abstract syntax tree, polishnotation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

#### UNIT – IV

**Symbol Tables:** Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information.

Intermediate code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Back patching.

**Code optimization:** Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, constant folding, DAG representation.

#### UNIT – V

**Data flow analysis:** Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation. **Object code generation:** Object code forms, machine dependent code optimization, register allocation and assignment, DAG for register allocation.

# **TEXT BOOKS**:

- 1. Principles of compiler design -A.V. Aho, J.D.Ullman, Pearson Education.
- 2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.
- 3. Compilers Principles, Techniques and Tools-Alfred V.Aho, Ravi Sethi, JD Ullman, Pearson Education, 2007.

#### **REFERENCES**:

- 1. lex&yacc John R. Levine, Tony Mason, Doug Brown, O'reilly.
- 2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
- 3. Engineering a Compiler-Cooper & Linda, Elsevier. Compiler Construction, Louden, Thomson.

# **COMPUTER ORGANIZATION**

### Semester- IV (R19) (CSE)

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

# **Course Objective:**

- 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
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

# **Course Outcomes:**

- Optimize the algorithms to exploit pipelining and multiprocessors
- Algorithm design for bit level arithmetic
- Ability to use memory and I/O devices effectively

# UNIT - I:

# 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

#### UNIT – II:

**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

#### UNIT – III:

**Register Transfer:** Register Transfer Language – Register Transfer – Bus and Memory Transfers – Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

**Control Unit:** Control Memory – Address Sequencing – Micro program Example – Design of Control Unit

#### UNIT – IV:

**Memory Organization:** Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

**Input/output Organization:** Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access (DMA).

#### UNIT – V:

**Pipeline:** Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline. **Multiprocessors:** Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization

#### **Text Books:**

- 1. "Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.
- 2. "Computer Systems Architecture", 3/e, M. Moris Mano, PEA, 2007

#### **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. "Computer Organization and Architecture", V. Rajaraman, T. Radakrishnan.
- 6. "Computer Organization and Design", P. Pal Chaudhuri, PHI
- 7. "Structured Computer Organization", Andrew S. Janenbaum, Todd Austin

"Computer Architecture" Parahmi, Oxford University Press

# **Operating Systems**

# Semester – IV (R19) (CSE)

LT PC 3003

UNIT - I:

**Operating Systems Overview:** Operating system functions, Operating system structure, protection and security, Kernel data Structures, Open- Source Operating Systems.

**Operating System Structure:** Operating System Services, User and Operating-System Interface, systems calls, system programs, operating system debugging, System Boot.

**Processes:** Process concept, Process Scheduling, Operations on processes, Inter process Communication.

# UNIT – II:

**Threads:** Overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

**Process Synchronization:** The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Monitors.

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling.

#### UNIT – III:

**Memory Management:** Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, and Allocating Kernel Memory.

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks-Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

#### UNIT – IV:

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, RAID structure.

**File system Interface:** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

# UNIT – V:

# **Case Studies:**

Mobile Operating System: Concepts, Structure, and Case Study.

# **Text Books:**

**1.** Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.

**2.** Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

### **Reference Books:**

R1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.

R2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.

R3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.

R4. Operating Systems, A.S.Godbole, Second Edition, TMH.

R5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.

R6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.

R7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, McGraw Hill.

# SOFTWARE ENGINEERING

# Semester – IV (R19) (CSE)

LT PC 3003

#### **UNIT I:**

**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, Process Terminology, Product and Process.

### **UNIT II:**

**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, Software Configuration Management

# UNIT III:

**Understanding Requirements**: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Requirements Analysis, Structured Analysis, Data Oriented Analysis, Object Oriented 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.

#### UNIT IV:

**Design Concepts:** Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model, Function oriented software design, Object oriented software development.

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

#### 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, Program Analysis Tools, Integration Testing.

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

# **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 Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition,2006.
- 6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition ,2006.
- 7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.
- 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.

# **Computer Networks**

# Semester – IV (R19) (CSE)

LT PC 3003

#### **Course Objectives:**

- Study the evolution of computer networks and future direction
- Study the concepts of computer networks from layered perspective
- Study the issues open for research in computer networks

#### **Course Outcomes**:

- Use appropriate transmission media to connect to a computer network and Internet
- Work on the open issues for their project
- Start using the Internet effectively
- Able to design new protocols for computer network

### UNIT –I:

Data Communications, Network, Business and Home applications of Computer Network, Internet history, Standards and Administration, Network hardware, Network Software: Protocol Hierarchies- Design Issues for the Layers- Connection-Oriented Versus Connectionless Service, Reference Models. Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate Limits, Performance, Circuit-Switched Networks, Packet Switching, and Guided Transmission Media.

#### UNIT –II:

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, the Channel Allocation Problem, Multiple Access Protocols, Ethernet

#### UNIT –III:

Data Link Layer Switching, Routing algorithms: The Optimality Principle-Shortest path Algorithm-Flooding-Distance Vector Routing-Link State Routing-Hierarchical Routing Broadcast Routing-Multicast Routing-Anycast Routing, Congestion Control Algorithms.

#### UNIT –IV:

Internetworking, The Network Layer in the Internet: The IP Version 4 Protocol- IP Addresses IP Version 6- Internet Control Protocols- Label Switching and MPLS-OSPF-BGP, Elements of Transport Protocols, Congestion Control: Desirable bandwidth Allocation-Regulating the Sending Rate.

# UNIT -V:

The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, World Wide Web and HTTP, FTP, Electronic Mail, TELNET, Secure Shell (SSH), Domain Name System (DNS).

