MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

BACHELOR OF TECHNOLOGY (B.Tech)

ARTIFICIAL INTELLIGENCE &

DATA SCIENCE (AI & DS)

COURSE STRUCTURE & SYLLABUS (R20)

(Batches admitted from the academic year 2020 - 2021)

Department of
Computational Intelligence
(ARTIFICIAL INTELLIGENCE & DATA SCIENCE)

M R C E T CAMPUS

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COURSE STRUCTURE BTECH- AI-DS

B. Tech (AI-DS) – I Semester (I Year I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS INT	MAX. MARKS EXT
1	R20A0001	English	2	0	0	2	30	70
2	R20A0021	Mathematics – I	3	1	0	4	30	70
3	R20A0201	Basic Electrical Engineering	3	0	0	3	30	70
4	R20A0301	Computer Aided Engineering Graphics	2	0	2	3	30	70
5	R20A0501	Programming for Problem Solving	3	0	0	3	30	70
6	R20A0081	English Language Communication Skills Lab	-	0	4	2	30	70
7	R20A0281	Basic Electrical Engineering Lab	-	0	3	1.5	30	70
8	R20A0581	Programming for Problem Solving Lab	-	0	3	1.5	30	70
9	R20A0003*	Human Values and Professional Ethics	**2**	**0**	**0**	**0**	**100**	**-**
		TOTAL	**15**	**1**	**12**	**20**	**340**	**560**

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

B. Tech (AI-DS) – II Semester (I Year II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX MARKS INT	MAX MARKS EXT
1	R20A0002	Professional English	2	0	0	2	30	70
2	R20A0022	Mathematics – II	3	1	0	4	30	70
3	R20A0011	Applied Physics	3	0	0	3	30	70
4	R20A0401	Analog and Digital Electronics	3	0	0	3	30	70
5	R20A0502	Python Programming	3	0	0	3	30	70
6	R20A0082	Applied Physics Lab	-	0	3	1.5	30	70
7	R20A0582	Python Programming Lab	-	0	3	1.5	30	70
8	R20A0083	Engineering and IT Workshop	-	0	4	2	30	70
9	R20A0064	Financial Institutions, Markets and Services	2	-	-	0	100	-
		TOTAL	**16**	**1**	**10**	**20**	**340**	**560**

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

B. Tech (AI-DS) – III Semester (II Year I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0503	Data Structures using python	3	0	0	3	30	70
2	R20A0563	Computer Organization and Operating Systems	3	0	0	3	30	70
3	R20A0505	Design and Analysis of Algorithms	3	0	0	3	30	70
4	R20A6701	Introduction to Data Science	3	0	0	3	30	70
5	R20A0024	Probability & Statistics	3	0	0	3	30	70
6	R20A0061	Managerial Economics and Financial Analysis	3	0	0	3	30	70
7	R20A0583	Data Structures using Python Lab	-	0	3	1.5	30	70
8	R20A0594	Computer Organization and Operating Systems Lab	-	0	3	1.5	30	70
9	R20A0004*	Foreign Language: French	2	-	-	0	100	-
		TOTAL	20	0	6	21	340	560

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

B. Tech (AI-DS) – IV Semester (II Year II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A0511	Software Engineering	3	0	0	3	30	70
2	R20A0508	Object Oriented Programming through Java	3	0	0	3	30	70
3	R20A0509	Database Management System	3	0	0	3	30	70
4	R20A0513	Artificial Intelligence	2	0	2	3	30	70
5	R20A0026	Discrete Mathematics	3	0	0	3	30	70
6	OE-I	Open Elective-I	3	0	0	3	30	70
7	R20A0585	Object Oriented Programming through Java Lab	-	0	3	1.5	30	70
8	R20A0586	Database Management System Lab	-	0	3	1.5	30	70
9	R20A0008*	Global Education & Professional Career	2	-	-	0	100	-
		TOTAL	20	0	6	21	340	560

