SCHEME OF INSTRUCTION & EXAMINATION FOR **I/IV B.Tech**
(With effect from 2019-20 admitted batches onwards)

B. Tech I Year – I Semester

CODE NUMBER	COURSE	HOURS PER WEEK				MAXIMUM MARKS			Credits
		L	T	P	Total	Ses.	Ext.	TOTAL	
1909101	Mathematics-I	3	--	--	3	30	70	100	3
1909102	Mathematics-II	3	--	--	3	30	70	100	3
1909103	Chemistry	3	1	--	4	30	70	100	4
1909105	Computer Programming with C and Numerical Methods	3	0	--	3	30	70	100	3
1909107	Essence of Indian Traditional Knowledge	2	0	-	2	30	70	100	0
1909109	English	3	--	--	3	30	70	100	3
1909103P	Chemistry Lab	0	0	3	3	50	50	100	1.5
1909105P	Computer Programming with C and Numerical Methods Lab	0	0	3	3	50	50	100	1.5
	Total	**17**	**1**	**6**	24	280	520	**800**	**19**

1909101 MATHEMATICS-I

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
3	3	-	-	3	30	70	100

PREREQUISITE (s)

Knowledge of Trigonometry, Differentiation and Integration.

COURSE OBJECTIVES

- To impart the knowledge of partial differentiation involving two or more variables, Euler‟s theorem, change of variables, Jacobians, Geometrical interpretation.
- To apply the concept of partial differentiation in finding the errors and approximations, maxima and minima of two variables, to introduce the Lagrange‟s method of undetermined constants and Leibnitz‟s rule.
- To solve the ordinary differential equations of first order and first degree, Bernoulli‟s equation, exact differential equations, and equations reducible to exact equations.
- To get knowledge about the applications of differential equations of first order like orthogonal trajectories, simple electric circuits, law of natural growth and decay.
- To solve the linear differential equations of higher order and Simultaneous Differential Equations.

COURSE OUTCOMES

At the end of the course student will be able to

CO 1 Analyze problems involving two or more variables and their interpretation

CO 2 Apply the techniques of multivariable differential calculus to determine extrema and series expansions etc. of functions of several variables.

CO 3 Understand some basic definitions and terminology associated with differential equations and their solutions.

CO 4 Solve practical problems which give rise to differential equations of the first order.

CO 5 Develop the ability to solve linear differential equations of higher order.

Unit-I

Partial Differentiation:

Functions of two or more variables - Partial derivatives - Homogeneous functions – Euler‟s theorem - Total derivative. Change of variables – Jacobians.

Unit-II

Applications of Partial Differentiation:

Taylor‟s theorem for functions of two variables - Errors and approximations, Maxima and Minima of functions of two variables - Lagrange‟s method of undetermined multipliers - Leibnitz‟s rule.

Unit-III

Ordinary Differential Equations of First Order and First Degree:

Formation of the ordinary differential equations (ODEs) - Solution of an ordinary differential equation - Equations of the first order and first degree - Linear differential equation - Bernoulli‟s equation - Exact differential equations - Equations reducible to exact equations.

Unit-IV

Applications of Differential Equations of First Order:

Orthogonal Trajectories - Simple Electric (LR & CR) Circuits - Newton‟s Law of Cooling - Law of Natural growth and decay.

Unit-V

Linear Ordinary Differential Equations of Higher order:

Solutions of Linear Ordinary Differential Equations with Constant Coefficients - Rules for finding the complimentary function - Rules for finding the particular integral - Method of variation of parameters – Cauchy‟s Linear Equation – Legendre‟s Linear Equations and Simultaneous linear differential equations.

TEXT BOOK:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, Khanna Publishers, 43rd Edition.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
5. Higher Engineering Mathematics by Dr. M.K.Venkataraman, National Publishing Co., Chennai.

1909102 MATHEMATICS-II

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
3	3	-	-	3	30	70	100

PREREQUISITE (s)

Knowledge of algebra of matrices, Trigonometry, Differentiation and Integration.

COURSE OBJECTIVES

The students are introduced with matrix algebra, Laplace transforms and Fourier series to enable them to use in their further studies.

- In matrix algebra, Consistency and inconsistency of system of equations by the use of rank of a matrix, Obtaining Eigen values and Eigen vectors of a square matrix and application of Cayley- Hamilton‟s theorem, Quadratic and canonical forms, Properties of complex matrices, Solution of system of equations by direct methods are thoroughly discussed.
- In Laplace transforms, Properties of Laplace transforms, Properties of Inverse Laplace transforms, Applications of Laplace transforms are presented.
- Whereas in Fourier Series, Euler's Formula, Conditions for a Fourier Expansion, Functions having points of discontinuity, Expansions of Odd or Even Functions, Half-Range Series, Parseval's Formula.

COURSE OUTCOMES

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

CO 1	Solve the linear system of equations analytically and compute Eigen values and eigenvectors of a square matrix.
CO 2	Reduce the Quadratic Form to Canonical Form and find the nature of a Quadratic Form
CO 3	Evaluation of integrals by using Laplace Transforms.
CO 4	Appraise the Laplace transform technique and use it to solve various engineering problems.
CO 5	Find Fourier series for certain functions.

Unit-I

Matrices-I

Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations - Consistency of Linear System of Equations - Direct & Indirect Methods: Gauss elimination method, LU Factorization method, Eigen Values and Eigen Vectors of a Matrix - Cayley-Hamilton theorem - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem and its applications.

Unit-II

Matrices-II

Diagonalization of a Matrix - Quadratic Forms - Reduction of Quadratic Form to Canonical Form - Nature of a Quadratic Form - Complex Matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their Properties.

Unit-III

Laplace Transforms - I

Introduction - Existence Conditions - Transforms of Elementary Functions - Properties of Laplace Transforms - Laplace Transforms of Periodic Functions -Transforms of Derivatives - Transforms of Integrals - Multiplication by t^n - Division by t – Evaluation of integrals by Laplace Transforms.

Unit-IV

Laplace Transforms - II

Inverse Laplace Transform – Convolution Theorem –Applications of Laplace Transforms in solving Ordinary Differential Equations - Second Shifting Theorem - Laplace Transforms of Unit Step Function, Unit Impulse Function

Unit-V

Fourier Series

Introduction - Euler‟s Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even Periodic Functions, Half-Range Series - Parseval‟s Formula.

TEXT BOOK:

Scope and Treatment as in “Higher Engineering Mathematics”, by Dr. B.S.Grewal, Khanna Publishers, 43rd Edition.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.

1909103 CHEMISTRY

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	4	30	70	100

PREREQUISITE (s)

Knowledge of theoretical and experimental chemistry from +2 Level.

COURSE OBJECTIVES

1. To apply the basic knowledge of Chemistry to the Engineering Discipline.
2. To develop knowledge about water and its treatment for industrial and potable purposes.
3. To develop understanding in the areas of solid state chemistry, polymers, mechanism of corrosion of metals and corrosion control methods, fuels, lubricants and building materials, conducting polymers, bio-degradable polymers and fiber reinforced plastics and apply the knowledge for solving existing challenges faced in various engineering and societal areas.

COURSE OUTCOMES

CO.1: Analyze and determine the water quality and prescribe the remedial measures for domestic as well as industrial usage.

CO.2: Obtain the knowledge on design and development of materials with pre-required properties based on understanding the structure of solids.

CO.3: Student will differentiate the moulding techniques of plastic materials &classify the polymers and can apply to specific purposes.

CO.4: Students can able to design the metallic materials to prevent corrosion.

CO.5: Student will apply suitable lubrication mechanisms for various machinery parts.

CO.6: To understand the properties of engineering materials and their applications.

Chapter – 1: Water Chemistry (8 Hrs)

Sources of Water – Impurities and their influence of living systems – WHO Limits – Hardness and its Determination – Boiler Troubles and their removal – Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water – Reverse Osmosis Method, Electro-dialysis. **(CO1)**

Chapter – 2: Solid State Chemistry (8 Hrs)

Solids - Classification of Solids – Types of Crystals – Fundamental Laws of Crystal Structure –X-Rays and Bragg‟s Law – Imperfections in Crystals – Band Theory of Solids – Chemistry of Semiconductors – Intrinsic, Extrinsic, Compound and Defects – Organic Semiconductors – Super Conductivity – Purification of Solids by Zone refining – Liquid Crystals. **(CO2)**

Chapter – 3: Polymers and Plastics (8 Hrs)

Polymers: Definition – Types of Polymerization (Addition & Condensation) – Mechanisms of Addition Polymerization – Radical and Ionic – Thermodynamics of Polymerization Process.

Plastics: Thermosetting and Thermoplastics – Effect of Polymer Structure on Properties of Cellulose Derivatives – Vinyl Resins – Nylon (6,6), Reinforced Plastics – Conducting Polymers. **(CO3)**

Chapter – 4: Corrosion (8 Hrs)

Corrosion: Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, Inter granular, Waterline, Stress – Galvanic Series – Factors Effecting Corrosion.

Corrosion Controlling Methods: Protective Coatings: Metallic Coatings, Electroplating and Electroless Plating – Chemical conversion Coatings – Phosphate, Chromate, Anodized, Organic Coatings – Paints and Special Paints. **(CO4)**

Chapter – 5: Fuels and Lubricants (8 Hrs)

Solid Fuels: Wood and Coal, Ranking of Coal – Analysis (Proximate and Ultimate) Coke Manufacture – Otto Hoffmann‟s Process – Applications.

Liquid Fuels: Petroleum Refining – Motor Fuels – Petrol and Diesel Oil – Knocking – Octane number – Cetane Number.

Gaseous Fuels: Biogas, LPG and CNG – Characteristics – Applications.

Rocket Fuels: Propellants – Classification – Characteristics.

Lubricants: Classification – Mechanism – Properties of Lubricating Oils – Selection of Lubricants for Engineering Applications. **(CO5)**

Chapter 6: Building Materials(8 Hrs)

Portland Cement: Manufacture of Cement - Dry and Wet Processes – Chemical Composition of Cement - Setting and hardening of cement - Cement concrete - RCC - Decay of concrete and Protective Measures - Special Cements.

Refractories: Classifications - Properties - Engineering Applications.

Ceramics: Classification - Properties - Engineering Applications. **(CO6)**

TEXT BOOKS:

1. Engineering Chemistry – P.C. Jain and M. Jain, 16th Ed., Dhanpath Rai and Sons, New Delhi (2015).
2. A Text book of Engineering Chemistry, S.S. Dara, 12th Ed., S. Chand & Co. New Delhi (2010).

REFERENCE BOOKS:

3. Engineering Chemistry, B.K. Sharma, Krishna Prakashan, 6th Ed., Meerut (2005).

- Engineering Chemistry - B.L. Tembe, Kamaluddin and M.S. Krishnan (NPTEL).

1909105 COMPUTER PROGRAMMING WITH C AND NUMERICAL METHODS

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
3	3	-	-	3	30	70	100

COURSE OBJECTIVES:

i. Aims to provide exposure to problem-solving through C programming.

ii. Aims to train the student to the basic concepts of the C-programming language & Numerical Methods.

COURSE OUTCOMES

CO1.Student will be able to write code using control structures & arrays

CO2. Student will be able to write code using strings & functions

CO3.Student will be able to write code using user defined data types

CO4.Student will be able to write code using Pointers for operations on files

CO5.Student will be able to write code for Numerical & Integral Methods

Unit –I

Introduction to C, Decision Making, Branching, Looping, Arrays

Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations, Formatted Input, Formatted Output, Decision making with if statement, Simple if statement, The if…else statement, Nesting of if…else statement, the else if ladder, switch statement, the (?:) operator, the GOTO statement., The while statement, The do statement, The for statement, Jumps in Loops, One, Two-dimensional Arrays.

Unit – II

Functions & Strings

Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, The scope, visibility and lifetime of variables, Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings.

Unit – III

Structure and Unions

Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, structures and functions and unions, size of structures and bit-fields- Program applications.

Unit – IV

Pointers&File handling

Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointes, pointers as function arguments,

functions returning pointers, pointers to functions, pointers to structures-Program

Applications, File handling: Defining and opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, random access to files and Command Line Arguments-Program Applications.

Unit – V

Numerical Methods & Integrations

Solutions of Algebraic and Transcendental Equations: Bisection Method, Newton Raphson Method. Interpolation: Newton‟s forward and backward Interpolation, Lagrange‟s Interpolation in unequal intervals, Trapezoidalrule, Simpson‟s 1/3 rule. Solutions of Ordinary First Order Differential Equations: Euler‟s Method, Modified Euler‟s Method and Runge-Kutta Method.

TEXT BOOKS:

1. Programming in ANSI C, E Balagurusamy, 6th Edition. McGraw Hill Education (India) Private Limited.
2. Introduction to Numerical Methods, SS Sastry, Prentice Hall.

REFERENCE BOOKS:

1. Let Us C, YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, 3rd Edition, Thomson, 2007.
3. The C –Programming Language‟ B.W. Kernighan, Dennis M. Ritchie, PHI
4. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M. Barone (Author), Enzo Marinari (Author), Giovanni Organtini, World Scientific.

1909107 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Credits	*Periods*			*Total Contact Hrs./Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
0	2	-	-	2	30	70	100

COURSE OBJECTIVES:

1. To know the contributions of scientists for the development of society over a period of time.
2. To understand the Science and Technological developments that lead to human welfare.
3. To appreciate the Science and Technological contributions for the development of various sectors of the economy.
4. To identify the technological transfer versus economic progress of the countries.

COURSE OUTCOMES:

CO1 - Demonstrate knowledge of broad concepts in the history of science, technology ranging over time, space and cultures and appreciate the science and technological contributions for the development of various sectors of the economy.

CO2 - Recognize the values of a wide range of methodologies, conceptual approaches and policies for the development of science and technology.

CO3 - Think independently and critically, using appropriate methodologies and technological developments in the critical areas of science and technology that lead to human welfare.

CO4 - Proficiently use contemporary technologies.

Unit -I

Historical Perspective of Science and Technology

Nature and Definitions; Roots of Science – In Ancient Period and Modern Period (During the British Period); Science and Society; Role of Scientist in the Society**.**

Unit -II

Policies and Plans after Independence: Science and Technology Policy Resolutions

New Technology Fund; Technology Development (TIFAC); Programs aimed at Technological Self Reliance; Activities of Council of Scientific and Industrial Research**.**

Unit -III

Science and Technological Developments in Critical Areas

Space – The Indian Space Program: India‟s Geostationary Satellite Services – INSAT System And INSAT Services; Defense Research and Technology – Research Coordination, Research efforts and Development of technologies and Spin-off technologies for civilian use; Nuclear Energy –Effects of a nuclear explosion and India‟s safety measures.

Unit -IV

Impact of Science and Technology in Major Areas

Ocean Development: Objectives of Ocean Development, Biological and Mineral resources, Marine Research and Capacity Building; Biotechnology: Meaning, Biotechnology techniques-Bioreactors, Cell fusion, Cell or Tissue Culture, DNA Fingerprinting, Cloning, Artificial Insemination and Embryo Transfer Technology and Stem Cell Technology; Application of Biotechnology – Medicine, Biocatalysts, Food Biotechnology, Fuel and Fodder and Development of Biosensors**.**

Unit -V

Technology Transfer and Development

Transfer of Technology – Types, Methods, Mechanisms, Process, Channels and Techniques; Appropriate Technology - Criteria and Selection of an Appropriate Technology; Barriers of Technological Change.

Text Books:

1. Kalpana Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi-58. 2. Srinivasan, M., Management of Science and Technology (Problems & Prospects), East – West Press (P) Ltd., New Delhi.

1909109 ENGLISH

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
3	3	-	-	3	30	70	100

PREREQUISITES:

Knowledge of literature and grammar from +2 Levels. Application of syntactical principles and phonetic techniques to the required course.

COURSE OBJECTIVES:

CO - 1:

- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.

- Learning new words and phrases.
- Using words and phrases in different contexts.

CO – 2:

- Using the basic structure of a sentence.

- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.

- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.
- Participating in discussions and influencing them and communicating ideas effectively.
- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.

CO - 3:

- Analyzing a topic of discussion and relating it to time management skills.
- Participating in discussions and influencing them.
  Communicating ideas effectively.
  Presenting ideas coherently within a stipulated time.

CO – 4:

- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.

- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.

- Understanding the importance of helping others: community services andenthusiasm.

CO – 5:

- The student will learn to avoid redundancy will learn common abbreviations useful for competitive exams and will acquire basic proficiency in English including reading, comprehension and writing skills.
- The student will be motivated with a sense of purpose throughout the course by learning life skills.

DETAILED SYLLABUS

Unit-I

Reading	:	On the conduct of life: William Hazlitt
Grammar	:	Prepositions
Vocabulary	:	Word Formation I: Introduction to Word Formation
Writing	:	Clauses and Sentences
Life skills	:	Values and Ethics -If: Rudyard Kipling

Unit-II

Reading	:	The Brook: Alfred Tennyson
Grammar	:	Articles
Vocabulary	:	Word Formation II: Root Words from other Languages
Writing	:	Punctuation
Life skills	:	Self-Improvement

How I Became a Public Speaker: George Bernard Shaw

Unit-III

Reading	:	The Death Trap: Saki
Grammar	:	Noun-Pronoun Agreement, Subject- Verb Agreement
Vocabulary	:	Word Formation III: Prefixes and Suffixes
Writing	:	Principals of Good Writing
Life skills	:	Time Management: On saving Time: Seneca

Unit -IV

Reading	:	ChinduYellama
Grammar	:	Misplaced Modifiers
Vocabulary	:	Synonyms; Antonyms
Writing	:	Essay Writing
Life skills	:	Innovation - Muhammad Yunus

Unit-V

Reading	:	Politics and the English Language: George Orwell
Grammar	:	Clichés; Redundancies
Vocabulary	:	Common Abbreviations
Writing	:	Writing a Summary
Life skills	:	Motivation - The Dancer with a White Parasol: Ranjana Dave

Textbook:

Language and Life: A Skills Approach Board of Editors, Orient Black Swan Publishers, India. 2018.

Writing Skills:

Paragraph, Letters (Formal, Enquiry, Complaint) E-mail Writing, Dialogue Writing, Story Writing with hints.

Suggested Readings:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

1909103P CHEMISTRY LAB

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
1.5	-	-	3	3	50	50	100

PREREQUISITE (s):

Knowledge of theoretical and experimental chemistry from +2 Level.

COURSE OBJECTIVES:

1. To develop the fine skills of quantitative determination of various chemical components through titrimetric analysis.
2. To prepare and use ion exchange/zeolite columns for the removal of hardness of water.
3. To develop the skill of organic synthesis through the preparation of a polymer/drug

COURSE OUTCOMES:

At the end of the course student will be able to

CO.1 Quantitatively determine the amount of various chemical species in solutions bytitrations.

CO.2 Conduct the quantitative determinations with accuracy

CO.3 Develop novel materials to be used as zeolite and prepare columns for removal of hardness of water

CO.4 Synthesize a polymer or a drug

List of Laboratory Experiments

1. Determination of sodium hydroxide with HCl (with Na_2CO_3 as primary standard)
2. Determination of alkalinity (carbonate and hydroxide) of water sample
3. Determination of Fe(II)/Mohr‟s salt by permanganometry
4. Determination of oxalic acid by permanganometry
5. Determination of chromium(VI) by Mohr‟s salt solution
6. Determination of zinc by EDTA method
7. Determination of hardness of water sample by EDTA method
8. Determination of chlorine in water by iodometric titration
9. Ion exchange/zeolite column for removal of hardness of water

10. Synthesis of a polymer (bakelite)/drug (aspirin)

REFERENCE BOOKS

- Vogel‟s Quantitative Chemical Analysis – V Edition – Longman
- Experiments in Applied Chemistry (For Engineering Students) – Sinita Rattan – S. K. Kataria & Sons, New Delhi.