#### **TEXT BOOKS:**

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", Pearson Education, 5<sup>th</sup> ed., ISBN 978-81-317-8757-1

2. Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill Education, 5<sup>th</sup> ed., ISBN 978-1-25-906475-3.

#### **REFERENCES:**

1. Douglas E. Comer, "Internetworking with TCP/IP – Principles, protocols, and architecture-Volume 1", 5th ed., PHI

2. Peterson, Davie,"Computer Networks", 5th ed., Elsevier.

3. Chawan- Hwa Wu, Irwin,"Introduction to Computer Networks and Cyber Security", CRC Publications. Computer Networks and Internets with Internet Applications, Comer

# B.Tech II Year II Semester JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA 19ACS27-COMPUTER NETWORKS AND OPERATING SYSTEMS LABORATORY

# L T P C 3 0 0 3

**Course Objectives:** The objectives of the course are to make the students learn about 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

To understand the techniques that computers use to communicate with I/O devices To study the concepts of pipelining and the way it can speed up processing.

# **Computer Networks Experiments**

- 1. Write a C program to implement the data link layer farming methods such as bit stuffing.
- 2. Write a C program to implement the data link layer framing method such as character stuffing.
- 3. Write a C program to implement data link layer framing method character count.
- 4. Write a C program to implement on a data set characters the three CRC polynomials

CRC 12, CRC 16, and CRC CCIP.

5. Write a C program to Implement Dijkstra's Algorithm to compute the shortest path through a given path.

# **Operating Systems Experiments**

- 1. Simulate the following CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
- 2. Simulate all file allocation strategies
  - a) Sequential b) Indexed c) Linked
- 3. Simulate MVT and MFT
- 4. Simulate all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
- 5. Simulate Bankers Algorithm for Dead Lock Avoidance
- 6. Simulate Bankers Algorithm for Dead Lock Prevention
- 7. Simulate all page replacement algorithms

a) FIFO b) LRU c) LFU Etc. ...

8. Simulate Paging Technique of memory management.

# B.Tech II Year II Semester JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA 19ACS24-SOFTWARE ENGINEERING LAB (Common to CSE)

### L T P C 0 0 2 1

Course Objectives: The objectives of the course are to make the students learn about

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

To understand the techniques that computers use to communicate with I/O devices

To study the concepts of pipelining and the way it can speed up processing.

# 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.

# B.Tech II Year II Semester JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA 19ACS22-COMPUTER ORGANIZATION LAB (Common to CSE)

# L T P C 0 0 2 1

**Course Objectives:** The objectives of the course are to make the students learn about 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

To understand the techniques that computers use to communicate with I/O devices

To study the concepts of pipelining and the way it can speed up processing.

# 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.

# 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	Ĺ	Т	P	С
	<b>Environmental Science</b>	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	Able to solve the environmental problems based fundamental concepts of				
	Environmental Science.				
CO2	Enable the students to understand the structure and function of significant environmental systems				
CO3	Knowledge of concepts makes them differentiate Natural and Polluted environment				
CO4	Enable to apply the Pyramid of number, mass and Energy, understand 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								1				
CO3												
CO4												
CO5												

# 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. Dams, benefits 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

c) Earth: Geomorphology, Weathering, Structure of Earth - inner core, outer core, mantle and the crust, magma.

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

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

- 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.

Types of some ecosystems: -

a. Forest ecosystem b. Desert ecosystem

d. Aquatic ecosystems (ponds, 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, India as a mega-diversity nation.

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

# **UNIT-III:**

Environmental Pollution and Disaster management:

Definition - Causes, effects and control measures of:

a. Air pollutionb. Water pollutionc. Soil pollution d. Marine pollutione. Noise pollutionf. Thermal pollutiong. Nuclear hazards

Disaster management: floods, earthquake, cyclone and landslides.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

# UNIT-IV:

#### Social Issues and the Environment

From Unsustainable to Sustainable development. Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Issues involved in enforcement of environmental legislation. Public awareness.

#### **UNIT-V:**

#### Human Population and the Environment i)

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health, 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 simple ecosystems-pond, river, hill slopes, etc.

### **Text Books:**

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4<sup>th</sup> edition, 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.

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING PULIVENDULA( AUTONOMOUS) -PIN: 516390(A.P.)

L	Т	Р	С
2	0	0	2

### UNIVERSAL HUMAN VALUES

#### **OBJECTIVES**

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

#### **Unit I: HUMAN VALUES**

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Self interest - Spirituality, Moral dilemmas- Consensus and controversy.

### **Unit II: PERSONALITY DEVELOPMENT**

Concept of personality, types of personalities, Knowing of self(SWOT), improving personality – techniques, interpersonal skills, intrapersonal skills, building right attitude, developing the spirit of universal human goodness.

#### Unit III: ENGINEERING AS SOCIAL EXPERIMENTATION AND

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground – General Principles – Utilitarian thinking respect for persons.

#### **RESPONSIBILITY FOR SAFETY AND RISK**

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety.

UNIT IV: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY.

Understanding Harmony in the family – the basic unit of human interaction, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the harmony

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in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family.

#### **UINIT V: GLOBAL ISSUES**

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights( IPR).

#### **Outcomes:**

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field.
- Identify the multiple ethical interests at stake in a real-world situation or practice.
- \* Articulate what makes a particular course of action ethically defensible.
- \* Assess their own ethical values and the social context of problems.
- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

# **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 McGraw-Hill–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.
- 6. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.

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

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