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

B. Tech (AI-DS)— V Semester (III Year I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0525	Machine Learning	3	0	0	3	30	70
2	R20A0510	Computer Networks	3	0	0	3	30	70
3	R20A0516	Full Stack Development	3	0	0	3	30	70
4	R20A1204 R20A1262 R20A6612 R20A0515	Professional Elective-I 1. Image Processing 2. Information Retrieval systems 3. R Programming 4. Scripting Languages	3	0	0	3	30	70
5	R20A7305 R20A1202 R20A6604 R20A0520	Professional Elective-II 1. Computer Vision 2. Automata and Compiler Design 3. Soft Computing 4. Graph Theory	3	0	0	3	30	70
6	OE-II	Open Elective-II	3	0	0	3	30	70
7	R20A0589	Full Stack Development Lab	0	0	3	1.5	30	70
8	R20A6681	Artificial Intelligence & Machine Learning Lab	0	0	3	1.5	30	70
9	R20A7291	Application Development-1	-	-	4	2	30	70
10	R20A0006	Technical Communication & Soft Skills	2	-	-	0	100	-
		TOTAL	**20**	**0**	**10**	**23**	**370**	**630**

B.Tech (AI-DS)— VI Semester (III Year II Semester)

S.NO	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A1206	Data Warehousing and Data Mining	3	0	0	3	30	70
3	R20A0519	Big Data Analytics	3	0	0	3	30	70
4	R20A6702 R20A7201 R20A6611 R20A7303	Professional Elective-III 1. Data Handling and Visualization 2. Design Patterns using Python 3. Health care Analytics 4. Software Testing Methodologies	3	-	-	3	30	70

S.NO	Subject Code	SUBJECT	L	T	P	C	INT	EXT
5	R20A7202 R20A7203 R20A6202 R20A6608	Professional Elective-IV 1. AI in Speech Processing 2. Business Intelligence 3. Cyber Security 4. Reinforcement Learning	3	0	0	3	30	70
6	OE-III	Open Elective-III	3	0	0	3	30	70
7	R20A1283	Data Warehousing and Data Mining Lab	0	0	3	1.5	30	70
8	R20A0592	Big Data Analytics Lab	0	0	3	1.5	30	70
9	R20A7292	Application Development-II	-	-	4	2	30	70
10	R20A0007	Constitution of India	2	-	-	0	100	-
		TOTAL	**17**	**0**	**10**	**20**	**340**	**560**

B.Tech (AI-DS)— VII Semester (IV Year I Semester)

S.NO	Subject Code	SUBJECT	L	T	P	C	INT	EXT
1	R20A6609	Computer Vision	3	0	0	3	30	70
2	R20A6610	Natural Language Processing	3	0	0	3	30	70
3	R20A6611	Deep Learning	3	0	0	3	30	70
4	R20A7204 R20A0514 R20A7205 R20A7307	Professional Elective-V 1. Optimization techniques 2. Social Network Analytics 3. Recommender Systems 5. Cloud Computing	3	0	0	3	30	70
5	R20A1210 R20A0564 R20A0521 R20A6607	Professional Elective-VI 1. Augmented & Virtual Reality 2. MicroServices 3. Blockchain Technology 4. Agile Methodologies	3	0	0	3	30	70
6	R20A6683	Deep Learning Lab	-	-	3	1.5	30	70
7	R20A6684	Natural Language Processing Lab	-	-	3	1.5	30	70
8	R20A7293	Mini Project	-	-	6	3	30	70
		TOTAL	**15**	**0**	**12**	**21**	**240**	**560**

B.Tech (AI-DS)— VIII Semester (IV Year II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A0337	Innovation, Startups, and Entrepreneurship	3	1	-	4	30	70
2	R20A7294	Major Project	-	-	20	10	30	70
		TOTAL	**3**	**1**	**20**	**14**	**60**	**140**

OPEN ELECTIVE I		
S.NO	SUBJECT CODE	SUBJECT
1	R20A1251	WEB DESIGNING TOOLS
2	R20A0551	INTRODUCTION TO DBMS
3	R20A0351	INTELLECTUAL PROPERTY RIGHTS
4	R20A0051	ENTERPRISE RESOURCE PLANNING
5	R20A0451	BASICS OF COMPUTER ORGANIZATION
6	R20A6751	FOUNDATION OF DATA SCIENCE

OPEN ELECTIVE II		
S.NO	SUBJECT CODE	SUBJECT
1	R20A1252	MANAGEMENT INFORMATION SYSTEMS
2	R20A0552	JAVA PROGRAMMING
3	R20A1253	SOFTWARE PROJECT MANAGEMENT
4	R20A0452	INTERNET OF THINGS & ITS APPLICATIONS
5	R20A0553	OPERATING SYSTEM CONCEPTS
6	R20A0066	PUBLIC POLICY AND GOVERNANCE

OPEN ELECTIVE III		
S.NO	SUBJECT CODE	SUBJECT
1	R20A0453	ROBOTICS & AUTOMATION
2	R20A1254	BIG DATA ARCHITECTURE
3	R20A6251	INFORMATION SECURITY
4	R20A0555	CLOUD COMPUTING FUNDAMENTALS
5	R20A0352	DESIGN THINKING
6	R20A0065	BUSINESS ANALYTICS

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COURSE STRUCTURE & SYLLABUS

INDEX

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2/-/-/2

(R20A0001) ENGLISH

INTRODUCTION

English is a global language, which is a means to correspond globally. Keeping in account of its vital role in the global market, emphasis is given to train the students to acquire language and communication skills. The syllabus is designed to develop and attain the competency in communicative skills.