1909105P COMPUTER PROGRAMMING WITH C AND NUMERICAL METHODSLAB

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
1.5	-	-	3	3	50	50	100

COURSE OUTCOMES

CO1.Ability to implement the programs using control structures & arrays
CO 2.Ability to implement the programs using strings & functions
CO 3.Ability to implement the programs using user defined data types
CO 4.Ability to implement the programs using pointers and operations on files
CO 5. Ability to implement the programs using numerical &integral methods

LIST OF EXPERIMENTS

1. a) Write a C program to find the roots of a quadratic equation
   b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and
   use Switch statement.
   c) Write a C program to find the sum of individual digits of that number and also print and save it in reverse order.
2. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
3. Write a program which generates 100 random real numbers in the range of 10.0 to 20.0 and sort them in descending order.
4. Write a function for transporting a square matrix in place (in place means that you are not allowed to have full temporary matrix).
5. Write a program to add two matrices with the dimension of the matrix specified by the user at the time of executing the program.
6. Write a program e.g. for getting a sub-string from a given position, copying one string to another, reversing a string and adding one string to another with and without using string manipulation functions.
7. Write a program to read the data of four students, each students has a name (string), roll number (string), age (integer), use an array of structure. Later find the average age of the students.
8. Write a program to demonstrate the difference between pointer to an array and array of pointers.
   a) Store your name, address and phone number in a 2-D character array and display the same using pointer notations.
   b) Use pointer to an array and array of pointers.

9. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.
10. Implement bisection method to find the square root of a given number to a given accuracy.
11. Implement Newton Raphson Method to determine a root of polynomial equation.
12. Given a table of x and corresponding f(x) values, write a program which will determine f(x) value at an intermediate x value using Lagrange Interpolation.
13. Implement Simpson‟s $1/3^{rd}$ rule for numerical integration.
14. Implement Trapezoidal rule for numerical integration.
15. Write a program to solve a differential equation using Runge-Kutta Method.

II-SEMESTER

CODE NUMBER	COURSE	HOURS PER WEEK				MAXIMUM MARKS			Credits
		L	T	P	Total	Ses.	Ext.	TOTAL	
1909201	Mathematics-III	3	1	--	4	30	70	100	4
1975202	Probability, Statistics and Queuing Theory	3	1	--	4	30	70	100	4
1909204	Physics	3	1	--	4	30	70	100	4
1909206	Engineering Graphics	2	-	4	6	30	70	100	4
1909208	Professional Ethics and Moral Values	2	--	--	2	30	70	100	0
1909204P	Physics Lab	--	--	3	3	50	50	100	1.5
1909210P	Workshop	--	--	3	3	50	50	100	1.5
	Total	**13**	**3**	**10**	**26**	**250**	**450**	**700**	**19**

1909201 MATHEMATICS-III

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	4	30	70	100

PREREQUISITES:

Knowledge of Complex numbers and it‟s properties, Trigonometry, Differentiation and Integration. How to sketch the graph of function.

COURSE OBJECTIVES:

The main objective of Engineering Mathematics is to make the students familiar with mathematical thinking and realization of the background of their problems.

- Multiple Integral is a natural extension of a definite integral to a function of more than one real variable.
- The students should be able to evaluate Double and Triple Integrals, volumes of solids and area of curved surfaces.
- They should know the concepts of analyticity, Complex integration, and complex power series classification of singularities.
- The student should know the applications of the calculus of residues in the evaluation of real definite integrals.

COURSE OUTCOMES

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

CO 1 Calculate the double and triple integral of a function of two or three variables.

CO 2 Apply the knowledge of multiple integral, to find areas, volumes and moment of inertia.

CO 3 Have deal with some elementary complex functions.

CO 4 Solve the complex integration of a function and find the singularities of a function

CO 5 Acquire the skill of contour integration to evaluate complicated real definite integrals via residue calculus.

Unit-I

Multiple Integral –I

Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates. Triple Integrals - Change of Variables.

Unit-II

Multiple Integral -II

Area enclosed by plane curves - Volumes of solids - Calculation of mass - Center of gravity - Moment of inertia Beta Function - Gamma Function - Relation between Beta and Gamma Functions.

Unit-III

Complex Analysis -I

Introduction - Limit and continuity of f(z)- Derivative of f(z), Cauchy-Reimann Equations, Analytic Functions, Harmonic functions, Orthogonal systems. Introduction to Conformal transformation, Bilinear transformation w (az +b) / (cz d)

Unit-IV

Complex Analysis -II

Integration of complex functions, Cauchy‟s theorem, Cauchy‟s integral formula and their applications. Complex terms -Taylor‟s and Laurent‟s series (without proofs), Zero‟s and Singularities of analytic functions.

Unit-V

Complex Analysis -II

Residues and Calculations of residues, Cauchy‟s Residue Theorem, Evaluation of real definite integrals: Integration around unit circle, semi-circle.

TEXT BOOK:

Scope and Treatment as in “Higher Engineering Mathematics”, by Dr. B.S. Grewal, Khanna Publishers, 43rd Edition.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, Inc.
2. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal; Lakshmi Publications.
3. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
4. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
5. Advanced Mathematics for Engineers″, by Chandrika Prasad, Pothishala Pvt. Ltd., Allahabad.

1975202 PROBABILITY, STATISTICS AND QUEUING THEORY

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	4	30	70	100

COURSE OBJECTIVES

- To discuss basics of probability and related theorems, Problems. To study about conditional probability and Bayes theorem.
- To study about random variables and their properties. To examine, analyze and compare Probability distributions.
- To discuss regression and estimation techniques.
- To discuss various types of tests such as F-test, Chi-square test. To study the various queuing models.

COURSE OUTCOMES

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

CO 1 Ability to solve various problems regarding probability and conditional probability.

CO 2 Examine, analyze and compare probability distributions.

CO 3 Prepare null and alternative hypothesis and test its validity based on random sample.

CO 4 Solve various types of regression problems.

CO 5 Understand various queuing models.

Unit-I

Probability

Definitions of Probability, Addition Theorem, Conditional Probability, Multiplication Theorem, Bayes‟ Theorem of Probability and Geometric Probability. Random Variables and their Properties: Discrete Random Variable, Continuous Random Variable, Probability Distribution, Joint Probability Distributions Their Properties, Transformation Variables, Mathematical Expectations, Probability Generating Functions.]

Unit-II

Probability Distributions

Discrete Distributions: Binomial, Poisson Negative Binominal Distributions and their Properties; Continuous Distributions: Uniform, Normal, Exponential Distributions and their Properties.

Unit-III

Multivariate Analysis and Curve Fitting

Correlation, Correlation Coefficient, Rank Correlation, Regression Analysis, Multiple Regression, Principles of Least Squares and Curve Fitting.

Unit-IV

Estimation and testing of hypothesis

Sample, Populations, Statistic, Parameter, Sampling Distribution, Standard Error, Un-Biasedness, Efficiency, Maximum Likelihood Estimator, Notion & Interval Estimation. Sample Tests: Large Sample Tests Based on Normal Distribution , Small Sample Tests : Testing Equality of Means, Testing Equality of Variances, Test of Correlation Coefficient, Test for Regression Coefficient; Coefficient of Association, 2 – Test for Goodness of Fit, Test for Independence.

Unit-V

Queuing Theory

Queue Description, Characteristics of a Queuing Model, Study State Solutions of M/M/1: Model, M/M/1; N Model, M/M/C: Model, Case Studies

Text Books:

1. Probability & Statistics for Engineers and Scientists, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Education.
2. Probability, Statistics and Random Processes T. Veerarajan, Tata McGraw Hill
3. Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor Sultan, Chand & son.

Reference Books:

1. Probability & Statistics with Reliability, Queuing and Computer Applications, Kishor S. Trivedi, Prentice Hall of India,1999.

1909204 PHYSICS

Credits	*Periods*			*Total Contact Hrs/Week.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	4	30	70	100

PREREQUISITES:

Knowledge of theoretical and experimental Physics from +2 Level. Application of Physics theory and calculations to required course.

COURSE OBJECTIVES:

The fundamentals of sciences are essential to learn as the application of science in solving problems is technology. The physics curriculum is designed in such a way that all branches of engineering will study the basic fundamentals of technology from where it is originated. The course objectives are:

1. Make the student familiar with the basic concepts, principles and laws in Waves and Oscillations, Electromagnetism, Wave Optics, Lasers and Fiber Optics, Super conductivity, Quantum Mechanics and Semiconductor Physics.
2. Make the student to realize the importance of fundamental concepts and make him learn how to apply these in solving problems.
3. To impart knowledge for the student how these basic concepts are related to engineering applications.

COURSE OUTCOMES:

By the end of this course, student would have

CO1. Learnt the fundamental laws and their applications in Waves and Oscillations.

CO2. Gained the basic and origin of electromagnetism from electrostatics and magnetism and summarize the basic theories of electrostatics and electromagnetics to solve a variety of problems.

CO3. Learnt the basics of physical optics and its corresponding applications.

CO4. Known how a laser light is different from ordinary light, how a laser light can be produced and its different applications in present day technology and the principles of Optical Fiber.

CO5. Learnt the concepts of modern physics and its applications in technology.

Unit-I

Waves and Oscillations (CO1)

Simple Harmonic Motion, Velocity, Acceleration and Energy of a Simple Harmonic Oscillator, Damped harmonic oscillator: heavy, critical and light damping, Coupled Oscillators, Longitudinal and Transverse waves, Reflection and Transmission of Waves, Electromagnetic Waves, The Spectrum of Electromagnetic Radiation.

Unit-II

Electromagnetism and Magnetic Properties of Materials (CO2)

Electric Flux, Gauss„s law of Electrostatics in Free Space and its applications, Biot-Savart Law, Ampere„s Law- Magnetic Induction on the axis of a circular current loop, Hall effect, Faraday„s Law of Induction, Lenz„s Law, Induced magnetic fields, Displacement Current, Maxwell„s Equations in Integral Form (no derivation), Magnetization, Permeability and Susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

Unit-III

Wave Optics (CO3)

Interference: Principles of superposition – Young„s Experiment – Coherence - Interference in thin films, Wedge shaped film, Newton„s Rings, Michelson Interferometer and its applications.

Diffraction: Diffraction, differences between interference and diffraction, two classes of diffraction, Fraunhofer diffraction due to Single slit (Qualitative and quantitative treatment).

Polarisation: Polarisation by double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization and detection.

Unit-IV

Lasers and Fibre Optics & Super conductivity (CO4)

Lasers and Fibre Optics: Introduction, spontaneous and stimulated emissions, population inversions, pumping, Ruby laser, Gas laser (He-Ne Laser), Semiconductor laser, Applications of lasers. Optical Fibre and Total Internal Reflection, Acceptance Angle and cone of a fibre, Numerical aperture, Fibre optics in communications, Application of optical fibers.**Super conductivity:** Super conductivity, Meissner Effect, Types of Superconductors and Applications of Superconductors.

Unit-V

Quantum Mechanics & Semiconductor Physics (CO5)

Quantum Mechanics: Introduction, Photoelectric effect, de-Broglie„s hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg„s Uncertainty principle, Born„s interpretation of the wave function, Schrodinger„s time independent wave equation, Particle in one dimensional box. **Semiconductor Physics:** Energy bands in solids, Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and Extrinsic semiconductors, Diode: p-n junction diode device structure, materials, characteristics, and figures of merit, LED: device structure,materials, characteristics, and figures of merit. Photo diode, Solar cell.

BOOKS RECOMMENDED

1. Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
3. Engineering Mechanics, 2nd ed.- M K Harbola, Cengage Learning
4. I. G. Main, ―Vibrations and waves in physics„, 3rd Edn, Cambridge University Press

REFERENCE BOOKS:

1. Engineering Physics by M.N. Avadhanulu & P.G. Kshirsagar, S Chand & Company Ltd.
2. Modern Engineering Physics by A.S. Vasudeva, S Chand & Company Ltd.
3. University Physics by Young & Freedman, Pearson Publications.

1909206 ENGINEERING GRAPHICS

Credits	*Periods*			*Total Contact Hrs/Week*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	2	-	4	6	30	70	100

COURSE OBJECTIVES:

COB 1 The course is aimed at developing Basic Graphic skills.

COB 2 Develop Skills in Preparation of Basic Drawings

COB 3 Skills in Reading and Interpretation of Engineering Drawings

COURSE OUTCOMES:

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

CO 1	Graphically construct and understand, the importance of mathematical curves in Engineering applications
CO 2	Graphically visualize and construct orthographic projection of points and lines
CO 3	Visualize and construct different views of planes and solids in different orientations
CO 4	Construct and develop the sectioned surfaces of geometrical solids
CO 5	Interpret and draw the Orthographic and Isometric views of different solids.

Unit – I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions.

Curves: Construction of Conic sections, cycloids and involutes. Normal and tangent to the curves.

Unit – II

Projections of Points and Straight Lines: Principal or Reference Planes, Projections of a point situated in any one of the four quadrants. Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of straight line inclined to both the reference planes. Traces.

Unit – III

Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes. Introduction to Auxiliary Planes.

Projections of Solids: Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

Unit – IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT – V

Isometric Views: Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, sphere and their combinations.

TEXT BOOK:

Elementary Engineering Drawing by N.D. Bhatt, Charotar Publishing House.

REFERENCE BOOK:

Engineering Graphics by K.L. Narayana and P. Kannaiah, Tata Mc-Graw Hill.

1909208 PROFESSIONAL ETHICS & MORAL VALUES

Credits	*Periods*			*Total Contact Hrs/Week.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
0	2	-	-	2	30	70	100

OBJECTIVES OF THE COURSE:

- To inculcate Ethics and Moral Values into the young minds.
- To develop moral responsibility and mold them as best professionals.
- To create ethical vision and achieve harmony in life.

COURSE OUTCOMES:

CO 1- Student will exhibit and promote Universality of values and take ethical decisions at appropriate situations.

CO 2- student will become a better professional and will also conduct oneself according to the code of Ethics in their professional life.

CO 3- student will perform better in showcasing life skills and will also have a better perspective in balancing work and life.

CO 4- student will execute and promote professional Rights.

CO 5- student will be adapting oneself to the global professional scenario and still be able to maintain harmony in life.

Learning outcome: By the end of the course student should be able to understand the importance of ethics and values in life and society.

Unit – I

Ethics and Moral Values: Ethics and Values, Ethical Vision, Ethical Decisions, **Moral Values** – Classification of Values, Universality of Values.

Unit – II

Engineering Ethics: Nature of Engineering Ethics, Profession and Professionalism, Professional Ethics, Code of Ethics, Sample Codes – IEEE, ASCE, ASME and CSI.

Unit – III

Engineering as Social Experimentation: Engineering as social experimentation, Engineering Professionals – life skills, Engineers as Managers, Consultants and Leaders, Role of engineers in promoting ethical climate, balanced outlook on law.

Unit – IV

Safety Social Responsibility and Rights: Safety and Risk, moral responsibility of engineers for safety, case studies – Bhopal gas tragedy, Chernobyl disaster, Fukushima Nuclear disaster, Professional rights, Gender discrimination, Sexual harassment at workplace.

UNIT – V

Global Issues: Globalization and MNCs, Environmental Ethics, Computer Ethics, Cyber Crimes, Ethical living, concept of Harmony in life.

TEXT BOOKS:

1. Govindharajan, M., Natarajan, S. and Senthil Kumar, V.S., Engineering Ethics, Prentice Hall of India, (PHI) Delhi,2004.
2. Subramainam, R., Professional Ethics, Oxford University Press, New Delhi,2013.

REFERENCES:

1. Charles D, Fleddermann, "Engineering Ethics", Pearson / PHI, New Jersey 2004 (IndianReprint).

1909204P PHYSICS LAB

Credits	*Periods*			*Total Contact Hrs/Week.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
1.5	-	-	3	3	50	50	100

PREREQUISITE (S):

Knowledge of theoretical and experimental Physics from +2 Level. Application of Physics theory and calculations to required course.

COURSE OBJECTIVES:

To train the student in acquiring skills, techniques of using instruments to observe the physical phenomena, to measure certain physical quantities and constants.

COURSE OUTCOMES:

By the end of the course the student will be able to

CO1. Experiment and evaluate basic principles of physics by observing and analyzing the data, plotting graphs and interpreting the results.

LIST OF LABORATORY EXPERIMENTS:

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton„s Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy „s Constants of a Given Material of the Prism usingSpectrometer.
5. Determination of Refractive Index of Ordinary ray μo and Extraordinary μe ray.
6. Determination of Thickness Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth„s Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.

11. Carey Foster,,s Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde,,s Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Laser- Diffraction.

1909210P WORKSHOP

Credits	*Periods*			*Total Contact Hrs/Week.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
1.5	-	-	3	3	50	50	100

COURSE OUTCOMES:

CO 1 Identify and use various tools required for performing operations in Carpentry for making various components

CO 2 Identify and use various tools required for performing operations in Fitting for making various components

CO 3 Identify and use various tools required for performing operations in Tinsmithy for making various components.

LIST OF EXPERIMENTS:

Minimum of three exercises have to be conducted from each trade.

Trade	Experiment (Job)
1. Carpentry	(a) Cross Lap Joint (b) Corner Dovetail Joint (c) Mortise and Tenon Joint (d) Bridle Joint
2. Fitting	(a) V-Fit (b) Square Fit (c) Half Round Fit (d) Dovetail Fit
3. Tin Smithy	(a) Taper Tray (b) Square Tray (c) 90^{o} Elbow (d) Funnel

REFERENCES:

1. Elements of workshop technology, Vol.1 by S. K. and H. K. Choudary.
2. A course in Workshop Technology ,Vol.1 by B.S.Raghuwanshi, Danpat Rai

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE & P.G. COURSES (A)

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ENGINEERING & TECHNOLOGY PROGRAM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME FOR II/IV B. TECH I SEM (3rd Semester)

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	Engineering Science Course	1975301	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	3	4.5
2	Professional Core Courses	1975302	DATA STRUCTURES AND ALGORITHMS	3	0	3	4.5
3	Engineering Science Course	1975303	DIGITAL LOGIC DESIGN	3	0	0	3
4	Professional Core Courses	1975304	OBJECT ORIENTED PROGRAM MING WITH JAVA	3	0	3	4.5
5	Humanities and Social Sciences including Management Course		Universal Human Values: Understanding Harmony	2	1	0	3
						Total credits	**19.5**

1975301	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal : 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To introduce Electronics and Communication Engineering in a nutshell.
2. To explain the role of Electronics and Communication Engineering in all other engineering disciplines.
3. To explain the basic building blocks of digital and analog electronic circuits.

COURSE OUTCOMES:

At the end of the course student will be able to

1) Understand the basic theorems and components used in Electrical circuits and also the functionality of electrical machines.
2) Discuss the functionality of basic semiconductors and their applications.
3) Implement the concepts of BJT, Rectifiers and Thermal stabilization to design CE, CB, CC amplifiers.
4) Analyse the Characteristics of FET & MOSFET.
5) Elaborate the Knowledge of Communication Engineering.

UNIT-I

ELECTRICAL CIRCUITS & MEASUREMENTS: Ohm‟s Law – Kirchoff‟s Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT-II

ELECTRICAL MECHANICS : Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT-III

SEMICONDUCTOR DEVICES AND APPLICATIONS: Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage

Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT-IV

FIELD EFFECT TRANSISTORS : Junction Field Effect Transistors (JFET) – JFET characteristics, JFET Parameters, Small signal equivalent circuit – MOSFETS – Depletion and Enhancement MOSFETS.

UNIT-V

FUNDAMENTALS OF COMMUNICATION ENGINEERING : Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

Text books:

1) D.P.Kotharti and I.J.Nagarath, Basic Electrical and Electronics Engineering, Mc graw hill, 2016, Third edition.
2) M.S.Sukhija and T.K.Nagsarkar, Basic Electrical and Electronics Engineering, Oxford, 2016.