The lectures focus on the communication skills and the selected excerpts support as resources for the teachers to develop the relevant skills in the students. The lessons stimulate discussions and help in comprehending the content effectively. The focus is on skill development, nurturing ideas and practicing the skills.

OBJECTIVES

1. To enable students to enhance their lexical, grammatical and communicative competence.

2. To equip the students to study the academic subjects with better perspective throughtheoretical and practical components of the designed syllabus.
3. To familiarize students with the principles of writing and to ensure error-free writing.
4. To analyze, interpret and evaluate a text and critically appreciate it.
5. To improve the writing and speaking skills, the productive skills.

SYLLABUS
Reading Skills:
Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To augment the ability of students to guess the meanings of words from context and grasp theoverall message of the text, draw inferences etc.Skimming the text
   - Understanding the gist of an argument   • Identifying the topic sentence
   - Inferring lexical and contextual meaning   • Understanding discourse features
     Recognizing coherence/sequencing of sentences • Scanning the text

NOTE:
The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:
Objectives
1. To develop an awareness in the students about basic formal writing skills.
2. To equip students with the components of different forms of writing, beginning with the required ones:
   • Writing sentences
   • Use of appropriate vocabulary
   • Coherence and cohesiveness
   • Formal and informal letter writing

Unit –I
"The Road not taken"by Robert Frost
Grammar –Tenses and Punctuation (Sequences of Tenses) Vocabulary –Word Formation - Prefixes and Suffixes Writing –Paragraph Writing (Focusing on Tenses and Punctuations) Reading – The art of skimming and scanning -Reading Exercise Type 1(Match the statements to the text they refer to)

Unit – II
Act II from 'Pygmalion' by G.B. Shaw
Grammar –Direct and Indirect Speech Vocabulary– Synonyms, Antonyms
Writing–Essay Writing (Introduction, body and conclusion)
Reading –Comprehending the context– Reading Exercise Type 2(Place the missing statement)

Unit – III
Satya Nadella's Email to His Employees on his First Day as CEO of Microsoft
Grammar – Voices
Vocabulary –One-Word Substitutes, Standard Abbreviations
Writing –E-mail Writing, Letter Writing (complaints, requisitions, apologies).
Reading   –Reading Comprehension- Reading Exercise Type 3
       (Reading between the lines)

Unit – IV
J K Rowling's Convocation Speech at Harvard Grammar –Articles, Misplaced Modifiers
Vocabulary –Phrasal Verbs
Writing – Précis Writing
Reading   –Reading Exercise Type 4(Cloze test)

Unit –V
Abdul Kalam's Biography
Grammar – Subject-Verb Agreement, Noun-Pronoun Agreement Vocabulary –Commonly Confused Words
Writing –Memo Writing
Reading   –Reading Exercise Type 5(Identifying errors)

* Exercises apart from the textbook shall also be used for classroom tasks.

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REFERENCE BOOKS
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 Pushpa Lata. Oxford University Press. 2011.
6.   Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES

Students will be able to:
1.   Gain competence and proficiency in 'productive' skills, i.e., writing and speaking with the recognition of the need for life-long learning of the same
2.   Hone their language abilities in terms of comprehending complex technical texts with a potential to review literature
3.   Present ideas clearly and logically to analyze data and provide valid conclusions in writtencommunication
4.   Enrich their grammatical accuracy and fluency to be adept at both the active and passive skills
5.   Represent old conventions with a set of the new by professional verbal communicative ability

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3/1/-/4

(R20A0021) MATHEMATICS –I

COURSE OBJECTIVES:
1.   The concept of a Rank of the matrix and applying the concept to know the consistency andsolving the system of linear equations.
2.   The concept of Eigen values, Eigen vectors and Diagonolisation.
3.   The maxima and minima of functions of several variables.
4.   The Applications of first order ordinary differential equations and methods to solve higherorder differential equations.
5.   The properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem.