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Reference Books:

1) S.B.Lal Seksena and Kaustuv Dasgupta, Fundamentals of Electrical Engineering, Cambridge, 2016.
2) B.L.Thereza, Fundamentals of Electrical Engineering and Electronics, Chand & Co 2008.
3) S.K.Sahdev, Basics of Electrical Engineering, Pearson, 2015

1975302	DATA STRUCTURES & ALGORITHMS	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External Exam: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To understand recursive algorithms and basic concepts of data structures
2. To learn linear data structures such as Stacks, Queues and Linked lists
3. To learn Nonlinear data structures such as Trees and Graphs
4. To understand and solve searching and sorting techniques
5. To solve problems using data structures such as stacks, queues, linear lists, trees and graphs

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the implementation of Stacks and Queues using Arrays and their applications.
2. Describe various types of linked lists and their implementation.
3. Construct various types of trees and their traversal techniques.
4. Discuss the computational efficiency of the principal algorithms for sorting and searching.
5. Describe how graphs are represented in memory and solve real time application problems using concepts of graphs.

UNIT - I

1. **Introduction to Data Structures:** Abstract Data Types, Meaning and Definition of Data Structures. **Stacks**: Stack as an Abstract Data Type, Primitive Operations, Implementing StackOperations using Arrays. Infix to Postfix, Infix to Prefix Conversions, Postfix Evaluation and Recursion. **Queues**: Queue as an Abstract Data Type, Sequential Representation, Types of Queues,Operations, Implementation using Arrays.

UNIT - II

Linked List: Operations, Implementation of Stacks, Queues and priority Queues using Linked Lists+, Circular Lists: Insertion, Deletion and Concatenation Operations, Stacks and Queues as Circular Lists,Doubly Linked Lists.

UNIT – III

Trees: Binary Trees - Definitions and Operations, Binary Tree Representation: Node Representation, Implicit array Representation, Binary Tree Traversal, Threaded Binary Trees and their Traversal, Trees and their Applications; Heterogeneous binary trees, Tree Searching Insertion and Deletion of a node from a Binary Search Tree, Efficiency of Binary Search Treeoperations.

UNIT – IV

Searching: Basic Searching Techniques: Dictionary as an Abstract Data Type, Algorithmic Notation, Sequential Searching and its Efficiency, Binary Search, Interpolation Search.
Sorting: General Background: Efficiency, Asymptotic Notations, Efficiency of Sorting, Bubble Sort and Quick Sort and their Efficiency, Selection Sorting, Binary Tree Sort, Heap Sort, Insertion Sorts, Shell Sort, Address calculation Sort, Merge andRadix Sorts.

UNIT – V

Graphs and Their Application: Definition of Graphs, Representation of Graphs, Transitive closure, Linked Representation of Graphs, Topological Ordering of nodes ,Graph Traversal and Spanning Forests, Undirected Graphs and their Traversals Applications of Graphs, Minimal Spanning Trees.

Textbooks:

1. Data Structures Using C and C++ Yaddish Langsam, Moshe J .Augenstein and Aaron M.Tanenbaum, Prentice Hall Of India(2^{nd}Edition)
2. Data Structure and Algorithm, Prof. Maria RukadikarS

Reference Books:

1. Data Structures, Algorithms and Applications with C++, Sahani Mc-Graw Hill.

1975303	DIGITAL LOGIC DESIGN	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To introduce the basic principles for design of combinational circuit and sequential circuits.
2. To learn simple digital circuits in preparation for computer engineering.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Represent different number systems and solve problems on binary addition, subtraction, 2,,s complement.
2. Minimize the Boolean expression using Boolean algebra and design it using logic gates.
3. Realize and simplify Boolean Algebraic functions using K-Maps and design combinational circuits.
4. Design and develop sequential circuits
5. Understand memories like RAM and ROM, Programmable Logic Array and Programmable Array Logic.

UNIT-I

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

UNIT-II

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-III

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, Exclusive-OR Function, Hardware Description Language (HDL). **Combinational Logic:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, HDL for Combinational Circuits.

UNIT-IV

Sequential Logic Design, Synchronous Sequential Logic: Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, HDL for Sequential Circuits, State Reduction and Assignment, Design Procedure.
Registers ad Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters, HDL for Registers and Counters.

UNIT-V

Memory and Programmable Logic: Introduction, Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-Only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

Text books:
1. Digital Design, 3rdEdition, M.Morris Mano, Pearson Education.
2. Digital Logic Design, Lokesh Chaudhary & Sunil S. Chaudhary Hardeep Singh

Reference Books:
1. Digital Logic Design Principles, Norman Balabanian & Bradley Carlson, John Wiley & Sons(Asia) Pvt.Ltd.,2002
2. Fundamentals of Digital Logic with VHDL Design, Stephen Brown and Zvonko Vranesic, Tata McGraw-Hill Edition,2002

1975304	OBJECT ORIENTED PROGRAMMING WITH JAVA	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To learn the basics of object-oriented programming concepts and Java programming.
2. To learn inheritance, polymorphism and how they relate to the design of abstract classes.
3. To understand the concepts of packages and interfaces with exception handling and multithreading.
4. To design concepts of real time problems are realized using Graphical User Interface.
5. To learn network programming and applications development.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the object-oriented programming concepts and basics of Java.
2. Write programs using polymorphism, inheritance, packages and interfaces in Java.
3. Develop applications using multithreading with exception handling.
4. Design GUI applications using Applets, AWT and Swing.
5. Understand the basics of networking concepts and develop client server applications.

UNIT-I

Introduction- Summary of oops concepts, Java Basics- History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, classes and objects – concepts of classes, objects, constructors, methods, Introducing access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT-II

Inheritance, Interface and Packages– Inheritance and its types with examples, benefits of inheritance, Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes. Interface-defining an interface, implementing interface, variables in interface and extending interfaces, differences between classes and interfaces, difference between interfaces and abstract classes. Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, exploring packages – java.io.

UNIT-III

Exception handling and multithreading - Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, java built in exceptions, creating own exception sub classes. Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads.

UNIT-IV

Applets - Concept of Applets, differences between applets and application, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, dialogs, menu bar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grid bag.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

UNIT-V

Networking – Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, java.net package.

Text books:

1. Java; the complete reference, 7th Edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

Reference Books:

1. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.
2. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education
3. Object Oriented Programming through Java, P. Radha Krishna, and University Press.
4. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.

1975305	UNIVERSAL HUMAN VALUES - UNDERSTANDING HARMONY	
Instruction: 2 Periods + 1 Tut/week, External Exam: 3 Hours		Credits: 3
Internal: 30 Marks	External: 70 Marks	Total: 100 Marks

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

At the end of the course student will be able to

1. to become more aware of themselves, and their surroundings (family, society, nature);
2. they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Module 1

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

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; „Natural Acceptance‟ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2

Understanding Harmony in the Human Being - Harmony in Myself!

1. Understanding human being as a co-existence of the sentient „I‟ and the material „Body‟
2. Understanding the needs of Self („I‟) and „Body‟ - happiness and physical facility
3. Understanding the Body as an instrument of „I‟ (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of „I‟ and harmony in „I‟
5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one‟s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
2. Understanding the meaning of Trust; Difference between intention and competence
3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
4. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students‟ lives.

Module 4

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
3. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

Module 5

Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics:
   a. Ability to utilize the professional competence for augmenting universal human order
   b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
   c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
7. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.

Text books:

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

Reference Books:

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

1975301P	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB	
Instruction: 3 Periods/week External. Exam: 3 Hours		**Credits: 1.5**
Internal:50 Marks	**External: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES

1. To Verify basic laws and theorems for a given resistive network
2. To determine the performance parameters for D.C & A.C Machines.
3. To Verify the V-I Characteristics of Diodes (PN Junction Diode & Zener Diode).
4. To Verify the Characteristics of BJT & FET
5. To perform Amplitude Modualtion & Demodulation for Sinusoid Waveform.

COURSE OUTCOMES

By the end of course a student would be able to

1. Verify Ohm's law and Kirchhoff's law, superposition theorem for a given resistive network excited by a D.C. source.
2. Determine Regulation of a single phase transformer, efficiency of a Three-Phase Induction motor, D.C Shunt motor.
3. Verify the V-I characteristics of PN Junction Diode & zener diode, Rectify & regualte a sinusoid using half wave & full wave rectifier.
4. Verify the characteristics of CE configuration of BJT & characteristics of JFET
5. For a given sinusoid perform Amplitude Modulation & Demodulation and calculate modulation index for under, critically and over modulation cases.

LIST OF EXPERIMENTS

1. Verification of Ohm's law & Kirchhoff's law
2. Verification of Superposition Theorem
3. Open circuit test and short circuit test on 1-phase transformer
4. No load and blocked rotor tests on 3-phase squirrel cage Induction motor
5. Brake test on a D.C Shunt motor.

6. V-I Characteristics of P-N Junction diode
7. V-I & Regulation Characteristics of Zener diode
8. Half Wave Rectifier with filter
9. Full wave Rectifier with filter
10. Input and Output Characteristics of CE Configuration
11. Drain and Transfer Characteristics of JFET
12. Amplitude modulation & Demodulation

1975302P	DATA STRUCTURES & ALGORITHMS LAB	
Instruction: 3 Periods/week External. Exam: 3 Hours		**Credits: 1.5**
Internal:50 Marks	**External Exam: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES

1. To implement stacks and queues using arrays and linked lists.
2. To develop programs for searching and sorting algorithms.
3. To write programs using concepts of various trees.
4. To implement programs using graphs.

COURSE OUTCOMES

At the end of the course student will be able to

1. Implement programs on stacks, queues and various types of linked list.
2. Develop programs using various graph algorithms
3. Implement program on Binary search tree traversals
4. Write programs using various searching and sorting techniques.

List of Programs

1. Write a C program to implement the operations on stacks.
2. Write a C program to implement the operations on circular queues.
3. Write a C program for evaluating a given postfix expression using stack.
4. Write a C program for converting a given infix expression to postfix form using stack.
5. Write a C program for implementing the operations of a dequeue.
6. Write a C program for the representation of polynomials using circular linked list and for the addition of two such polynomials.
7. Write a C program to create a binary search tree and for implementing the in order, preorder, post order traversal using recursion

8. a) Write a C program for finding the transitive closure of a digraph

   b) Write a C program for finding the shortest path from a given source to any vertex in a digraph using Dijkstra‟s algorithm

9. a) Write a C program for finding the Depth First Search of a graph.

   b) Write a C program for finding the Breadth First Search of a graph.

10. Write a C program for sorting a list using Bubble sort and then apply binary search.
11. Write a C program for quick sort
12. Write a C program for Merge sort.
13. Write a C program for Heap sort

1975304P	OBJECT ORIENTED PROGRAMMING LAB WITH JAVA	
Instruction: 3 Periods /Week	External. Exam: 3 Hours	**Credits: 1.5**
Internal: 50 Marks	**External: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. Practice object-oriented programs and build java applications.
2. Implement java programs for inheritance, interfaces and polymorphism.
3. Implement sample programs for developing reusable software components.
4. Build applications using files concept.
5. Design GUI and networking applications.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Develop java programs using control structure statements, polymorphism, inheritance and interface.
2. Implement applications using package and multithreading, files concepts.
3. Create GUI applications and client server application using network concept.

CYCLE -1

Week-1: BASIC PROGRAMS

1. Try debug step by step with 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 ax2 +bx+c=0. Read in a, b,c and use the quadratic formula.
3. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

Week-2: MATRICES, OVERLOADING, OVERRIDING

1. Write a java program to multiply two given matrices.
2. Write a java program to implement method overloading and constructors overloading.
3. Write a java program to implement method overriding.

Week-3: PALINDROME, ABSTRACT CLASS

1. Write a java program to check whether a given string is palindrome.

2. Write a java program for sorting a given list of names in ascending order.

3. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Week-4: INTERFACE

1. Write a program for hybrid inheritance.

CYCLE -2

Week-5: PACKAGE, MULTITHREADING

1. Create user defined package.
2. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
3. Write a java program that correct implements of producer consumer program.

Week-6: FILES

1. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
2. Write a java program that displays the number of characters, lines and words in a text file.
3. Write a java program that reads a file and displays the file on the screen with line number before each line.

CYCLE -3

Week-7: TRAFFIC LIGHT

1. Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP” or “READY” or” GO” should appear above the buttons in selected color. Initially, there is no message shown.

Week-8: MOUSE EVENTS

1. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.

Week-9: KEY EVENTS

1. Write a java program to demonstrate the key event handlers.

Week-10: CALCULATOR

1. Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.

Week 11: APPLET and Swing

1. Develop an applet that displays a simple message.
2. Develop an applet that receives an integer in one text field and computes its factorial value and returns it in another text field, when the button named "compute" is clicked.
3. Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box using Swing concept.

Week 12: NETWORKING

1. Write a java program for client server application for one to one chatting.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE & P.G. COURSES (A)

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ENGINEERING & TECHNOLOGY PROGRAM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME FOR II/IV B. TECH II SEM (4th Semester)

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	Professional Core Courses	1975401	COMPUTER ORGANIZATION & ARCHITECTURE	3	0	0	3
2	Professional Core Courses	1975402	OPERATING SYSTEMS	3	0	3	4.5
3	Engineering Science Course	1975403	MICROPROCESSORS	3	0	3	4.5
4	Humanities &Social Sciences including Management courses	1975404	PRINCIPLES OF ECONOMICS & MANAGEMENT	3	0	0	3
5	Mandatory Course		ENVIRONMENTAL STUDIES	3	0	0	0
6	Professional Core Courses	1975406	DISCRETE MATHEMATICS	3	1	0	4
7	Engineering Science Course	1975407	PROBLEM SOLVING USING PYTHON	0	0	4	2
						Total credits	**21**

1975401	COMPUTER ORGANIZATION AND ARCHITECTURE	
Instruction: 3 Periods /week, External. Exam: 3 Hours		Credits: 3
Internal: 30 Marks	University: 70 Marks	Total: 100 Marks

COURSE OBJECTIVES:

1. To study about structure and functional components of a computer.
2. Understanding the hierarchical organization of a computer system which consists of instruction set of commands.
3. Learn about the architecture of a computer from a programming view.
4. To design a balance system that minimizes performance and utilization of all elements.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the Concepts of Register Transfer and Microoperations and detailed idea about Computer Organization and Design.
2. Describe Micro-programmed Control & Organization of the CPU.
3. Discuss the design concepts of pipeline and vector processing
4. Classify various I/O devices and the I/O interface.
5. Distinguish the organization of various parts of a system memory hierarchy.

UNIT-I

Register Transfer and Micro operations:

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

UNIT-II

Micro programmed Control: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control,

Reduced Instruction Set Computer (RISC), Architecture and Programming of 8085Microprocessor.

UNIT-III

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISK Pipeline, Vector Processing, Array Processors.

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UNIT-IV

Input/output Organization: Peripheral Devices, I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory access, Input-Output Processor (IOP), Serial Communication.

UNIT-V

Memory Organization: Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and Virtual memory, Memory Management Hardware.

Text books:

1. Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd. Third Edition Sept. 2008.
2. Computer Architecture and Organization, P.Chakraborty.
3. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh S Gaonkar

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Reference Books:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003.
2. Computer Organization and Architecture, Linda Null, Julia Lobur, Narosa Publications ISBN81- 7319-609-5
3. Computer System Architecture‖, John. P.Hayes.

1975402	OPERATING SYSTEMS	
Instruction: 3 Periods /week, External. Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To learn about operating system structure, services, operations and design principles.
2. To understand how processes are scheduled and synchronized by Operating System.
3. To learn different OS approaches to memory management and deadlocks.
4. To learn design and implementation of OS subsystems such as File Systems, I/O Systems and to investigate case studies to understand the design philosophies.

COURSE OUTCOMES:

At the end of the course student will be able to

1. **Understand** Operating System structure, **classify** OS services and **analyze** scheduling algorithms.
2. **Identify** solutions to overcome synchronization problems and deadlocks in modern operating system design.
3. **Explain** about memory management functions and **compare** various page replacement algorithms.
4. **Understand** how File Systems and I/O Systems are organized, implemented and managed by operating system.
5. **Distinguish** the relative merits of LINUX, Windows OS and **Recognize** how OS protects system from unauthorized access.

UNIT-I

Introduction to Operating Systems: Over View of Operating Systems, Types of Operating Systems, Operating System Structures, Operating System Services, System Calls, Virtual Machines, Operating System Design and Implementation. **Process Management**: Process Concepts, Operations on Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms.

UNIT-II

Process Synchronization: The Critical Section Problem, Peterson,,s Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors. **Deadlocks**: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Deadlock Detection, Recovery from Deadlocks.

UNIT-III

Memory Management: Logical versus Physical Address, Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, Virtual Memory, Demand Paging, Page Replacement, Allocation of Frames, Thrashing.

UNIT-IV

File Systems: Implementation and Secondary-Storage Structure: Concept of a file, Access Methods, Directory Structure, Protection, File System Structure, Allocation Methods, Free Space Management.
I/O systems: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, swap-space management.

UNIT-V

System Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights.
Case Study: Overview of LINUX, Windows OS.

Text books:

1. Operating Systems, Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, John Wiley Publ., 9th Edition.

Reference Books:

1. Modern Operating Systems, Andrew S. Tanenbaum, 4th edition, 2016, Pearson.
2. Operating Systems, William Stallings 5th Edition –PHI.
3. Operating Systems: A Design-Oriented Approach,,, Charles Crowley, Tata Hill Co., 1998 edition.

1975403	MICROPROCESSORS	
Instruction: 3 Periods /week,	**Univ. Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**University Exam: 70 Marks**	**Total: 100 Marks**

Course Objectives:

1. To discuss the architectures of 8085, 8086 microprocessors, their instruction sets and related ALP programs.
2. To discuss interfacing semiconductor memories, interfacing peripheral to Intel 8086.
3. To study interfacing data converters to 8086 and discuss about micro controller 8051 architecture, Programming and its applications.

Course Outcomes:

1. Understand the basic architecture of 8085 and ability to write ALP Programs using Instruction Set.
2. Understand the basic architecture of 8086 and ability to write ALP Programs using Instruction Set.
3. Implement the Interfacing of 8086 Microprocessor with Semiconductor Memories and I/O Devices.
4. Implement the Interfacing of 8086 Microprocessor with various peripheral devices and data converters.
5. Develop Applications of 8051 using the knowledge of Architecture, Programming concepts of 8051 Microcontroller.

Syllabus:

UNIT – I

Introduction to Microprocessors and Microcomputers: A Brief Architecture and Programming of 8085 Microprocessor.

UNIT - II

8086 Architecture: Instruction Set and Programming of 8086 Microprocessor

UNIT - III

Interfacing Semiconductor Memories and I/O Devices: Semiconductor Memories: Classification Internal Organization& Functional Description, Interfacing SRAMs and EPROMs to 8086.

UNIT - IV

Interfacing Peripherals to Intel 8086 : Parallel I/O Interface- 8255, Serial I/O Interface – 8251, Timer Interface - 8253/8254, **Interfacing Data Converters to 8086:** D/A Conversion Methods, A/D Conversion methods.

UNIT - V

Introduction to Micro controllers: Intel 8051Architecture, Instruction Set, Addressing Modes, Programmingand Applications of 8051.

TextBooks:

1. Microprocessor Architecture, Programming, and Applications with the 8085 Ramesh S. Gaonkar, 4th Edition, Penram International, 1999
2. The 80x86 Family, Design, Programming and Interfacing, John E.Uffenbeck, 3rd Edition, Pearson Education Inc., 2002
3. KennethJ.Ayala, 8051 Microcontroller Architecture, Programming And Applications,2nd Edition, Penram International Publications,1999

1975404	PRINCIPLES OF ECONOMICS AND MANAGEMENT	
Instruction:3Periods/week, Univ. Exam: 3Hours		**Credits: 3**
Internal: 30 Marks	**University Exam: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. Apply economic reasoning to the analysis of selected contemporary economic problems.
2. Understand how households (demand) and businesses (supply) interact in various market structures to determine price and quantity of goods and services produced and consumed.
3. Analyze the efficiency and equity implications of government interference in markets.
4. To unable student to understand various Management Principles
5. Understand the Entrepreneurship environment.