UNIT I: Matrices
Introduction, Rank of a matrix - Echelon form, Normal form, Consistency of system of linear equations (Homogeneous and Non-Homogeneous)-Gauss-Siedel method, Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties (without proof), Cayley-Hamilton theorem(without proof), Diagonolisation of a matrix.

UNIT II: Multi Variable Calculus (Differentiation)
Functions of two variables, Limit, Continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobian-functional dependence and independence, Maxima and minima and saddle points, Method of Lagrange multipliers, Taylors theorem for two variables.

UNIT III:First Order Ordinary Differential Equations
Exact, Equations reducible to exact form, Applications of first order differential equations - Newton's law of cooling, Law of natural growth and decay, Equations not of first degree-Equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT IV: Differential Equations of Higher Order
Linear differential equations of second and higher order with constant coefficients: Non-homogeneous term of the type $f(x) = e^{ax}$, sinax, cosax, x^n, e^{ax} V and x^n V - Method of variation of parameters, Equations reducible to linear ODE with constant coefficients-Cauchy's Euler equation and Legendre's equation.

UNIT V: Laplace Transforms
Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms, Existence of Laplace transform, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied and divided by "t", Laplace transforms of derivatives and integrals of functions, Unit step function, Periodic function.
Inverse Laplace transform by Partial fractions, Inverse Laplace transform of functions when they are multiplied and divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem, Solving ordinary differential equations by Laplace transform.

TEXT BOOKS
1. Higher Engineering Mathematics by B V Ramana. Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics by Kreyszig, JohnWiley &Sons.

REFERENCE BOOKS
1. Advanced Engineering Mathematics by R.K Jain & S R K Iyengar, Narosa Publishers.
2. Ordinary and Partial Differential Equations by M.D. Raisinghania, S.Chand Publishers
3. Engineering Mathematics by N.P Bali and Manish Goyal.

COURSE OUTCOMES:
 After learning, the concepts of this paper the student will be able to
1.   Analyze the solutions of the system of linear equations and find the Eigen values and Eigen vectors of a matrix, which are used to analyze the long term behavior of any system.
2.   Find the extreme values of functions of two variables with / without constraints.
3.   Solve first order, first degree differential equations and their applications.
4. Form a differential equation for typical engineering problems and hence can solve those higher order differential equations.
5.   Solve differential equations with initial conditions using Laplace Transformation.

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(R20A0201) BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES:

1. To understand the basic concepts of electrical circuits & networks and their analysis which isthe foundation for all the subjects in the electrical engineering discipline.
2. To emphasize on the basic elements in electrical circuits and analyze Circuits using Network Theorems.
3. To analyze Single-Phase AC Circuits.
4. To illustrate Single-Phase Transformers and DC Machines.
5. To get overview of basic electrical installations and calculations for energy consumption.

UNIT –I:

Introduction to Electrical Circuits: Concept of Circuit and Network, Types of elements, R-L-C Parameters, Independent and Dependent sources, Source transformation and Kirchhoff's Laws

UNIT –II:

Network Analysis: Network Reduction Techniques- Series and parallel connections of resistive networks, Star–to-Delta and Delta-to-Star Transformations for Resistive Networks, Mesh Analysis, and Nodal Analysis,

Network Theorems: Thevenin's theorem, Norton's theorem, MaximumPower Transfer theorem and Superposition theorem, Illustrative Problems.

UNIT-III:

Single Phase A.C. Circuits: Average value, R.M.S. value, form factor and peak factor for sinusoidal wave form. Steady State Analysis of series R-L-C circuits.Concept of Reactance, Impedance, Susceptance, Admittance, Concept of Power Factor, Real, Reactive and Complex power and Illustrative Problems.

UNIT –IV:

Electrical Machines (elementary treatment only):

Single phase transformers: principle of operation, constructional features and emf equation. DC.Generator: principle of operation, constructional features, emf equation. DC Motor: principle of operation, Back emf, torque equation.

UNIT –V:

Electrical Installations:

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption and battery backup.

TEXT BOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuits - A. Chakrabarhty, Dhanipat Rai & Sons.
3. Electrical Machines – P.S.Bimbra, Khanna Publishers.

REFERENCE BOOKS:

1. Network analysis by M.E Van Valkenburg, PHI learning publications.

2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.

3. Electrical Circuits by A. Sudhakar, Shyammohan and S Palli, Mc Graw Hill Companies.

4. Electrical Machines by I.J. Nagrath & D. P. Kothari, Tata Mc Graw-Hill Publishers.

COURSE OUTCOMES:
At the end of the course students, would be able to

1. Apply the basic RLC circuit elements and its concepts to networks and circuits.
2. Analyze the circuits by applying network theorems to solve them to find various electrical parameters.
3. Illustrate the single-phase AC circuits along with the concept of impedance parameters and power.
4. Understand the Constructional Details and Principle of Operation of DC Machines and Transformers
5. Understand the basic LT Switch gear and calculations for energy consumption.

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                                                    2/-/2/3

(R20A0301) COMPUTER AIDED ENGINEERING GRAPHICS

COURSE OBJECTIVES:
1. To learn basic engineering graphic communication skills & concept.
2. To learn the 2D principles of orthographic projections and Multiple views of the same
3. To know the solid Projection and its Sectional Views
4. To gain the capability of designing 3D objects with isometric principles by using computer aided sketches
5. To know the conversion of Orthographic Views to isometric Views and isometric to Orthographic views

UNIT-I
Introduction to Computer Aided Engineering Graphics
Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning & free hand practicing. AutoCAD User Interface – Menu system – coordinate systems, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse– tool bars (draw, modify, annotations, layers etc.) – status bar (ortho, grid, snap, iso etc.),
Generation of points, lines, curves, polygons, dimensioning, layers, blocks, electrical symbols.
Geometrical constructions
Curves Used In Engineering Practice
   a) Conic Sections (General Method only- Eccentricity Method)
   b) Cycloid, Epicycloids and Hypocycloid

UNIT-II:
2D PRJECTIONS
Orthographic Projections: – Conventions – First and Third Angle projections.
Projections of Points, Projections of Lines, Projections of planes, Circuits Designs **–** Basic Circuit Symbols & Sensors

UNIT– III
Projections of Solids: Projections of regular solids prism and pyramid inclined to both planes.
Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone, True shapes of the sections.

UNIT– IV
3D Projections
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views, Commands for 3D UCS, Extrude, revolve, loft, 3D move, 3D rotate, dox, sphere, cone, wedge, cylinder, view ports.Plane
Figures, Simple and Compound Solids. 3D models of electrical components Switch, Diode, Resistor, Battery, Capacitor, Transistor, Motor

UNIT– V
Transformation of Projections: Visualize the 2D &3D View of Engineering Objects for Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects in AutoCAD

TEXT BOOKS:

1.   Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar
     Publishing House, Gujarat.
2.   "Computer Aided Engineering Drawing"by Dr. M H Annaiah, Dr C N Chandrappa and Dr
     B Sudheer Premkumar Fifth edition, New Age International Publishers

REFERENCE BOOKS:

1.   Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International
     Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2.   Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers
     Bangalore.

COURSE OUTCOMES:

After the completion of course the student will be capable to

1. Produce geometric construction, dimensioning & Curves and detail drawings.
2. Compile Projections of points, lines ,planes then create virtual drawing by using computer
3. Sketch the Solid Projections & Sectioning of the solids
4. Develop isometric drawings of simple objects reading the orthographic projections of those
   objects.
5. Understand and visualize the 3-D view of engineering objects. Elaborate the conversions
   of 2D -3D and Vice-Versa

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(R20A0501)PROGRAMMING FOR PROBLEM SOLVING

Objectives

- To understand the use of computer system in problem solving
- To understand the various steps in Program development.
- To learn the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To be able to write programs (using structured programming approach) in C to solve problems.

UNIT - I
Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Algorithms and Flowcharts, Steps for Creating and Running programs.
Introduction to C – History of C, Features of C, Structure of C Program, Character Set,
C Tokens - keywords, Identifiers, Constants, Data types, Variables. Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion, typedef, enum
Control Structures: Selection Statements(Decision Making) – if and switch statements, Repetition Statements (Loops) - while, for, do-while statements, Unconditional Statements – break, continue, goto. Command line arguments.
UNIT-II
Pointers – Pointer variable, pointer declaration, Initialization of pointer, Accessing variables through pointers, Pointer Arithmetic, pointers to pointers, void pointers
Arrays – Definition, declaration of array, Initialization, storing values in array, Two dimensional arrays, Multi-dimensional arrays. Arrays and Pointers, Array of pointers
Strings – Declaration and Initialization, String Input / Output functions, Arrays of strings, String manipulation functions, Unformatted I/O functions, strings and pointers
UNIT-III
Designing Structured Programs using Functions - Types of Functions- user defined functions, Standard Functions, Categories of functions, Parameter Passing techniques, Scope – Local Vs Global, Storage classes, Recursive functions.
Passing arrays as parameters to functions, Pointers to functions, Dynamic Memory allocation
UNIT-IV
Structures and Unions - Declaration, initialization, accessing structures, operations on structures, structures containing arrays, structures containing pointers, nested structures, self referential structures, arrays of structures, structures and functions, structures and pointers, unions..
Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions. Sequential Access and Random Access Functions
UNIT-V
Basic Data Structures – Linear and Non Linear Structures – Implementation of Stacks, Queues, Linked Lists and their applications.