COURSE OUTCOMES:

1. Understand the links between production costs and the economic models of supply.
2. Represent supply, in graphical form, including the upward slope of the supply curve and what shifts the supply curve.
3. To know the procedure of various forms of starting a organization
4. Able to relate the basics of Principles of Management in relation with functional areas like Financial Management and Human Resources Management and Production Management.
5. Students will acquire the knowledge on basics of entrepreneurship.

Syllabus:

1. **Introduction to Managerial Economics:** Wealth, Welfare and Scarce Definitions of Economics; micro and Macro Economics; Demand- Law of Demand, Elasticity of Demand, types of Elasticity and factors of determining price elasticity of Demand: utility- Law of Diminishing Marginal Utility andits limitations.

2. **Conditions of Different Market Structures:** Perfect Competition, Monopolistic Competition, Monopoly, Oligopoly and Duopoly.
   Forms of Business Organizations: Sole Proprietorship, Partnership, Joint Stock Company- Private Limited and Public Limited Companies, Public Enterprises and their types.

3. **Introduction to Management:** Functions of Management- Taylor „s Scientific management; Henry Fayol„s Principle of Management; Human Resource Management- basic Functions of HR Manager; Man Power Planning, Recruitment, Selection, Training, Development, Placement, Compensation and performance Appraisal(inbrief).

4. **Production Management:**Production Planning and Control, plant Location, Break-EvenAnalysis, assumptions and applications.

5. **Financial Management:** Types of Capital: Fixed and Working Capital and Methods of Raining Finance; Depreciation: Straight Line and Diminishing Balance Methods. Marketing Management: Functions of marketing and Distribution Channels.

6. Entrepreneurship: Entrepreneurial Functions, Entrepreneurial Development: Objectives, Training, Benefits: Phases of Installing a project.

Text Books:

1. K.K. DEWETT, **Modern Economic Theory**, S.Chand and Company, NewDelhi-55.
2. S.C. Sharma and Banga T. R., Industrial Organization & Engineering Economics, Khanna Publications,Delhi-6.

Reference Books:

1. A.R. AryaSri, Management Science, TMH publications, NewDelhi-20.
2. A.R. AryaSri, Managerial Economics and Financial Analysis, TMH Publication.

1975405	ENVIRONMENTAL STUDIES	
Instruction: 3Periods/week,	**Univ. Exam: 3 Hours**	**Credits: 0**
Internal: 30 Marks	**University Exam: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To Make the students get awareness on environment
2. To understand the importance of protecting natural resources, ecosystems for future generations
3. To know about the causes of pollution due to the day to day activities of human life
4. To get an idea about the measures for sustainable development.

COURSE OUTCOMES:

At the end of the Course, the Student will be able to:

1. Learn about the scope and importance of Environmental studies. The students understand about different kinds of ecosystems.
2. Learn about biodiversity and its conservation. They also learn about types of biodiversity, values of biodiversity and threats to biodiversity.
3. Understand about the types of natural resources and problems associated with them.
4. Gain knowledge about different types of environmental pollutions, their causes, effects and control measures.
5. Gain knowledge about characteristics of human population growth and its impact on environment. The students develop deep understanding about the environmental legislation.

UNIT-I

Introduction to Environmental studies and Ecosystems:

Definition, Scope and importance of environmental studies. Concept of an Eco system, Biotic and Abiotic components of ecosystem, structure and function of an ecosystem. Food Chains, Food webs and Ecological Pyramids Forest ecosystem, Grassland ecosystem, Desert ecosystem, Pond ecosystem and Marine ecosystem.

UNIT – II

Bio-Diversity and its Conservation;

Introduction – Definition and types of biodiversity – value of biodiversity - India as mega diversity nation – Hot spots of biodiversity – Threats to biodiversity – Conservation methods of biodiversity – In-situ & Ex – situ methods of conservation - Concept of sustainable development.

UNIT – III

Environment and Natural Resources Management:

Soil erosion and desertification, Effects of modern agriculture, fertilizer-pesticide problems, Forest Resources : Use and over-exploitation, Mining and dams – their effects on forest and tribal people, Water resources : Use and over-utilization of surface and ground water, Floods, droughts, Water logging and salinity, Dams – benefits and costs, Conflicts over water, Energy Resources : Energy needs, Renewable and non-renewable energy sources.

UNIT – IV

Environmental Pollution – climate change and environmental problems:

Definition, causes, effects and control measures of (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution. Global Warming – Acid Rain – Ozone depletion – Photochemical smog. Drinking water, Sanitation and public health, Effect of activities of the quality ofenvironment Urbanization, transportation, Industrialization. Water scarcity and ground water depletion, Controversies on major dams –resettlement and rehabilitation of people problems andconcerns

UNIT – V

Human Population and Environmental legislations:

Population Explosion – characteristics of population explosion. Impact of population growth on Environment – Role of Information technology in Environment and Human Health, Environmental Ethics .Environmental acts: Water (Prevention and control of pollution) act, air (Prevention and control of pollution) act, Environmental Protection Act, Wild life protection act, Forest conservation act.

Textbooks :

Kaushik – Kaushik, Anubha

Reference :

Deswal&Deswal, Raja Gopal, Dharmaraj Publishers.

1975406	DISCRETE MATHEMATICS	
Instruction: 3 Periods+1 Tutorial /week, Univ. Exam: 3 Hours		**Credits: 4**
Internal: 30 Marks	**University Exam: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To understand mathematical arguments using logical connectives and quantifiers and verify the validity of logical flow of arguments using propositional , predicate logic and truth tables.
2. To understand about permutations and combinations.
3. To understand various types of relations and discuss various properties of the relations.
4. To study the graphs, graph isomorphism and spanning trees.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Solve the basic principles of Logics and proofs.
2. Solve different kinds of problems related to Relations and set theory
3. Analyze the fundamental algorithms and construct simple mathematical proofs
4. Acquire knowledge to solve network problems using graph theory.
5. Solve problems related to counting and advanced counting techniques

UNIT-I

The Foundations-Logic and Proofs: Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT-II

Basic Structures-Sets, Functions, Sequences and Sums: Sets, Set Operations, Functions, Sequences and Summations. Relations: Relations and their properties, n-ary relations, applications, Representation, closure equivalence relations, Partial orderings

UNIT-III

The Fundamentals-Algorithms, the Integers and Matrices: Algorithms, The Growth of Functions, Complexity of Algorithms, The Integers and Division, Primes and Greatest Common Devisors, Integers and Algorithms, Applications of Number Theory, Matrices. Induction and Recursion:

Mathematical Induction, Strong Induction and Well- Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT-IV

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest- Path Problems, Planar Graphs, Graph Coloring

UNIT-V

Counting: The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations. Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations,Divide-and-Conquer Algorithms and Recursion Relations, Generating Functions, Inclusion- Exclusion, and Applications of Inclusion-Exclusion.

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Text books:

1. Discrete Mathematics & Its Applications with Combinatorics and Graph Theory by Kenneth H Rosen, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

Reference Books:

1. Discrete Mathematics for Computer Scientists & Mathematicians by Joe L. Mott, Abraham Kandel, Theodore P. Baker, Prentice-Hall, India
2. Discrete Mathematics by Richard Johnson Baug, Pearson Education, New Delhi.
3. Discrete and Combinatorial Mathematics by Ralph. G. Grimaldi, Pearson Education, NewDelhi.

1975402P	OPERATING SYSTEMS LAB	
Instruction: 3 Periods	Univ. Exam: 3 Hours	**Credits: 1.5**
Internal: 50Marks	**University Exam: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To learn about UNIX/LINUX operating system and system calls.
2. To understand and simulate the principles of resource management.
3. To understand UNIX/LINUX shell and its programming and vi editor.
4. To identify the data structures used for solving the problems related to synchronization, deadlocks and file allocation methods.

COURSE OUTCOMES:

At the end of the course student will be able to

1. **Examine** different Unix commands and Experiment programs using system calls.
2. **Develop** shell programs using vi editor
3. **Employ** various data structures to implement OS functions.

MODULE-I

1. OS lab familiarization, Home Assignment on Unix commands, vi editor.

2. Simple C programs using command line arguments, system calls, library function calls.

3. C programs using fork system call to create processes and study parent, child process mechanism

4. C programs to create process chaining, spawning.

5. C programs to handle errors using errno, perror() function.

6. C programs to use pipe system call for inter process communication.

MODULE-II

1. Familiarization of UNIX shell programming.

2. Simple shell programming exercises.

3. Shell programming using decision making constructs.

4.Shell programming using loop constructs.

5. Shell programming for file and directory manipulation.

MODULE-III

1.C programs to study process scheduling implementing FCFS, Shortest Job First, and Round Robin algorithms.

2. C programs to study page replacement implementing FIFO, Optimal, and LRU page replacement algorithms.

3.C programs to study deadlock avoidance and detection.

4.C Programs to simulate free space management.

5.Implement the Producer – Consumer problem using semaphores.

6.Implement Paging memory management scheme.

7.Implement any file allocation technique Linked-Indexed-Contiguous.

References:

1. Unix concepts and applications by Sumitabha Das, TMH Publications.

2. Unix programming by Stevens, Pearson Education.

3. Shell programming by Yashwanth Kanetkar.

4. Operating System, Concepts by Silberschatz, and Peter Galvin

1975403P	DIGITAL ELECTRONICS AND MICROPROCESSORS LAB	
Instruction:3Periods/week,	Univ. Exam: 3Hours	Credits: 1.5
Internal: 50 Marks	University Exam: 50 Marks	Total: 100 Marks

COURSE OBJECTIVE:

1. To learn the about logic gates, half adders, full adders and flip -flops.

2. To learn about the microprocessor programming.

3. To learn about the microprocessor interfacing with stepper motor, R-2R ladder.

4. To learn about 8051 Microcontroller Programming

COURSE OUTCOMES:

1. The student understands the logic gates, half adders, full adders and flip-flops to design a circuit.

2. The student develops the skill of writing microprocessor programming.

3. The student understands the interfacing of microprocessor with stepper motor, R-2R ladder.

4. Write basic Programs 8051 Microcontroller using Keil Software

CYCLE – 1

1. DIGITAL EXPERIMENTS

Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR gates (By using 7400-series)

Construction of gates using NAND, NOR gates.

Construction of Half and Full adders and verifying their truth tables.

Operation and verifying truth tables of flip- flops- RS, D, and JK using ICs.

Construction of Decade counters (7490).

Decade counter using JK flip flops.

Up/Down counter using JK flip flop.

2. MICROPROCESSOR using 8085 Kit

Binary addition & subtraction. (8-bit & 16-bit)

Multiplication & Division.

Picking up largest/smallest number.

Arranging –ascending/descending order.

Decimal addition (DAA) & Subtraction.

Time delay generation

CYCLE - 2

3. MICROPROCESSOR using 8085 Interfacing Kits

Interfacing R-2R Ladder network (DAC) (4 bits) to generate waveforms.

Interfacing a stepper motor and rotating it clockwise/anti clockwise through a known angle.

Interfacing a seven-segment display.

Interfacing ADC for temperature measurement.

4. Microcontroller using 8051 Keil Software

Addition

Subtraction

Multiplication

Division

Addition of Array of Numbers

1975407P	PROBLEM SOLVING USING PYTHON	
Instruction:4 Periods/week, Univ. Exam: 3Hours		**Credits: 2**
Internal: 50 Marks	**University Exam: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. Learn basic programming of Python
2. To develop programs using Python packages

COURSE OUTCOMES:

At the end of the course student will be able to

1: Develop the Python programs using operators, conditional and looping statements and strings
2: Implement programs using functions and different types of Data structures
3: Develop the programs using Python Packages, OOP and GUI concepts

MODULE-I

Week 1:

Introduction: History of Python, Need of Python Programming, Python Installation, Python basics.

Week 2:

Operators in python, conditional statements

1. Accept two numbers from the user and calculate Addition, Subtraction, multiplication and Division.
2. Write a Program for checking whether the given number is a even number or not.
3. Given a two integer numbers return their product and if the product is greater than 1000, then return their sum.
4. A student will not be allowed to sit in exam if his/her attendance is less than 75%. Take following input from user
   Number of classes held
   Number of classes attended.
   And print

   percentage of class attended

   Is student is allowed to sit in exam or not

Week 3

Iterations, continue and break statements.

1. Print the following pattern

```
1

1 2

1 2 3

1 2 3 4

1 2 3 4 5
```

2. Accept number from user and calculate the sum of all number between 1 and given number

3. Given a number count the total number of digits in a number

Week 4

Strings, string functions, string slicing

1. Given 2 strings, s1 and s2, create a new string by appending s2 in the middle of s1

2. Given a string input Count all lower case, upper case, digits, and special symbols

3. Given an input string, count occurrences of all characters within a string

MODULE-II

Week 5

Lists and Tuples

1. Write a Python program to get the largest number and smallest number from a list**.**
2. Write a Python program to remove duplicates from a list
3. Write a Python program to find the length of a tuple
4. Write a Python program to convert a list to a tuple

Week 6

Sets and Dictionaries

1. Dictionaries and dictionary methods, Sets and set methods.
2. Write a Python script to merge two Python dictionaries
3. Write a Python program to sort a dictionary by key
4. Return a set of identical items from a given two Python set

Week 7

Functions: Defining Functions, Calling Functions, Passing Arguments, Anonymous Functions, Fruitful Functions (Function Returning Values)

1. Write a Python program to reverse a string using functions
2. Write a Python function to check whether a number is perfect or not
3. Write a function unique to find all the unique elements of a list.

Week 8

Recursion

1. Write a Python program to get the factorial of a non-negative integer using Recursion
2. Write a Python program to solve the Fibonacci sequence using recursion

Week 9

Regular expressions: Metacharacters, Special Sequences, Sets, RegEx Function, File handling: modes, reading files, writing and closing files, Iterators, Generators, Filters and Lambda.

1. Write a Python program to find the substrings within a string
2. Write a Python program to Email id validation
3. Write a Python program to write a list to a file
4. Write a Python program to copy the contents of a file to another file

MODULE-III

Week 10

Modules: Creating modules, import statement, from. Import statement, name spacing. **Python ## packages:** Introduction to PIP, Installing Packages via PIP, Using Python Packages.

1. Install packages requests, flask and explore them. using (pip)
2. Write a script that imports requests and fetch content from the page. Eg. (Wiki)
3. Write a simple script that serves a simple HTTPResponse and a simple HTML Page

Week 11

Basics of NumPy and Pandas packages, Basics of Matplotlib library.

1. Add the following two NumPy arrays and Modify a result array by calculating the square of each element.
2. Write a Python program to convert a dictionary to a Pandas series

Week 12

OOP

a) Class variables and instance variable

i) Robot

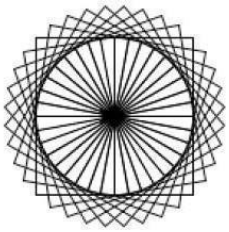
ii) ATM Machine

Week13

GUI, Graphics

1. Write a GUI for an Expression Calculator using tk

2. Write a program to implement the following figures using turtle



GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE & P.G. COURSES (A)

RUSHIKONDA, VISAKHAPATANAM 530045 | website: www.gvpcdpgc.edu.in

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ENGINEERING & TECHNOLOGY PROGRAM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME FOR III/IV B. TECH I SEM (5th Semester)

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	Professional Core Courses	1975501	COMPUTER NETWORKS	3	0	3	4.5
2	Professional Core Courses	1975502	DATABASE MANAGEMENT SYSTEMS	3	0	3	4.5
3	Professional Core Courses	1975503	FORMAL LANGUAGES AND AUTOMATA THEORY	3	0	0	3
4	Engineering Science Course	1975504	OPERATIONS RESEARCH	3	0	0	3
5	Professional Core Courses	1975505	ARTIFICIAL INTELLIGENCE	3	0	0	3
6	Professional Elective Courses	1975506	PROFESSIONAL ELECTIVE – I	3	0	0	3
7	Massive Open Online Courses	1975507	MOOCS - I	0	0	3	1.5
						Total credits	**22.5**

Professional Elective-I

Principles of Programming Languages
Data Warehousing and Data Mining
Distributed Systems

1975501	COMPUTER NETWORKS	
Instruction: 3 Periods/week	**External Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To make the students understanding of basic requirements of network hardware, software and its architecture.
2. Familiarize the students with layered architecture of the network software and hierarchal nature of the network physical infrastructure.
3. Study of various network interconnecting devices and other associated network hardware.
4. Introduction of advanced networking concepts and wireless and wireless sensor networks.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the design and estimate the requirements for practical setup of a given network.
2. Understand concepts of sub netting and routing mechanisms.
3. Explain the concepts of Transport layer
4. Describe various application layer protocols and classify the different types of network devices.
5. Understand various wireless Networks.

UNIT-1

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Network Examples, Internet Based Applications.

The Medium Access Control: The Channel Allocation Problem, CSMA, Collision Free Protocols, The Ethernet, Wireless LANS, Bluetooth.

UNIT-2

Network Layer : Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service (QoS), Internetworking, Network Layer in the Internet, IP Protocol, IP Address, Subnets.

UNIT-3

Transport layer: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

UNIT-4

Application Layer: Over View of DNS, Electronic Mail, FTP, HTTP, SNMP Protocols,

World Wide Web. **Network Devices:** Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

UNIT-5

Overview of Networks: Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks.

Text Books:

1. Computer Networks, Andrews S Tanenbaum,, 5th Edition, Pearson Edu.
2. An Engineering Approach to Computer Networks- S.Keshav, 2nd Edition, Pearson Education.

References:

1. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill Co Ltd, Second Edition, and ISBN: 0-07-049935-7.
2. William Stallings, "Data and Computer Communications", Eighth Edition, Pearson Education.
3. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Third Edition, Pearson Education,

1975502	DATABASE MANAGEMENT SYSTEMS	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To learn the evolution of DBMS Versus File systems, data models, and layers of abstraction.
2. To understand conceptual and physical aspects of database design.
3. To learn formal and commercial query language specifications.
4. To understand concurrency control, recovery management, and other related issues.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the advantages of DBMS over traditional file system and its Characteristics
2. Design relational database and execute various queries using SQL
3. Design ER-models to represent simple database applications.
4. Understand various anomalies that can occur in databases and overcome those with the help of normal forms.
5. Describe the concepts of Transaction Management, Concurrency Control and data Recovery

UNIT-I

Introduction: File system versus DBMS , Advantages of a DBMS, Describing and Storing Data in a DBMS, The Relational model, Levels of abstraction, Data Independence, Transaction management, Structure of a DBMS.

UNIT-II

Relational Algebra and SQL: Preliminaries, Relational Algebra, The form of a Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Databases, Embedded SQL, Dynamic SQL, JDBC.

UNIT-III

Introduction to Database Design and The Relational Model: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships & Relationship Sets, Additional Features of the ER Model, Conceptual Design with ER Model, Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational, Introduction to Views, Destroying/ Altering Tables and Views.

UNIT-IV

Database Design: Schema Refinement and Normal Forms, Introduction to Schema Refinement, Functional Dependencies, Reasoning about FD‘s, Normal Forms, Properties of Decomposition, Normalization, Other kinds of Dependencies.

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UNIT-V

Transaction Management: The ACID Properties, Transactions &Schedules, ConcurrentExecution of Transactions, Lock-Based Concurrency Control.**Concurrency Control**: 2PL, Serializability and Recoverability, Introduction to Lock Management,Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking.**Crash Recovery**: Introduction to ARIES, The Log, Other Recovery-Related Structures, The Write-Ahead Log Protocol, Check pointing, Recovering from a System Crash, Media Recovery.

Text books:

1. Database Management Systems; Raghu Ramakrishnan, Johannes Gehrke 4th Edition, McGraw- Hill

Reference Books:

1. Database System Concepts; A. Silberschatz, H. Korth 5th Edition, McGraw-Hill.

1975503	FORMAL LANGUAGES AND AUTOMATA THEORY	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. Learn about different types of Finite State Machine and its representations.
2. Learn about different representations for a given Finite State Machine.
3. Learn how to construct a regular expression for a given Finite State Machine and a Finite State Machine for a given regular expression.
4. Learn about the context free grammar and Push down Automata.
5. Learn working of Turing Machine.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Identify the type of Finite State Machine, represent them in its mathematical notations.
2. Analyze the given finite state machine, represent it in its minimal form and equivalent grammar.
3. Construct Finite State Machine for a given regular expression and Vice-Versa.
4. Convert a given context free grammar into its equivalent norms and Push down Automata.
5. Construct Push down Automata and Turing Machine for a given grammar.

UNIT-I

Definitions of alphabet, strings, language, grammar, types of grammar, types of machines, generation of languages from grammar, construction of grammar from the given description of languages, Definition of finite state machine, Definite state machine, indefinite state machine, representations in mathematical diagram, tabular etc., id of finite state machine's.

UNIT-II

Design of finite state machine from the given description, elimination of ϵ-transitions, indefinite state machine to definite state machine, optimization of finite state machine, Conversion of regular grammar to finite state machine, finite state machine to regular grammar, discussion of pumping lemma, systematic way of construction of finite state machine.

UNIT-III

Definition of regular expression, regular algebra, minimization of regular expressions, closure properties, construction of regular expression from the given description, regular expression to finite state machine, finite state machine to regular expression, construction of regular expression for the given finite state machine- a systematic way using Arden's theorem.

UNIT-IV

Parsing tree, bottom-up parsing, top-down parsing, types of context free grammar's, left-most and right most derivations, productions, reductions, optimization of context free grammar's, elimination of e productions, unit productions, normal forms- cnf, gnf, Definition of push down machine, push down machine, types of push down machine's, push down machine to context free grammar, context free grammar to push down machine.

UNIT-V

Design methodology of various push down machine's, push down machine by empty stack, push down machine by final states, conversion from one type to other type, applications of push down machine's, Definition of Turing machine, ways of representing Turing machine's- tabular form, diagram, mathematical form, quintuples etc., design of Turing machine, id of Turing machine, types of Turing machine, halting problem, church's thesis, universal Turing machine, Gödel number, definitions of recursive functions- prf, rf, decidability.

NOTE: Theorem proofs are eliminated

Text books:

1. Introduction to automata theory, languages and computation, John.E.H.P croft/ Rajeev Motwani & JD Ullman—pearson education- III edition

Reference Books:

1. Theory of computation, K.L.P.Mishra and N.Chandrasekhar, PHI
2. Theory of computation, formal languages and automata theory, G P Saradhi Varma, B.Thirupathi Rao –Sci Tech publications.

1975504	OPERATIONS RESEARCH	
Instruction: 3Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

Course Objectives

1. To discuss about basic Operation Research concepts , Formulation of LPP and its solution using graphical method.
2. To discuss about standard form of LPP. solving LPP using various methods.
3. To study the various solutions of transportation problems and assignment problems.
4. To discuss about PERT and CPM charts
5. To discuss about replacement problems, inventory problems and game theory.

Course Outcomes:

1. Ability to solve LPP problems using various methods.
2. Ability to solve transportation and assignment problems using several methods.
3. Analyze the PERT and CPM charts
4. Ability to solve replacement problems and game theory problems.

Syllabus:

1. Overview of Operations Research, Types of OR Models, Phases of Operations Research– OR Techniques, Introduction to Linear Programming, Formulation of Linear Programming Pro blem, Graphical Solution; Graphical Sensitivity Analysis, Standard Form of LPP, Basic Feasible, Solutions, Unrestricted Variables, Simplex Algorithm, Artificial Variables, Big M Method, Two Phase Simplex Method, Degeneracy, Alternative Optimal, Unbounded Solutions, Infeasible Solutions, Primal And Dual Problems And Their Relations, Dual Simplex Method.

2. Transportation Problem as LPP, Initial Solutions, North West Corner Rule, Lowest Cost Method, Vogels Approximation Method, Optimum Solutions of TPP, Degeneracy in Transportation, Transportation Algorithms, Assignment Problem , Assignment Problem as LPP, Hungarian Method, Travelling Salesman Problem, Solutions Of TSP, Sequencing Problems, N-Jobs Two Machine Problems, N-Jobs K Machines Problems, Two-Jobs M- Machine Problems, Crew Scheduling Problems.

3. Network Representation of A Project, CPM and PERT,Critical Path Calculations, Time– Cost Optimizations, PERT Analysis and Probability Considerations, Resource Analysis in Network Scheduling.

4. Replacement Problems-Individual And Group Replacement Policy, Reliability &SystemFailure Problems, Inventory-Factors Effecting Inventory-EOQ, Inventory Problems With andWithout Shortages, Inventory Problems With Price Breakups, Multi Item DeterministicProblems. Probabilistic InventoryProblems

5. Game Theory : Two Person Zero SumGames , MixedStrategyGamesandTheir Algorithms.

TextBooks:

1. Operations Research, Kanti Swaroop, P.K. Gupta, Man Mohan, Sulthan Chand& SonsEducation

2. PublishersOperationsResearch–AnIntroduction, HandyATaha– PearsonEducation.

Reference B:

1. Operations Research Panneer Selvan Prentice Hall OfIndia.
2. Operations Research By S.DSharma
3. Introduction To Operations Research, F.S. Hiller, G.J. Liberman,TMH
4. Operations Research, Richard Bronson, Schaum‘s Series,Mcgrawhill

1975505	ARTIFICIAL INTELLIGENCE	
Instruction: 3 Periods /week, External Exam:3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To learn about AI problem, Production Systems and their characteristics.
2. To understand the importance of search and the corresponding search strategies for solving AI problem.
3. To introduce to Planning, Natural Language Processing and Expert Systems.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Solve AI Problems using the knowledge of State Space Search.
2. Apply several optimal search strategies and heuristic techniques to solve AI problems.
3. Learn relational, inferential, inheritable and procedural knowledge and the corresponding knowledge representation approaches.
4. Apply the concepts of Reasoning under Uncertainty and solve the complex problems of AI.
5. Implement AI problem solving approaches to develop natural language processing, planning and expert systems.

UNIT-I

Introduction to Artificial Intelligence: Artificial Intelligence, AI Problems, AI Techniques, Defining the Problem as a State Space Search, Problem Characteristics, Production Systems.

UNIT-II

Search Techniques: Issues in The Design of Search Programs, Un-Informed Search, BFS, DFS; Heuristic Search Techniques: Generate-And- Test, Hill Climbing, Best- First Search, A* Algorithm, Problem Reduction, AO*Algorithm, Constraint Satisfaction, Means-Ends Analysis.

UNIT-III

Knowledge Representation using Rules: Procedural Vs Declarative Knowledge, Logic programming, Forward Vs Backward Reasoning, Matching Techniques, Partial Matching, RETE Matching Algorithm AI Programming languages: Overview of LISP and PROLOG, Production System in Prolog.

Symbolic Logic: Propositional Logic, First Order Predicate Logic: Representing Instance and is-a

Relationships, Computable Functions and Predicates, Unification & Resolution, Natural deduction; **Structured Representations of Knowledge**: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency, Conceptual Graphs, Scripts.

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UNIT-IV

Reasoning under Uncertainty: Introduction to Non-Monotonic Reasoning, Truth Maintenance Systems, Logics for Non-Monotonic Reasoning, **Statistical Reasoning**: Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Probabilistic Inference, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic: Crisp Sets ,Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences &Fuzzy Systems.

UNIT-V

Natural Language Processing: Steps in the Natural Language Processing, Syntactic processing and Augmented Transition Nets, Semantic Analysis, NLP Understanding Systems; **Planning:** Components of a Planning System, Goal Stack Planning, Non- linear Planning using Constrait Posting, Hierarchical Planning, Reactive Systems.

Experts Systems: Overview of an Expert System, Architecture of an Expert Systems, Different Types of Expert Systems- Rule Based, Frame Based, Decision Tree based, Case Based, Neural Network based, Black Board Architectures, Knowledge Acquisition and Validation Techniques, Knowledge System Building Tools, Expert System Shells.

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Text books:

1. Artificial Intelligence, Elaine Rich and Kevin Knight, Tata Mcgraw-Hill Publications

Reference Books:

1.Artificial Intelligence, George F Luger, Pearson Education Publications
2.Artificial Intelligence : A modern Approach, Russell and Norvig, Prentice Hall
3.Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI publications

1975506	ELECTIVE-I PRINCIPLES OF PROGRAMMING LANGUAGES	
Instruction: 3Periods/week,	**External Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

Course objectives:

1. To learn the underlying principles and concepts of programming language.
2. To understand programming language translation process.
3. To expose students to the important paradigms of programming.
4. To understand the concepts of distributed processing and network programming.

Course outcomes:

1. Ability to compare different programming languages.
2. Ability to discuss the significant achievements in programming language history.
3. Ability to assess the programming languages in scientific manner.
4. Ability to understand sequence control.
5. Ability to understand storage management.

Syllabus:

UNIT-1

Language Design Issues: Study Programming Languages, History of Programming Languages, Role of Programming Languages, Programming Environments.

UNIT-2

Impact of Machine Architectures: Operation of a Computer, Virtual Computers and Binding Times; Language Translation Issues: Programming Language Syntax, Stages in Translation, Formal Translation Models, Recursive Descent Parsing; Modeling Language Properties: Formal Properties of Languages, Language Semantics.

UNIT-3

Elementary Data Types: Properties of Types and Objects, Scalar Data Types, Composite Data Types Encapsulation: Structured Data Types, Abstract Data Types, Encapsulation by Subprograms, Type Definitions, Inheritance: Abstract Data Types Revisited, Inheritance, Polymorphism.

UNIT-4

Sequence Control: Implement and Explicit Sequence Control, Sequence with Arithmetic Expressions, Sequence Control Between Statements, Sequencing with Non arithmetic Expressions. Subprogram Control: Subprogram Sequence Control, Attributes of Data Control, Parameter Transmission, Explicit Common Environment.

UNIT-5

Storage Management: Elements Requiring Storage, Programmer- and System –Controlled Storage, Static Storage Management, Heap Storage Management. Distributed Processing: Variations on Subprogram Control, Parallel

Programming, Hardware Developments, Software Architecture. Network Programming: Desktop Publishing, The World WideWeb.

TextBook:

1. Programming languages – Design and Implementation by Terrence W. Pratt MarvinV. Zelkowitz.3 rd Edition, Prentice Hall ofIndia.
2. Principles of Programming Languages by Er. Anil Panghal and Ms. Sharda Panghal

Reference Books:

1. Concepts of Programming Languages by Robert L. Sebesta, 4th Edition,Pearson Education.
2. Fundamentals of Programming Languages, Design & Implementation by SeyedH.Roosta. Vikaspublications.
3. Programming Languages by Paradigm and Practice – Doris Appleby Julius J. VendekoppleTata McGraw HillEdi

1975506	ELECTIVE-I DATA WAREHOUSING AND DATA MINING	
Instruction: 3 Periods /week,	**External Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To understand the evolution of data warehousing and data mining systems.
2. To understand extracting, cleaning and transformation of data into a warehouse.
3. To learn the principles of statistics, information theory, machine learning and other areas AI and implementation of data mining techniques.
4. To understand pattern mining using classification and clustering methods.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the concepts related to Data Mining and Data Pre-Processing.
2. Understand data ware house design and how data cube technology supports summarization and querying high dimensional data
3. Understand various approaches of association rule mining, supervised and unsupervised learning
4. Apply knowledge for various classification and prediction techniques for developing new Data Mining algorithms.
5. Apply knowledge for various clustering analysis algorithms for designing new Data Mining algorithms.

UNIT-I

Introduction to Data Mining, Data pre-processing: Evolution of IT into DBMS, Motivation and importance of Data Warehousing and Data Mining, Kinds of Patterns, Technologies, Applications, Major Issues in Data Mining, Data Objects and Attributes Types, Statistical Descriptions of Data, Data Visualization, Estimating Data Similarity and Dissimilarity, Quality data, Data Cleaning, Data Integration, Data Reduction, Data Transformation, Discretization and Concept Hierarchy Generation.

UNIT-II

Data Warehouse, OLAP Technology and Data Cube Technology: Basic Concepts of Data warehouse, Data Modeling using Cubes and OLAP, DWH Design and usage, Implementation using Data Cubes and OLAPs, Data Generalization with AOI, Preliminary Concepts of Data Cube Computation, Data Cube Computation Methods: Multi-way Array Aggregation for Full Cube, Multi-dimensional Data Analysis in cube space.

UNIT-III

Mining Frequent Patterns Based on Associations and Correlations: Basic Concepts, Frequent Item set Mining Methods: Apriori Algorithm, Association Rule Generation, Improvements to A Priori, FP- Growth Approach, Mining Closed and Max Patterns, Pattern Evaluation Methods, Association mining in multi-level, multi-dimensional space.

UNIT-IV

Classification & Prediction: Basic Concepts, Decision Tree Induction, Bayes Classification, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy, Classification by Back Propagation, Associative Classification, K-nearest neighbor classifier.

UNIT-V

Cluster Analysis: Basic Concepts and issues in clustering, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Evaluation of Clustering Solutions.

Text Book:

1. Data Mining- Concepts and Techniques by Jiawei Han, Micheline Kamber and Jian Pei –Morgan Kaufmann publishers –--3rd edition

References:

1. Introduction to Data Mining, Adriaan, Addison Wesley Publication

2. Data Mining Techniques, A.K.Pujari, University Press Data mining concepts by Tan, Steinbech, and Vipin Kumar - Pearson Edu publishers

1975506	ELECTIVE-I DISTRIBUTED SYSTEMS	
Instruction: 3Periods/week,	**External Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

Course Objectives:

This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.

Course Outcomes:

By the end of the course, students should be able to build distributed systems that:

1. Scale as the number of entities in the system increase
2. Can sustain failures and recover from them
3. Work with distributed, fault tolerant file systems
4. Can handle and process large data volumes
5. Are secure and handle certain classes of distributed denial of service attacks
6. Are Loosely coupled, transactional and eventually stable

Syllabus:

1. Introduction to Distributed Systems, What is a Distributed System?, Hard ware concepts, Software concepts, Design issues.

2. Communication in Distributed Systems, Lay red Protocols, ATM networks, The Client – server model, Remote Procedure call, Group communication.

3. Synchronization in Distributed System, Clock Synchronization, Mutual Exclusion, Election algorithms, Atomic transactions, Deadlocks in Distributed Systems.

4. Process and processors in Distributed System threads, System Models, Processors allocation, Scheduling in Distributed System, Fault tolerance, Real time Distributed System.

5. Distributed File Systems, Distributed File System Design, Distributed File System implementation, Trends in Distributed File System.

Distributed Shared Memory, Introduction, What is Shared memory?, Consistency models, Page based Distributed Shared memory, Shared – variable Distributed Shared memory, Object based Distributed Shared Memory.

Text Books:

1. Distributed Operating Systems, Andrew S. Tanenbanm
2. Advanced Concepts in Operating Systems, Makes Singhal and Niranjan G.Shivaratna

1975507	MOOCS-I	
Instruction: 3 Periods /week.		**Credits: 1.5**

Students completes a certificate course in MOOCS(Massive Open Online Course) based on the platform they opted for performing the project in the current semester.

1975501P	COMPUTER NETWORKS LAB	
Instruction: 3 Periods	**External Exam**: 3 Hours	**Credits: 1.5**
Internal: 50 Marks	**External : 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. Learn various network protocols and verify simple network topologies using simulation tool.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Demonstrate various network components and Implement network protocols.
2. Implementation of error and flow control techniques on network.
3. Design and implementation of network topologies, routing algorithms using network tools.

CYCLE-1

1. **a)** Study of different types of network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
   b) Study of network devices in detail
   c) Connect the computer in Local Area Networks
2. Write a Program with following four options to transfer
   a) Characters separated by space
   b) One Strings at a time
   c) One Sentence at a time
   (To demonstrate Framing, Flow control, Error control).
3. Write a program for error detection and correction for 7/8 bits ASCII codes using Hamming Codes or CRC.
4. Write a program to simulate Go Back N and Selective Repeat Modes of Sliding Window Protocol in peer to peer mode
5. Write a program using TCP socket for wired network for following
   a) Say Hello to Each other
   b) File transfer

6. Write a program using UDP Sockets to enable file transfer (Script, Text, Audio and Video one file each) between two machines.
7. Development of applications such as DNS/ HTTP
8. Development of applications such as E – mail/ Multi – user Chat
9. Implementation of RPC.

CYCLE-2

1. Demonstrate the packets captured traces using Wire shark Packet Analyzer Tool for peer to peer mode.

2. Study of Network Simulator (NS 2).

3. Network Topology: Bus Topology, RING Topology, and STAR Topology

REFERENCE BOOKS:

1. Internet and Web Technologies by Raj Kamal, TataMcGraw-Hill
2. Programming the World Wide Web by Robert W. Sebesta, PearsonEducation

1975502P	DATABASE MANAGEMENT SYSTEMS LAB	
Instruction: 3 Periods /week,	**External Exam: 3 Hours**	**Credits: 1.5**
Internal: 50 Marks	**External: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To introduce to a commercial DBMS such as ORACLE.
2. To learn and practice SQL commands for schema creation, data manipulation.
3. To learn conceptual and physical database design based on a case study.
4. To apply database design stages by studying a casestudy.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand and effectively explain the underlying concepts of database technologies
2. Explore to a commercial RDBMS environment to write SQL queries.
3. Understand Design and implement a database schema for a given problem-domain
4. Normalize a database
5. Develop mini project using DBMS Concepts.

CYCLE-I

Features of a commercial RDBMS package such as ORACLE/DB2, MS Access, MYSQL &Structured QueryLanguage(SQL)usedwiththeRDBMS.

I. Laboratory Exercises ShouldInclude:

   a. Defining Schemas forApplications,
   b. Creation ofDatabase,
   c. Writing SQLQueries,
   d. Retrieve Information fromDatabase,
   e. CreatingViews
   f. CreatingTriggers
   g. Normalization up to Third NormalForm
   h. Use of HostLanguages,
   i. Interface with EmbeddedSQL,
   j. Use ofForms
   k. ReportWriting

CYCLE-II

II. Some sample applications are givenbelow:

1. Accounting Package for Shops,
2. Database Manager for Magazine Agency or NewspaperAgency,
3. Ticket Booking forPerformances,
4. Preparing Greeting Cards & BirthdayCards
5. Personal Accounts - Insurance, Loans, Mortgage Payments,Etc.,
6. Doctor's Diary & BillingSystem
7. Personal BankAccount
8. Class MarksManagement
9. HostelAccounting
10. Video TapeLibrary,
11. History of CricketScores,
12. Cable TV Transmission ProgramManager,
13. Personal Library.
14. SailorsDatabase
15. Suppliers and PartsDatabase

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE & P.G. COURSES(A)
RUSHIKONDA, VISAKHAPATANAM 530045 | website: www.gvpcdpgc.edu.in
(Approved by A.I.C.T.E | Affiliated to Andhra University | An ISO 9001:2015 Certified Institute)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME FOR III/IV B. TECH II SEM (6th Semester)

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	Professional Core Courses	1975601	OBJECT ORIENTED SOFTWARE ENGINEERING	3	0	3	4.5
2	Professional Core Courses	1975602	WEB TECHNOLOGIES	3	0	3	4.5
3	Professional Elective Courses	1975603	PROFESSIONAL ELECTIVE – II	3	0	0	3
4	Professional Elective courses	1975604	PROFESSIONAL ELECTIVE – III	3	0	0	3
5	Professional Core Courses	1975605	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3
6	Open Elective Courses	1975606	OPEN ELECTIVE -1	3	0	0	3
7	Project	1975607	Project-I	0	0	8	4
						Total Credits	**25**

Professional Elective-II
Advanced Data Structures.
Embedded Systems
Cryptography and Network Security

Professional Elective-III
Cyber Security & Digital Forensics
Image Processing
Natural Language Processing.

Open Elective-I
Introduction to Civil Engineering (Offered by CE to other Branches)
Linear and Digital IC Applications (Offered by ECE to other Branches)
Basics of Mechanical Engineering (Offered by ME to other Branches)

1975601	OBJECT ORIENTED SOFTWARE ENGINEERING	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. Learn the importance of Object Oriented Software Engineering in Software Development.
2. Learn to develop problem statement and requirements elicitation.
3. Learn to design UML Diagrams.
4. Learn about architectural models and design patterns.
5. Learn different testing methodologies.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the concepts related to development of Software Engineering.
2. Apply the knowledge of requirements elicitation process.
3. Design the UML Diagrams for improving communication between client and developer.
4. Analyze architecture models and design patterns.
5. Apply various testing strategies on the developed products.

UNIT-I

Introduction to Object Oriented Software Engineering: Nature of the Software, Types of Software, Software Engineering Projects, Software Engineering Activities, Software Quality, Introduction to Object Orientation, Software Process Models-Waterfall Model, Opportunistic Model, Phased Released Model, Spiral Model, Evolutionary Model, Concurrent Engineering Model.

UNIT-II

Requirements Engineering: Domain Analysis, Problem Definition and Scope, Requirements Definition, Types of Requirements, Techniques for Gathering and Analyzing Requirements, Requirement Documents, Reviewing, Managing Change in Requirements.

UNIT-III

Unified Modeling Language & Use Case Modeling, Class Design and Class Diagrams: Introduction to UML, Modeling Concepts, Types of UML Diagrams with Examples; User-Centered Design, Characteristics of Users, Developing Use - Case Models of Systems, Use-Case Diagram, Use- Case Descriptions, Basics of User Interface Design, Usability Principles, User Interfaces, Essentials of UML Class Diagrams, Associations and Multiplicity, Other Relationships, Generalization, Instance Diagrams, Advanced Features of Class Diagrams, Interaction and Behavioral Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component and Deployment Diagrams.

UNIT-IV

Software Design and Architecture: Process of Design, Principles Leading to Good Design, Techniques for Making Good Design Decisions, Good Design Document; Pattern Introduction, Design Patterns: Abstraction-Occurrence Pattern, General Hierarchical Pattern, Play-Role Pattern, Singleton Pattern, Observer Pattern, Delegation Pattern, Adaptor Pattern, Façade Pattern, Immutable Pattern, Read-Only Interface Pattern and The Proxy Pattern; Software Architecture Contents of Architecture Model, Architectural Patterns: Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter and MVC Architectural Patterns.

UNIT-V

Software Testing and Process Management: Overview of Testing, Testing Concepts, Testing Activities, Testing Strategies, Unit Testing, Integration Testing, Function Testing, Structural Testing, Class Based Testing Strategies, Use Case/Scenario Based Testing, Regression Testing, Performance Testing, System Testing, Acceptance Testing, Installation Testing, OO Test Design Issues, Test Case Design, Quality Assurance, Root Cause Analysis, Post-Mortem Analysis, Introduction to Software Project Management, Rationale Management, Configuration Management, Activities of Software Project Management, Structure of Project Plan, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking and Monitoring**.**

CASE STUDY:

1. Simple Chat Instant Messaging System
2. GPS Based Automobile Navigation System
3. Waste Management Inspection Tracking System (WMITS)
4. Geographical Information System

Text Book:

1. Object-Oriented Software Engineering Practical software development using UML and Java by Timothy C. Lethbridge & Robert, Langaniere Mcgraw-Hill

2. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia.

References:

1. Software Engineering: A Practitioner's Approach, Roger S Pressman.

2. A Practical Guide to Testing Object-Oriented Software, John D. McGregor; David A. Sykes, Addison-Wesley Professional.

3. Software Engineeing, K.K. Agarwal, New Age Publications 2008

1975602	WEB TECHNOLOGIES	
Instruction: 3 Periods /Week , External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To get familiar with basics of the Internet Programming.
2. To acquire knowledge and skills for creation of web site considering both client and server side programming
3. To gain ability to develop responsive web applications

COURSE OUTCOMES:

At the end of the course student will be able to

1. Describe about WWW, Protocols and deployment of websites using HTML and CSS.
2. Use the various JavaScript functions for web page development.
3. Apply XML to develop the dynamic web pages.
4. Understand JSON functionalities and role of NoSQL databases.
5. Develop dynamic web applications using PHP and MySQL.

UNIT-1

Basics of WWW & HTML : Introduction to WWW, web 2.0,3.0,40, Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5 and CSS

UNIT-2

JavaScript : Variables, functions, conditions, loops, Pop up boxes, Advance JavaScript: Javascript and objects, DOM , Manipulation using DOM, forms and validations, DHTML

UNIT-3

XML : Introduction to XML, XML key components, DTD and Schemas, Transforming XML using XSL and XSLT.

UNIT-4:

JSON : Introduction to JSON, syntax, datatypes, Client-side and Server-side Frameworks, NoSQL databases.

UNIT-5

PHP **:** Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions PHP. MySQL: Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin management.

Text Books:

1. Programming the World Wide Web, 8th Edition, Robert W. Sebesta, Pearson.
2. Introduction to JavaScript Object Notation by Lindsay Bassett, O'Reilly Media, 2015.
3. Learning Php, Mysql, Robin Nixon.

Reference Books:

1. Web Programming, building internet applications, 2nd Ed., Chris Bates, Wiley Dreamtech.
2. Programming Php, Kevin Tatroe, Peter MacIntyre & Rasmus Lerdorf foreword by Michael Bourque.

1975603	ELECTIVE- II ADVANCED DATA STRUCTURES	
Instruction: 3Periods/week,	**External Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To study the concepts related to trees such as binary trees, BST, AVL trees etc.
2. To discuss various hashing technique.
3. To study the various external sorting algorithms.
4. To discuss the concepts related to disjoint set ADT.
5. To study several graph algorithms and their time complexities.

COURSE OUTCOMES

At the end of the course student will be able to

1. Write programs to implement various trees.
2. Understand various hashing techniques and Write programs to implement sorting techniques.
3. Construct various types of Heaps and understand the concept of Amortized analysis.
4. Understand the concepts of Disjoint Set ADT.
5. Discuss the concepts related to graph theory.

UNIT - I

1. **Trees:** Definition , operations and applications of Binary search trees, AVL trees, Red-Black Trees, Splay trees, Tries and B-Trees, B+ Trees

UNIT - II

2. **Hashing:** Hash Table Structure, Hash Function, Collision handling, Separate Chaining, Open Addressing, Rehashing, Extendible hashing

   External sorting: Difference between internal and external sorting, Model and simple algorithm for external sorting, Multi-way Merge, Poly-phase Merge, Replacement selection

UNIT - III

3. **Priority Queues:** Heap model and implementations, Binary Heap, Applications of Priority Queues, d-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues structure, operations and implementation

Amortized analysis: Introduction to amortized analysis, Basic approaches, binary queues, Fibonacci heaps, skew heaps and splay trees.

UNIT - IV

4. **Disjoint Set ADT:** Equivalence relations, Dynamic equivalence problem, Basic data structure, smart union algorithms, path compression, Analysis of union/find algorithm, applications of ADT Disjoint set

UNIT - V

5. **Graph algorithms:** Representation of graphs, Topological sort, Network flow problems, Applications of Depth first search for finding Bi-connectivity, Euler circuits, strong components, Introduction of NP-Completeness.

Text Book:

1. Data Structures and Algorithm Analysis in C – Mark Allen Weiss, Pearson Edu Publishers.
2. Advanced Data Structures by Ikvinderpal Singh

References:

1. Data Structures and Algorithms: Concepts, Techniques and Applications – G.A.V.Pai, Tata Mc Graw Hill Publishers
2. Advanced Data Structures – Peter Brass, Cambridge University Press, 2008

1975603	ELECTIVE-II EMBEDDED SYSTEMS	
Instruction: 3Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

Course Objectives:

1.To learn the basics of embedded systems with Microcontroller and interrupts.
2.To study various software architectures used in embedded systems.
3.To analyze Inter Task Communication procedures and design issues of RTOS.
4.To distinguish various embedded software development tools and debugging techniques.
5.To design various embedded systems with advanced processors.

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

1. Interpret the hardware components and interrupts
2.Classify software architectures and identify importance of RTOS architecture.
3.Infer Inter Task Communication methods and design issues in RTOS.
4.Compare various embedded software development tools and debugging techniques.
5.Develop embedded systems.

Unit 1

Introduction to Embedded Systems: Examples, Typical Hardware, Memory, Microcontrollers, Busses. **Interrupts**: Interrupt Basics, Shared-Data problem, Interrupt Latency.

Unit 2

Software Architectures: Round-Robin Architecture, Round-Robin with Interrupts Architecture, Function-Queue Scheduling Architecture, Real-Time Operating Systems Architecture, Selection of Architecture. **Real Time Operating System**: Tasks and Task States, Tasks and Data, Semaphores and Shared Data, Semaphore Problems, Semaphore variants.

Unit 3

Inter Task Communication: Message Queues, Mailboxes, Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in RTOS Environment. **Design issues of RTOS:** Principles, Encapsulation Semaphores and Queues, Hard Real- Time Scheduling Considerations, Saving Memory Space, Saving Power.

Unit 4

Embedded Software Development Tools: Host and Target Machines, Linker/Locator for Embedded Software, Getting Embedded Software into the Target System. **Embedded Software Debugging Techniques: Testing** on your Host Machine, Instruction Set Simulators, Laboratory Tools used for Debugging.

Unit 5

Introduction to advanced Microcontrollers: Introduction to ARM, ARM Architecture and Assembly Language Programming, ARM Memory Map, Memory Access and Stack. Arduino UNO- Pin Configuration, Architecture, Interfacing to real-world devices. (Ch1,2 and 6 of Text book 2 and Text Book 3)

Text Books:

1. An Embedded Software Primer, David E. Simon, Pearson Education, 2005.
2. ARM Assembly Language Programming & Architecture. 2nd Edition, Md Ali Mazidi, Sarmad Naimi, Sepehr Naimi and Shujen Chen.
3. The AVR Microcontroller and Embedded Systems Using Assembly and C: Using Arduino Uno and Atmel Studio, M. A. Mazidi, Sarmad Naimi , 2nd Edition, Micro Digital Edition.

Reference Book:

1. Embedded Systems: B.Kanta Rao, PHI.
2. Embedded Systems: Architecture, Programming and Design, Raj Kamal, Tata McGraw- Hill Education, 2
3. Introduction to Embedded Systems by K.V Shibu.
4. Computers as Components-principles of Embedded computer system design, Wayne Wolf, Elseveir.

1975603	ELECTIVE-II CRYPTOGRAPHY AND NETWORK SECURITY	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To introduce several issues in network security- its need and importance, taxonomy and terminology.
2. To learn various cryptographic techniques.
3. To understand Internet security protocols and standards.
4. To design security applications in the field of Information technology.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Classify network security attacks, services, mechanisms and classical encryption techniques.
2. Apply symmetric/asymmetric key cryptographic techniques to ensure privacy of data in transit.
3. Describe symmetric keys distribution techniques and public key Infrastructure (PKI).
4. Design new cryptographic protocols for different security applications.
5. Explain intrusion detection techniques, Firewalls and malicious software.

UNIT-I

Overview: Computer Security Concepts, the OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, a Model for Network Security, Basics of Buffer Overflow**,** Software Security Issues**. Classical Encryption Techniques**: Symmetric Cipher Models, Substitution Techniques, Transposition techniques, Stenography.

UNIT-II

Block Ciphers and the Data Encryption Standard: Stream Ciphers and Block Ciphers, the Data Encryption Standard (DES), A DES Example, the Strength of DES. **Advanced Encryption Standard**: AES Structure, AES Transformation Functions, AES Key Expansion, and IDEA. **Block Cipher Operations**: Multiple Encryption and Triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode. **Public-Key Cryptography and RSA**: Principles of Public Key Cryptosystems, the RSA Algorithm. **Other Public-Key Cryptosystems:** Diffie-Hellman Key Exchange, Elliptic curve Cryptography.

UNIT-III

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm (SHA-512). **Digital Signatures:** Digital Signatures, NIST Digital Signature Algorithm. **Key Management and Distribution:** Symmetric Key Distribution using Symmetric Key Encryption, Symmetric Key Distribution using Asymmetric Key Encryption, Distribution of public Keys, X.509 Certificates, Public-Key Infrastructure. **User Authentication**: Remote User-Authentication Principles, Kerberos.

UNIT-IV

Transport-Level Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, Transport Layer Security. **Electronic Mail Security**: Pretty Good Privacy, S/MIME. **IP Security**: Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations.

UNIT-V

Malicious Software: Types of Viruses, Virus Countermeasures, Worms, Distributed Denial Of Service Attacks. **Intruders:** Intruders, Intrusion Detection, Password Management. **Firewalls:** Need of Firewalls, Firewall Characteristics, Types of Firewalls, Configurations.

Text BookS:

Cryptography and Network Security Principles and Practice, William Stallings, Seventh Edition, Pearson Education.

Reference Books:

1. Computer Security - Principles and Practice, 4th Edition by William Stallings, Pearson Education.
2. Cryptography and Network Security, Atul Kahate, 4th Edition, Tata McGraw Hill Publications.
3. Cryptography and Network Security Behrouz A Frorouzan, Second Edition, Tata McGraw Hill Pub Company Ltd, New Delhi.

1975604	ELECTIVE-III CYBER SECURITY AND DIGITAL FORENSICS	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To understand underlying principles and many of the techniques associated with the digital forensic practices and cybercrimes.
2. To explore practical knowledge about ethical hacking Methodology.
3. To develop an excellent understanding of current cyber security issues (Computer Security Incident) and analysed the ways that exploits in securities.
4. To apply digital forensic knowledge to use computer forensic tools and investigation report writing.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Gain the knowledge on effective use of computer, data and internet securely.
2. Understand concepts and ethics of cyber security and cyber laws.
3. Acquire the knowledge on various web architectures, vulnerabilities, penetration testing, attacks and security of web applications
4. Illustrate the methods for Forensic Technologies, evidence collection, Evidentiary Reporting and information risk management
5. Analyze and respond to the cyber incidents.

UNIT-I

Introduction to Information Security Fundamentals and Best Practices: Protecting Your Computer and its Contents, Securing Computer Networks--Basics of Networking, Compromised Computers, Secure Communications and Information Security Best Practices, Privacy Guidelines, Safe Internet Usage.

UNIT-II

Ethics in Cyber Security & Cyber Law: Privacy, Intellectual Property, Professional Ethics, Freedom of Speech, Fair User and Ethical Hacking, Trademarks, Internet Fraud, Electronic Evidence, Cybercrimes.

UNIT-III

Penetration Testing: Overview of the web from a penetration testers perspective, Exploring the various servers and clients, Discussion of the various web architectures, Discussion of the different types of vulnerabilities, Defining a web application test scope and process, Defining types of penetration testing.

Web Application Security: Common Issues in Web Apps, What is XSS, SQL injection, CSRF, Password Vulnerabilities, SSL, CAPTCHA, Session Hijacking, Local and Remote File Inclusion, Audit Trails, Web Server Issues.

UNIT-IV

Forensics & Network Assurance: Forensic Technologies, Digital Evidence Collection, Evidentiary Reporting, Layered Defense, Surveillance and Reconnaissance, Outsider Thread Protection.

Information Risk Management: Asset Evaluation and Business Impact Analysis, Risk Identification, Risk Quantification, Risk Response Development and Control, Security Policy, Compliance, and Business Continuity. Forensic investigation using Access Data FTK, En-Case.

UNIT-V

Cyber Incident Analysis and Response: Incident Preparation, Incident Detection and Analysis. Containment, Eradication, and Recovery. Proactive and Post-Incident Cyber Services, CIA triangle

Text Books:

1. The Official CHFI Study Guide for Computer Hacking Forensic Investigator by Dave Kleiman
2. CISSP Study Guide, 6th Edition by James M. Stewart
3. Title: Cyber Forensics by Dejey & S.Murugan, OXFORD University Press

1975604	ELECTIVE-III IMAGE PROCESSING	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Learn the concepts of a digital image, operations on image and transformation techniques.
2. Learn enhancement techniques on a digital image using Spatial Domain and Frequency Domain Methods.
3. Learn various compression techniques on a digital image.
4. Learn segmentation and morphological techniques on a digital image.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand different digital image transformations techniques that can be applied on a digital image.
2. Apply different enhancement techniques on a digital image by using Spatial Domain Methods.
3. Apply different enhancement techniques on a digital image by using Frequency Domain Methods.
4. Apply different compression techniques on a digital image by following Image Compression standards.
5. Understand different segmentation and morphological techniques on a Digital Image.

UNIT-I

Fundamentals of Image Processing and Image Transforms: Image Acquisition, Image Model, Sampling, Quantization, Relationship between pixels, distance measures, connectivity, Image Geometry, Photographic film. Histogram: Definition, decision of contrast basing on histogram, operations basing on histograms like image stretching, image sliding, Image classification. Definition and Algorithm of Histogram equalization, A detail discussion on Fourier Transform, DFT, FFT, properties. A brief discussion on WALSH Transform, WFT, HADAMARD Transform, DCT.

UNIT-II

Image Enhancement (by SPATIAL Domain Methods): Arithmetic and logical operations, pixel or point operations, size operations, smoothing filters- Mean, Median, Mode filters– Comparative study, etc. Edgeenhancementfilters- Directorial filters, Sobel, Laplacian, Robert, KIRSCH, Homogeneity & DIFF Filters, prewitt filter, Contrast Based edge enhancement techniques. Comparative study. Low Pass filters, High Pass filters, sharpening filters. – Comparative study of all filters, Color image processing.

UNIT-III

Image enhancement (By FREQUENCY Domain Methods): Design of Low pass, High pass, EDGEEnhancement, smoothening filters in Frequency Domain. Butterworth filter, Homomorphic filters in Frequency Domain. Advantages of filters in frequency domain, comparative study of filters in frequency domain and spatial domain.

UNIT-IV

Image compression: Definition, A brief discussion on– Run length encoding, contour coding, Huffman code, compression due to change in domain, compression due to quantization, Compression at the time of image transmission. Brief discussion on Image Compression standards.

UNIT-V

Image Segmentation and Morphology: Definition, characteristics of segmentation. Detection of Discontinuities, Thresholding Pixel based segmentation method. Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram based segmentation, spilt and merge technique. Use of motion in segmentation (spatial domain technique only), Dilation, Erosion, Opening, closing, Hit-and-Miss transform, Boundary extraction, Region filling, connected components, thinning, Thickening, skeletons, Pruning, Extensions to Gray–Scale Images Application of Morphology in I.P.

Text Book:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E.Woods, Addision Wesley.

References:

1. Fundamental of Electronic Image Processing, Arthur. R. Weeks, Jr. (PHI)
2. Image processing, Analysis, and Machine vision, Milan Sonka,Vaclav Hlavac, Roger Boyle, Vikas Publishing House

1975604	ELECTIVE-III NATURAL LANGUAGE PROCESSING	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Learn the techniques in natural language processing.
2. Perform natural language generation..
3. Apply the techniques of machine translation.
4. Understand Semantic Analysis and Syntactic Analysis
5. Understand the information retrieval techniques

COURSE OUTCOMES:

At the end of the course student will be able to

1. Analyze the natural language text and language modeling.
2. Understand Words, Word classes and Syntactic Analysis.
3. Understand Semantic Analysis, coherence and structure
4. Generate the Language and do machine translation
5. Apply information retrieval techniques on different models.

UNIT-I

Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages - NLP Applications-Information Retrieval. **Language Modeling**: Various Grammar- based Language Models-Statistical Language Model.

UNIT-II

Word level analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. **Syntactic Analysis**: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.

UNIT-III

Semantic analysis: Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. **Discourse Processing**: cohesion-Reference Resolution- Discourse Coherence and Structure.

UNIT-IV

Natural language Generation : Architecture of NLG Systems- Generation Tasks and Representations-Application of NLG. **Machine Translation**: Problems in Machine Translation- Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages

UNIT-V

Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation. **Lexical Resources**: World Net-Frame Net- Stemmers-POS Tagger- Research Corpora.

Text book:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

References:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, Prentice Hall,2008.
2. James Allen, "Natural Language Understanding", 2nd edition, Benjamin /Cummings publishing company, 1995.

1975605	DESIGN AND ANALYSIS OF ALGORITHMS	
Instruction: 3 Periods /week	**External Exam:** 3 Hours	**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To learn techniques for effective problem solving in computing.
2. To analyze the asymptotic performance of algorithms.
3. To explain familiarity with major algorithms and data structures.
4. To apply algorithm designing techniques such as greedy algorithms, dynamic programming, divide and conquer, backtracking, branch and bound etc. for common engineering design situations.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Analyze the efficiency of algorithms using mathematical analysis and asymptotic notations.
2. Employ divide-and-conquer and decrease-and-conquer strategies for problem solving.
3. Apply transform-and-conquer and string matching techniques appropriately when an algorithmic design situation calls for it.
4. Solve problems using algorithm design methods such as the greedy method, dynamic programming.
5. Understand P and NP, NP-complete and NP-hard problems.

UNIT-I

Introduction – Fundamentals of algorithmic problem solving, important problem type. Fundamentals of analysis of algorithms and efficiency, Analysis framework, Asymptotic Notations and Basic Efficiency classes, Mathematical Analysis of Non- recursive Algorithms, Mathematical Analysis of recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization. **Brute Force:** Selection Sort and Bubble sort, Sequential Search and Brute-Force String Matching, Closest Pair and Convex, Hull Problems by Brute Force – Exhaustive Search.

UNIT-II

Divide-and-Conquer – Merge sort, Quick sort, Binary Search, Binary Tree Traversals and Related Properties, Multiplication of large integers and Strassen‘s Matrix Multiplication, Closest- Pair Convex-Hull Problems by Divide-and-Conquer. **Decrease–and–Conquer:** Insertion Sort, Depth-First Search and Breadth-First Search, Topological Sorting, Algorithms for Generating Combinatorial Objects, Decrease-by-a- Constant-Factor Algorithms, Variable-Size-Decrease Algorithms.

UNIT-III

Transform-and-Conquer – Pre-sorting, Gaussian Elimination, Balanced Search Trees, Heaps and Heap sort, Horner‘s Rule and Binary Exponentiation, Problem Reduction. **Space and Time Tradeoffs:** Sorting by Counting, Input Enhancement in string Matching, Hashing, B-Trees.

UNIT-IV

Dynamic Programming – Computing a Binomial Coefficient,Warshall‘s and Floyd‘s Algorithm, Optimal Binary Search Trees, The Knapsack Problem and Memory Functions **Greedy Technique :** Prim‘s Algorithm, Kruskal‘s Algorithm, Dijkstra‘s Algorithm, Huffman Trees.

UNIT-V

Limitations of Algorithm Power - Lower-Bound Arguments, Decision Trees , P, NP and NP – complete problems , Challenges of Numerical Algorithms.. **Coping with the Limitations of Algorithms Power:** Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems, Algorithms for solving Nonlinear Equations.

Text Books:

1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 3rd Edition, 2017.
2. Fundamentals of Computer Algorithms, Horowitz and Sahni, Galgothia publications.

Reference Books:

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest &Clifford Stein, Prentice Hall of India, New Delhi, NewDelhi

1975607	PROJECT-I	
Instruction: 8 Periods /week, External Exam: 3 Hours		**Credits: 4**
Internal: 50 Marks	**External: 50 Marks**	Total: 100 Marks

Student should submit a project work, by integrating the front end tools used in OOSE Lab and back end tools (PHP and MySQL) used in Web Technologies Lab.

OR

Student should submit a project work, using python as front end.

1975601P	SOFTWARE ENGINEERING AND MINI PROJECT LAB	
Instruction: 4 Periods/week, External Exam: 3 Hours		**Credits: 2**
Internal: 50 Marks	**External:50 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Learn to draw UML Diagrams.
2. Learn to develop a Mini- Project.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Design different Structural UML Diagrams for a project using Rationale Architect Software Designer.
2. Design different Behavioral UML Diagrams for a project using Rationale Architect Software Designer.
3. Develop the contents of Mini-Project for a given problem.

The purpose of the Software Engineering Lab course is to familiarize the students with modern software engineering methods and tools, **Rational Products**. The course is realized as a project-like assignment that can, in principle, by a team of three/four students working full time. Typically the assignments have been completed during the semester by each project team.

The goal of the Software Engineering Project is to have a walk through from the requirements, design to implementing and testing. An emphasis is put on proper documentation. Term projects are projects that a group student might take through from initial specification to implementation by giving equal importance to both design and implementation.

Cycle I: Practicing UML diagrams using IBM Rational Rose.

Before developing a mini-project, in this cycle, the student is acquainted with different UML diagrams using Rational Rose. The experiments should include drawing UML diagrams listed below for two demo/example applications assigned by the lab Instructor. The input for the following experiments is problem statement for any two demo projects supplied by the instructor.

1. Introduction to Rational Rose and practicing the following diagrams
    a. Activity diagrams for the overall business process of the projects
    b. Use-case diagram for the demo projects along with Use-case descriptions and sub-diagrams for Use-cases.
2. Class diagram- Class diagrams including the features like classes, relationships, attributes and methods along with their visibilities.

3. Interaction diagrams- Sequence diagrams and Collaboration diagrams for different scenarios of the systems with all features like actors, objects and interactions.

4. Activity diagrams, State chart and other diagrams - Activity diagrams including the features like fork join and swim lanes. State diagrams including composite states and transitions. Component diagrams, Package diagrams and Deployment diagrams.

5. Forward and Reverser Engineering- Forward Engineering Class diagrams to classes in C++ and java and persistent classes to a database. Reverse Engineering C++ code, java code and a database.

6. Documentation using Rational Rose clear quest.

Cycle II: Mini-Project

The project deliverables include

- Problem statement
- Requirements Analysis
- Design
- A Software Design Description and a System Design.
- A test specification.
- Implementation
- Implement the assigned project with one of the following web technologies
  Front end: Java technologies/PHP/MS.NET Technologies
  Backend: Oracle/My-SQL/SQL-Server
  Testing

References :

1. Project-based software engineering: An Object-oriented approach, Evelyn

Stiller, Cathie LeBlanc, Pearson Education
2. Visual Modeling with Rational Rose 2002 and UML, Terry Quatrini, Pearson Education

1975602P	WEB TECHNOLOGIES LAB	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 1.5**
Internal: 50 Marks	**External: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

1. To enable students to have skills that will help them to develop various web applications

COURSE OUTCOMES:

At the end of the course student will be able to

1. Able to work in a team
2. Able to analyze the project requirements and design the project
3. Able to implement and integration of the various modules involved in the project
4. Able to document and demonstrate the project

EACH STUDENT SHOULD DEVELOP TWO PROJECTS OUT OF THIS LIST USING PHP & MYSQL

1. Design Airlines Ticket Reservation System
2. Design ONLINE Banking system.
3. Design Library Information system
4. Design Gram Panchayat Information system for House tax, water tax, wealth tax, Library
5. tax collection, phone bill, Electricity bill collection.
6. Design student information system portal which maintain attendance, marks etc.
7. Design online examination system.

Reference Books:

1. PHP Web 2.0 Mashup Projects by Shu-Wai Chow, Packt Publishing

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE & P.G. COURSES(A)
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ENGINEERING & TECHNOLOGY PROGRAM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME FOR IV/IV B. TECH I SEM (7th Semester)

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	Professional Elective courses	1975701	PROFESSIONAL ELECTIVE – IV	3	0	3	4.5
2	Professional Elective courses	1975702	PROFESSIONAL ELECTIVE – V	3	0	0	3
3	Professional Core courses	1975703	MACHINE LEARNING	3	0	3	4.5
4	Professional Core courses	1975704	COMPILER DESIGN	3	0	0	3
5	Open Elective courses	1975705	OPEN ELECTIVE -2	3	0	0	3
6	Project (Summer Industry Internship)	1975706	PROJECT – II	0	0	7	3.5
7	Humanities &Social Sciences including Management courses	1975707	ENTERPRENUERSHIP	2	1	0	3
						Total credits	**24.5**

Professional Elective-IV

Internet of Things
Big Data Analytics
Data Science with R

Professional Elective-V

Soft Computing Computer Graphics.
Cloud Computing

Open Elective-II

Building Services and Maintenance (Offered by CE to other Branches)

Principles of Communication Systems (Offered by ECE to other Branches)

Renewable Energy Technologies (Offered by ME to other Branches)

1975701	ELECTIVE-IV INTERNET OF THINGS	
Instruction: 3 Periods/week,	**External Exam: 3 Hours**	**Credits: 3**
Internal: 30 Marks	**External Exam: 70 Marks**	Total: 100 Marks

Course Objectives:

1.To learn the basics concept Internet of Things.
2.To study design principles.
3.To understand different sensors in IoT environment
4.To study basic building blocks of IoT devices

Course Outcomes:

At the end the course student will be able to

1. Understand IoT framework and architecture.
2. Understand design principles and standards of connected devices.
3. Understand design principles for web connectivity and protocols.
4. Classify various sensors used in IoT networks.
5. Design IoT devices using Raspberry Pi and other microcontroller boards.

1. **Internet of Things: An Overview:** Internet of Things, IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT, M2M Communication, Examples of IoT.

2. **Design Principles for Connected Devices:** Introduction, IoT/M2M Systems Layers and Design Standardization, Communication Technologies, Data Enrichment, Data Consolidation and Device Management at Gateway, Ease of Designing and Affordability.

3. **Design Principles for Web Connectivity:** Introduction, Web Communication Protocols for Connected Devices, Message Communication Protocols for Connected Devices, Web Connectivity for Connected – Devices Network using Gateway, SOAP, REST, HTTP RESTful and Web Sockets.

4. **Sensors, Participatory Sensing, RFID's and Wireless Sensor Networks:** Introduction, Sensor Technology, Participatory Sensing, Industrial IoT and Automotive IoT, Actuator, Sensor Data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Networks Technology.

5. **IoT Physical Devices & Endpoints**: What is an IoT Device- Basic Building blocks of an IoT Device, Exemplary Device: Raspberry Pi, About the board, Linux on Raspberry Pi, Raspberry Pi Interfaces-Serial, SPI, I2C, Programming Raspberry Pi with Python-Controlling LED with Raspberry Pi, Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, Other IoT Devices- pcDuino, BeagleBone Black, Cubie board

Text Books:

1. INTERNET OF THINGS – Architecture and Design Principles by Raj Kamal, McGraw Hill Education India Pvt. Ltd (Chapters 1,2,3,7)

2. INTERNET OF THINGS – A Hands On Approach by Arshdeep Bahga, Vijay Madisetti, Universities Press (India) Private Limited (Chapter 7)

Reference:

1. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Marina Ruggieri & Homayoun Nikookar, River Publishers Series in Communications.

1975701	ELECTIVE-IV BIG DATA ANALYTICS	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External Exam: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Understand the Big Data Platform and its Use cases
2. Provide an overview of Apache Hadoop
3. Provide HDFS Concepts and Interfacing with HDFS.
4. Understand Map Reduce Jobs

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand concept of Big Data and Hadoop Eco System
2. Configure various Hadoop services in distributed environment
3. Analyze unstructured data using Map Reduce
4. Understand various advanced Map Reduce tasks for analyzing the data
5. Solve various real times problems using Hadoop

UNIT-I

Introduction to Big Data:Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity, Veracity, Validity), Importance of Big Data , Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop, Introduction to Hadoop:Hadoop- definition, Understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop—running your first program.

UNIT-II

Hadoop Architecture:History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker, YARN. Components of Hadoop -Working with files in HDFS, Reading and writing the Hadoop Distributed File system -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop Filesystem, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives

UNIT-III

MapReduce- Anatomy of a MapReduce program, A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes, Developing a MapReduce Application - The Configuration API, Configuring the Development Environment, Running Locally on Test Data, Running on a Cluster, Tuning a Job, MapReduce Workflows, Getting the patent data set, constructing the basic template of a Map Reduce program, Counting things, Adapting for Hadoop's API changes, Streaming in Hadoop, Improving performance with combiners.

UNIT-IV

MapReduce Advanced Programming:Advanced MapReduce - Chaining MapReduce jobs, joining data from different sources, creating a Bloom filter, Passing job-specific parameters to your tasks, probing for task-specific information, Partitioning into multiple output files, Inputting from and outputting to a database, keeping all output in sorted order

UNIT-V

Graph Representation in MapReduce: Modeling data and solving problems with graphs, Shortest Path Algorithm, Friends-of-Friends Algorithm, PageRank Algorithm, Bloom Filter, Parallelized Bloom filter creation in MapReduce, Map-Reduce semi-join with Bloom filters

Text Books:

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

References:

1. Hadoop in Action by Chuck Lam, MANNING Publ.
2. Hadoop in Practice by Alex Holmes, MANNING Publishers
3. Mining of massive datasets, AnandRajaraman, Jeffrey D Ullman, Wiley Publications.

1975701	ELECTIVE-IV DATA SCIENCE with 'R'	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Learn the Concepts of Data Science.
2. Perform Data Analytics
3. Apply the techniques of data visualization in various applications.
4. Write R Programs for Data Science Applications.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the concepts of data science.
2. Analyze the Data Collection and Management.
3. Understand and Perform the Data Analysis.
4. Perform Data Visualization.
5. Apply R- Programming Concepts in Data Science.

UNIT-I

Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications

UNIT-II

Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, using multiple data sources

UNIT-III

Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

UNIT-IV

Data visualisation: Introduction, Types of data visualisation, Data for visualisation: Data types, Data encodings, Retinal variables, mapping variables to encodings, Visual encodings.

UNIT-V

Introduction to R – Basic Commands, Graphics, Indexing data and Loading data, Classification, Linear Regression, Logistic Regression, Linear Discriminant Analysis, Comparison of Classification Methods, Tree based Methods – Decision Trees, Bagging, Random Forest and Boosting methods, Clustering Methods – K-Means Clustering and Hierarchical Clustering .

Text Books:

1. Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from The Frontline. O'Reilly, 2013.
2. An Introduction to Statistical Learning With Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani · Springer Publishers – 2013

Reference:

1. Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press, 2014.

1975702	ELECTIVE-V SOFT COMPUTING	
Instruction: 3 Periods /week, External Exam:3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To make the student to understand the role of imprecision and uncertainty in real world scenarios.
2. To explain the role of Soft Computing in addressing the imprecision anduncertainty.
3. To explain the principal components of soft computing that include Fuzzy Sets and Fuzzy Logic, Artificial Neural Networks, Genetic Algorithms and RoughSets.
4. To learn the Design and Implementation of Soft Computingmethodologies.
5. To explain the design of hybrid systems which is combination of one or more soft computing methodologiesmentioned.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Learn the concepts of Soft computing and its applications.
2. Implement the Concepts of Fuzzy Logic and Inference techniques.
3. Develop Neural Network Applications using the Algorithms in Artificial Neural networks
4. Develop the concepts of Evolutionary and Stochastic Techniques using the concepts of Genetic Algorithms.
5. Solve problems related to rough sets and develop applications of Soft computing.

UNIT-I

Soft Computing: Introduction to Fuzzy Computing, Neural Computing, Genetic Algorithms, Associative Memory, Adaptive Resonance Theory, Different Tools and Techniques, Usefulnessand Applications.

UNIT-II

Fuzzy Sets and Fuzzy Logic: Introduction, Fuzzy Sets Versus Crisp Sets, Operations on Fuzzy Sets, Extension Principle, Fuzzy Relations and Relation Equations, Fuzzy Numbers, Linguistic Variables, Fuzzy Logic, Linguistic Hedges, Applications. **Interference in fuzzy logic:** fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzifications and Defuzzifications, Fuzzy

Controller, Fuzzy Controllers, Fuzzy Pattern Recognition, Fuzzy Image Processing,Fuzzy Database.

UNIT-III

Artificial Neural Network: Introduction, Artificial Neuron and its model, activationfunctions, Neural network architecture: single layer and multilayer feed forward networks,recurrent networks. Various learning techniques, perception and convergence rule, Auto-associativeand hetero-associative memory , Hebb's Learning, Adaline,Perceptron

Multilayer Feed Forward Network: Back Propagation Algorithms, Different IssuesRegarding Convergence of Multilayer Perceptron, Competitive Learning, Self- Organizing, FeatureMaps, Adaptive Resonance Theory, Associative Memories,Applications.

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UNIT-IV

Evolutionary and Stochastic Techniques: Genetic Algorithm (GA), Genetic Representations, (Encoding) Initialization and Selection, Different Operatorsof GA, Analysis ofSelection Operations, Hypothesis of Building Blocks, Schema Theorem andConvergence ofGenetic Algorithm, Simulated Annealing and Stochastic Models, BoltzmannMachine,Applications

UNIT-V

Rough Set: Introduction, Imprecise Categories Approximations and Rough Sets, Reductionof Knowledge, Decision Tables and Applications. Hybrid Systems: Neural- Network-BasedFuzzy Systems, Fuzzy Logic-Based Neural Networks, Genetic Algorithm for Neural Network Designand Learning, Fuzzy Logic and Genetic Algorithm for Optimization,Applications

Text Books:

1.Neural Networks, Fuzzy Logic and Genetic Algorithm:Synthesis and Applications,S.Rajsekaran and G.A. Vijayalakshmi Pai, Prentice Hall of India.
2.Rough Sets, Z.Pawlak, Kluwer Academic Publisher,1991.
3.Intelligent Hybrid Systems, D. Ruan, Kluwer AcademicPublisher,1997

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References:

1.Artificial Intelligence and Intelligent Systems, N.P.Padhy, Oxford University Press.
2.Neural Fuzzy Systems, Chin-Teng Lin & C. S. George Lee, Prentice Hall PTR.Addison-Wesley
3.Learning and Soft Computing, V. Kecman, MITPress,2001
4.Fuzzy Sets and Fuzzy Logic, Klir& Yuan,PHI,1997

1975702	ELECTIVE-V COMPUTER GRAPHICS	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Provides a comprehensive introduction to computer graphics with a foundation in Graphics Applications.
2. A thorough introduction to computer graphics techniques.
3. Learn the basics of Geometric Transformations and projections.
4. Introduce Viewing Pipeline, Clipping operations, three dimensional concepts and object representations.
5. Study color models and basics of computer animation.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various output primitives.
3. Describe the use of geometric transformations on graphics objects and their application in composite form.
4. Understanding Viewing Pipeline, Clipping operations, three dimensional concepts and object representations.
5. Create interactive graphics applications and demonstrate computer graphics animation.

UNIT-I

Introduction: Computer Graphics and their applications:Computer Aided Design, Computer Art, Entertainment, Education and Training, Graphical User Interfaces; Overview of Graphics systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphics Monitors And Workstations, Input Devices, Hard Copy Devices, Interactive Input Methods, Windows and Icons, Virtual Reality Environments, Graphics Software.

UNIT-II

Output primitives :Points and Lines, , Line and Curve Attributes, Color and Gray scale levels, Antialiasing, Loading the Frame buffer, Line function, Line Drawing Algorithms, Circle Generating Algorithms, Ellipse Generating Algorithms, Pixel Addressing, Area Fill Attributes, Filled Area

Primitives, Filled Area Functions, Cell Array, Character Generation, Character Attributes, Bundled Attributes, Curve Functions, Parallel Curve Algorithms.

UNIT-III

Two Dimensional Transformations: Basic 2DTransformations, Matrix Representations, Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations between Coordinate Systems, Affine Transformations.**Three Dimensional Transformations &Projections**: Translation, Rotation, Scaling, Other Transformations, Composite Transformations, 3D Transformation Functions, Modeling and Coordinate Transformations, Need for projections, Parallel & Perspective projections, General Projection Transformations.

UNIT-IV

Viewing Pipeline and Clipping operations: Viewing Pipeline,Viewing Coordinates &Reference frames, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions, Three Dimensional Viewing, View Volumes, Clipping and its Operations, Types of clipping, operations-Point Clipping, Line Clipping, Polygon Clipping, Curve Clipping, Text and Exterior Clipping.**Three Dimensional Concepts and Object representations:** 3D display methods, 3D Graphics, Polygon Surfaces, Curved Lines and Surfaces, Quadratic Surfaces, Super Quadrics, Blobby Objects, Spline Representations, Cubic Spline methods, Bézier Curves and Surfaces, B-Spline Curves and Surfaces,

UNIT-V

Color Models and Basics of Computer Animation: Intuitive color concepts, Basics of RGB Color model, YIQ Color Model, CMY & HSV Color models. Design of animation Sequences, Raster Animations, Key Frame systems: Morphing, A Simple program on Animation.

Text Books:

1. Computer Graphics, Donald Hearn & M.Pauline Baker, Pearson Education, NewDelhi.
2. Computer Graphics by Dr. RajivChopra.

References:

1. Procedural Elements for Computer Graphics,David F.Rogers,Tata Mc Graw Hill Book Company,NewDelhi,2003
2. Computer Graphics: Principles & Practicein C,J.D.Foley,S.KFeiner, AVan Dam F.H John Pea rson Education,2004
3. Computer Graphics using Open GL, Franscis S Hill Jr,Pearson Education,2004.
4. Computer Vision and Image Processing: A Practical Approach using CVIP tools, S. E.Umbaugh, Prentice Hall,1998

1975702	ELECTIVE-V CLOUD COMPUTING	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To understand fundamental concepts in the area of cloud computing.
2. To learn different service modelsand concepts of Virtualization and cloud datastorage.
3. To differentiate cloud Application Development concepts.
4. To analyze cloudGovernance and economics
5. To gain competence in Map Reduce and HadoopOverview in view of cloud.

COURSE OUTCOMES:

1. Able to Understand the architecture and infrastructure of cloud computing.
2. Able to identify importance of virtualization cloud computing.
3. Able to classify different cloud service models
4. Able to develop applications for cloudcomputing.
5. Able to understand cloud business economics and role of big data in cloud.

UNIT-I

Introduction to cloud computing: Cloud computing components, Infrastructure services, storage applications, database services – introduction to SaaS, PaaS, IaaS, IdaaS, data storage in cloud.

UNIT-II

Virtualization: enabling technologies, types of virtualization, server virtualization,desktop virtualization, memory virtualization, application and storage virtualization-tools andproducts availableforvirtualization

UNIT-III

SaaS, PaaS, IaaS and Cloud data storage: Getting started with SaaS, SaaS solutions,SOA, PaaSandbenefits. Understanding IaaS, improving performance for load balancing,server types within IaaS, utilizing cloud based NAS devices, cloud based data storage, and backupservices, cloud based block storage and database services.

UNIT-IV

Cloud Application Development: Client server distributed architecture for cloud designing cloud based solutions, coding cloud based applications, traditional Apps vs cloud Apps, client side programming, server side programming overview- fundamental treatment of webapplication frameworks.

UNIT-V

Cloud Governance and Economics: Securing the cloud, disaster recovery and business continuityin the cloud, managing the cloud, migrating to the cloud, governing and evaluating the clouds business impact and economics. **Inside Cloud**: Introduction to Map Reduce and Hadoop-over view of big data and its impact on cloud.

Text Books:

1.Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Kris Jamsa, Jones & Bartlett Publishers, Paperback edition,2013
2.Hadoop Map Reduce cookbook, Srinath Perera and Thilina Gunarathne, Packt publishing

Reference:

1.Cloud Computing: A Practical Approach, Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill Edition

1975703	MACHINE LEARNING	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods, classification methods, clustering Methods and understand the basic problems using Hidden Markov Models.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Perform regression analysis using the concepts of supervised machine learning algorithms.
2. Apply different classification algorithms for real time problem solving.
3. Apply different clustering algorithms for real time problem solving
4. Solve real time problems using decision trees and regression trees.
5. Understand the applications of Hidden Markov Models.

UNIT-I

Introduction to Machine Learning, Applications of Machine learning, and Supervisory Learning: Learning classes from examples, Vapnik-Charvonenkis (VC) Dimension, Probably Approximately Correct(PAC) Learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of supervised machine learning algorithms.

UNIT-II

Bayesian Decision Theory: Classification, losses and risks, discriminant functions, utility theory, value of information, Bayesian networks, Influence diagrams, Association rules, Parametric Methods: Maximum likelihood estimation, evaluating an estimator with bias and variance, Bayes' estimator, parametric classification, regression, tuning model complexity: bias vs variance dilemma, model selection procedures.

Multivariate methods: Multivariate data, parameter estimation, missing value imputation, univariate normal distribution and classification, discrete features, regression, Dimensionality Reduction: Subset selection, PCA, Factor Analysis, multi-dimensional scaling, LDA.

UNIT-III

Clustering: Mixture densities, K-means clustering, Expectation Maximizationalgorithm, mixtures of Latent Variable Models, Supervised learning after clustering, Hierarchical clustering, and choosing number of clusters.

Non-parametric methods: Non-parametric methods density estimation, generalization to multivariate data, nonparametric classification, condensed nearest neighbors, non-parametric regression: smoothing models, choosing smoothing parameters.

UNIT-IV

Decision trees and Linear Discrimination: Univariate classification and regression trees, rule extraction from trees, Multivariate trees, Generalizing linear model, two class and multi-class geometry of linear discriminant, pairwise separation, gradient descent, logistic discrimination for binary and multi-class problems, Support vector machines, optimal separating hyperplane, kernel functions for non-separable spaces, SVM for regression.

UNIT-V

Hidden Markov Models: Discrete Markov processes, Hidden Markov Models, Three basic problems of HMM, Evaluation problem, finding the state sequence, Learning model parameters, continuous observations, Model selection in HMM Assessing and comparing classification Algorithms: Cross-validation and resampling methods, measuring error, interval estimation, hypothesis testing, assessing performance of a classifier, comparing two classification algorithms, comparing multiple classification algorithms based on variance.

Text Book:

Introduction to Machine Learning by Ethem Alpaydin, Prentice-Hall of India, 2006
Machine Learning by Saikat Dutt and Subramanian Chandramouli

Reference:

Machine Learning, Tom Mitchell , McGraw Hill,1997

1975704	COMPILER DESIGN	
Instruction: 3 Periods /week, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Learn about language processors, phases of compiler and Lexical Analyzer.
2. Learn about Syntax Analyzer and various types of parsers.
3. Learn about intermediate code generation.
4. Learn different code optimization techniques.
5. Learn symbol tables, run time environment, error handling, code generation and code scheduling.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Describe the various phases of Compiler and generate tokens for the given program.
2. Explain the working of syntax analyzer and generate a parsing table to parse a string.
3. Construct intermediate code for the given parse tree.
4. Construct an Optimized Code for the given intermediate code using different techniques.
5. Understand the working of Code Generation, Code Scheduling, Symbol Tables, Run time Environment and Error Handling.

UNIT-I

Introduction Finite Automata & Lexical Analysis:: Introduction to Compilers and Language processors, , Programming Language basics, Structure & Different Phases of a Compiler, Review of Compiler Structure, Structure of Optimizing Compilation, Compiler construction tools, Boot strapping, Cross compilers, Introduction to Lexical Analysis, Lexical Analyzers, Approaches to design Lexical Analyzers, Language for specifying lexical analyzers, Introduction to Finite automata, Regular Expressions & Languages, Recognition of Tokens, Transition Diagrams, Implementation of lexical analyzers, Lexical Analyzer Generator LEX.

UNIT-II

Syntax Analysis and Semantic Analysis: Syntactic Specification of Programming Languages, Context Free Grammars & Languages, Introduction to Parsers. Top-down parsing techniques: Brute force parsing, Recursive Descent Parsing, Predictive Parsing, Bottom – up Parsing: Shift reduce parsing, Operator parsing, LR (k) parsing, Semantic Actions, Syntax Directed Translations, Translation on the parse Tree, Implementation of Syntax Directed Translator.

UNIT-III

Intermediate Code Generation: Intermediate Codes, Syntax Directed translation to Postfix code, Syntax Trees, Intermediate Code Generation, Three Address Code-Translation of Expressions, Type Checking& Type Conversions.

UNIT-IV

Code Optimization: Principal sources of Code Optimization, Loop Optimization, Basic Blocks & Flow Graphs, DAG Representation of Basic Blocks, Applications of DAG, Local Optimization, Unreachable Code Elimination, Dead Code Elimination, Data Flow Analysis, Data Flow Equations & Computations, Peep-Hole Optimization. Machine Dependent Optimizations, Overview of Informal Compiler Algorithm Notation(ICAN), If Simplification, Loop Simplification, Loop Inversion, Branch Optimization and Prediction.

UNIT-V

Code Generation, Code Scheduling, Symbol Tables, Run time Environment and Error Handling: Issues in Code Generation, Input to Code Generator, Instruction Selection, Register Allocation, Simple Target Machine Model, Program and Instruction Costs, Register allocation & Assignments, Code Generation Algorithm, Code Generators, Optimal Code Generation for Expressions, Code Generation From DAG, Contents of a Symbol Table, Data Structures for Symbol Tables, Run time Environments, Implementation of a simple Stack allocation, Heap Management, Block Structured Languages; Error Detection & Recovery, Lexical Phase Errors, Syntactic & Semantic Errors, Error Handling Routines.

Text Books:

1. Principles of Compiler Design by Aho,D. Ullman, Lam and Ravi Sethi, Pearson Education Second Edition
2. Advanced Compiler Design and Implementation, Steven Muchnic, Elsevier Publications.

References:

1. Compiler Construction by Kenneth. C. Louden, Vikas Pub.House.
2. Compiler Design, A.A. Pentambekar, Technical Publications
3. Modern Compiler Design, Grune.D, Van Reeuwijk K, Bal H.E, Jacobs C J H, Langendoen K, Springer

1975706	PROJECT-II	
Instruction: 7 Periods /week, External Exam: 3 Hours		**Credits: 3.5**
Internal: 50 Marks	**External: 50 Marks**	Total: 100 Marks

Student submits a project work, executed in any platform depending on Electives opted in the current semester or according to the project offered by the industry in his/her internship. In addition to the project work, student completes a certificate course in MOOCS based on the platform they opt for performing the project.

1975707	ENTREPRENEURSHIP	
Instruction: 2 Periods /week+ 1 Tut, External Exam: 3 Hours		**Credits: 3**
Internal: 30 Marks	**External: 70 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. Creating awareness among the students about the significance of entrepreneurship and its social relevance.
2. Imparting knowledge to the students on institutional support available to start a business venture.
3. To study about the importance of woman entrepreneurs and the support provided to them by thegovernmental and non-governmental agencies.
4. To acquaint the students with the process of project management.
5. To understand the significance of entrepreneurial training in the development of new and existing entrepreneurs.

COURSE OUTCOMES:

1. The student will be able to build an organization and run with entrepreneurial ethics and social responsibility.
2. Student will acquire the knowledge of various financial institution support and various schemes for establishing an enterprise.
3. The student would be adept at starting and evaluating a new business venture, with a special emphasis on women entrepreneurship.
4. Student will be able to prepare project feasibility report, acquire skills on project management and design training programs.
5. Student gains knowledge about the sources and accessibility to financial and non-financial institutions.

UNIT-I

Entrepreneurship: Definition, Characteristics and Skills , Types of Entrepreneurs, Entrepreneur vs. Professional Managers, , Growth of Entrepreneurs, Nature and Importance of Entrepreneurs, Problems of Entrepreneurship, social entrepreneurs.

UNIT-II

Institutional support: Role of Government, Role of Financial Institutions, Role of Commercial Banks, Role of Development Financial Institutions such as IDBI, ICICI, NABARD, SIDBI & SFC, Role of other supporting institutions such as SIDO, NIESBUD, DIC, Entrepreneurship Development Institute, MSMEs.

UNIT-III

Women Entrepreneurship: Role & Importance, Profile of successful Indian and global women Entrepreneurs, Problems of Women Entrepreneurs, Role of government and Non Government Organizations in promoting Women Entrepreneurship in India.

UNIT-IV

Entrepreneurial Development and Project Management: Institutions in aid of Entrepreneurship Development, Idea generation: Sources and Techniques;, Stages in Project formulation; Steps for starting a small enterprise - Incentives for Small Scale Industries by Government.

UNIT-V

Training: Designing Appropriate Training Programmes to Inculcate Entrepreneurial Spirit, Significance of Entrepreneurial Training, Training for New and Existing Entrepreneurs, Feedback and Performance of Trainees.

Text Books:

1.Sharma,S.C, and Banga, T.R., Industrial Organization & Engineering Economics, Khanna Publishers, Delhi, 2000.
2. Vasant Desai The Dynamics of Entrepreneurial Development and Management (Planning for future Sustainable growth), HImalayan Publishing House, 2018.

References:

1.Aryasri , A.R., Management Science**,** McGraw Hill Education (India Private Limited , New Delhi2014.
2.Sheela, P. , and Jagadeswara Rao, K., Entrepreneurship, Shree Publishing House, Guntur, Andhra Pradesh, 2017.

1975701P	ELECTIVE-IV INTERNET OF THINGS LAB	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 1.5**
Internal: 50 Marks	**External: 50 Marks**	Total: 100 Marks

Course objective:

To Study functionality of different embedded boards used in IoT environment.

To test sensors used for IoT applications

To analyze the sensor data and design IoT applications.

COURSE OUTCOMES:

CO1. Understand the functionality of Arduino, ESP8266 and Raspberry Pi.
CO2. Test different sensors used for IoT applications and understand cloud interfacing.
CO3: Experiment the connectivity protocols of IoT applications using Raspberry Pi
CO4: Design IoT devices using Arduino, ESP8266 and Raspberry Pi

LIST OF EXPERIMENTS:

1. Study the Arduino, ESP8266 and Raspberry Pi boards
2. Simulate Arduino/ESP8266 board and test different sensors with Tinker cad
3. Interface LED, temperature sensor and humidity sensor to Arduino/ESP8266 Board.
4. Using Arduino/ESP8266 for Cloud interfacing (Things Speak) and publishing sensor data to cloud.
5. Study of various network protocols used in IoT.
6. Application of Wi-Fi in IoT systems.
7. Application of 6LowPan in IoT systems.
8. Application of Bluetooth in IoT systems.
9. Application of 802.15.4 Zigbee. in IoT systems.
10. Design a simple IoT system comprising sensors, wireless network connection, data analytics

1975701P	ELECTIVE-IV BIG DATA ANALYTICS LAB	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 1.5**
Internal: 50 Marks	**External: 50 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To enable students to have skills that will help them to solve complex real world problems using Hadoop for decision support.

COURSE OUTCOMES:

At the end of the course student will be able to

1. Configure single, pseudo and fully distribution node Hadoop Cluster.
2. Apply Map Reduce algorithms for various real time problems.
3. Perform various Analytic operations in Hadoop.

CYCLE 1. Getting Hadoop Up and Running in a cluster:

1. Setting up Hadoop on standalone machine.
2. Wordcount Map Reduce program using standalone Hadoop.
3. Adding the combiner step to the Wordcount Map Reduce program.
4. Setting up HDFS.
5. Using HDFS monitoring UI
6. HDFS basic command-line file operations.
7. Setting Hadoop in a distributed cluster environment.
8. Running the WordCount program in a distributed cluster environment.
9. Using Map Reduce monitoring UI

CYCLE 2. Hadoop Map Reduce Applications:

10. Choosing appropriate Hadoop data types.
11. Implementing a custom Hadoop Writable data type.
12. Implementing a custom Hadoop key type.
13. Emitting data of different value types from a mapper.
14. Choosing a suitable Hadoop Input Format for your input data format.
15. Formatting the results of Map Reduce Computation – using Hadoop Output Formats.

CYCLE 3. Analytics

16. Simple analytics using Map Reduce.
17. Performing Group-By using Map Reduce.
18. Calculating frequency distributions and sorting using Map Reduce.
19. Plotting the Hadoop results using GNU plot.
20. Calculating histograms using Map Reduce.
21. Calculating scatter plots using Map Reduce.
22. Parsing a Complex dataset with Hadoop.
23. Joining two datasets using Map Reduce.

Text Book:

1. Hadoop Map Reduce Cookbook, Srinath Perera &Thilina Gunarathne, 2013, PACKT PUBLISHING.

1975701P	ELECTIVE-IV Data Science with R – Programming Lab	
Instruction: 3 Periods/week, External Exam: 3 Hours		**Credits: 1.5**
Internal: 50 Marks	**External Exam: 50 Marks**	Total: 100 Marks

COURSE OBJECTIVES:

1. To Understand the various concepts in R Programming Language
2. To implement the essential Data Science Applications in R Programming

COURSE OUTCOMES:

At the end of the course student will be able to

1: Understand the concepts R Programming Language
2: **Apply** R Programming Concepts in Data Science Applications.
3. Analyze Data Sets using various algorithms applying R language.

Week 1 :

Getting Data In and Out of R.

Week 2 :

Using Textual and Binary Formats for Storing Data.

Week 3 :

Interfaces to the Outside World.

Week 4 :

Managing Data Frames with the Dplyr Package.

Week 5 :

Functions of R.

Week 6 :

Loop Functions.

Week 7 & 8 :

Learn R programming fundamentals such as data structures, variables, loops, and functions.

Week 9 & 10 :

Learn to visualize data in the popular data visualization library ggplot2.

Week 11 & 12 :

Data Analysis using R and Case Study

Reference Books:

1. R Programming for Data Science by Roger D. Peng

1975703P	MACHINE LEARNING LAB	
Instruction: 3 Periods /week, Univ. Exam: 3 Hours		**Credits: 1.5**
Internal: 50 Marks	**University Exam: 50 Marks**	**Total: 100 Marks**

COURSE OBJECTIVES:

This LAB course will enable students to

1. Make use of Data sets in implementing the machine learning algorithms.
2. Implement the machine learning concepts and algorithms in any suitable language of choice.

COURSE OUTCOMES:

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

1. Understand the implementation procedures for the machine learning algorithms.
2. Design Java/Python programs for various Learning algorithms.
3. Apply appropriate data sets to the Machine Learning algorithms.
4. Identify and apply Machine Learning algorithms to solve real world problems.

Description (If any):

1. The programs can be implemented in either JAVA or Python.
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
3. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

Lab Experiments:

1. Implement and demonstrate the **FIND-S algorithm** for finding the most specific hypothesis based on a given set of training data samples. Read the training data froma.CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the **Candidate-Elimination algorithm** to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based **ID3 algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the **Back propagation algorithm** and test the same using appropriate data sets.

5. Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the **naïve Bayesian Classifier** model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a **Bayesian network** considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply **EM algorithm** to cluster a set of data stored in a .CSV file. Use the same data set for clustering using ***k*-Means algorithm**. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement ***k*-Nearest Neighbor algorithm** to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric **Locally Weighted Regression algorithm** in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME FOR IV/IV B. TECH II SEM (8th Semester)

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	Project	1975801	PROJECT – III	0	0	16	8
2	Massive Open Online Courses	1975802	MOOCS - II	0	0	3	1.5
						Total credits	**9.5**

- The Student should opt MOOCs Courses in the area of their respective projects in Project 2and Project 3.

Or

- Should opt in the list provided

1975801	PROJECT-III	
Instruction: 16 Periods /week, External Exam: 3 Hours		**Credits: 8**
Internal: 50 Marks	**External: 50 Marks**	Total: 100 Marks

Student submits a high-end project work to assess his/her ability of performing an industrial project or applied research linked to the knowledge discipline. In addition to the project work, student completes a certificate course in MOOCS based on the platform they opted.

1975802	MOOCS-II	
Instruction: 3 Periods /week		**Credits: 1.5**

Students completes a certificate course in MOOCS (Massive Open Online Course) based on the platform they opted for performing the project in the current semester.