Case Studies Case 1: Student Record Management System

The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

❖ Add record
❖ List record
❖ Modify record
❖ Delete record

Case 2: Library Management System

This project has 2 modules.

1. Section for a librarian
2. Section for a student

A librarian can add, search, edit and delete books. This section is password protected. That means you need administrative credentials to log in as a librarian.

A student can search for the book and check the status of the book if it is available. Here is list of features that you can add to the project.

1. You can create a structure for a student that uniquely identify each Student. When a student borrows a book from the library, you link his ID to Book ID so that Librarian can find how burrowed particular book.
2. You can create a feature to bulk import the books from CSV file.
3. You can add REGEX to search so that a book can be searched using ID, title, author or any of the field.
4. You can add the student login section.

TEXT BOOKS:

1. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, Career Monk publications, 2017

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Data Structures using C by Aaron M. Tenenbaum, Pearson Publications
6. Data Structures using C by Puntambekar

Course Outcomes:
- Understand a problem and build an algorithm/flowchart to solve it
- Interpret the structure of C program and various key features of C
- Construct C programs using various control statements, arrays and pointers
- Understand the concept of subprograms and recursion
- Develop programs using structures and unions for storing dissimilar data items
- Make use of files and file operations to store and retrieve data.

(R20A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of the English language and familiarizes the students with its use in everyday situations and contexts.

COURSE OBJECTIVES:

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation, ample speaking opportunities are provided.
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussions and public speaking

English Language Communication Skills Lab has two parts:

A. Computer Assisted Language Learning (CALL) Lab
B. Interactive Communication Skills (ICS) Lab
The following course content is prescribed for the English Language Communication Skills Lab

UNIT –I

CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants- Transcriptions

ICS Lab: Ice-Breaking activity - JAM session

UNIT –II

CALL Lab: Pronunciation: Past Tense Markers and Plural Markers

ICS Lab: Situational Dialogues/Role Plays-–Greetings - Taking Leave – Introducing Oneself and Others - Requests and Seeking Permissions

UNIT–III

CALL Lab: Syllable and Syllabification

ICS Lab: Communication at Workplace- Situational Dialogues/Role Plays – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice

UNIT –IV

CALL Lab: Word Stress and Intonation

ICS Lab: Information transfer – from visual to verbal - maps, charts, tables and graphs

UNIT –V

CALL Lab: Errors in Pronunciation- Accent - the Influence of Mother Tongue (MTI)

ICS Lab: Making a Short Speech - Extempore

ELCS Lab:
1. **Computer Assisted Language Learning (CALL) Lab:**
   The Computer aided Language Labfor 60 students with 60 systems, one master console, LAN facilityand English language software for self-study by learners.
   System Requirement (Hardware component):
   Computer network with LAN with minimum 60 multimedia systems with the following specifications:
   i)   P   –IV   Processor
   a)Speed –2.8 GHZ
   b)   RAM –512 MB Minimum
   c)   HardDisk –80 GB
   ii)   Headphones of High quality
2. **Interactive Communication Skills (ICS) Lab :**
   A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

COURSE OUTCOMES:

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

1. Learn with precision through computer-assisted individualized and independent language learning to work independently in an engineering set-up.
2. Improve conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
3. Acquire accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
4. Imbibe appropriate use of language in situations where one works as an individual and as a leader/team player.
5. Display professional behaviors and body language.

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(R20A0281) BASIC ELECTRICAL ENGINEERING LAB

COURSE OBJECTIVES:
1. To design electrical systems.
2. To analyze a given network by applying various network theorems.
3. To expose the students to the operation of dc generator.
4. To expose the students to the operation of dc motor and transformer.
5. To examine the self excitation in dc generators.

CYCLE – I
1. Verification of KVL and KCL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Super position theorem.
5. Verification of Maximum power transfer theorem.
6. Verification of Reciprocity theorem.

CYCLE -II
6. Magnetization characteristics of DC shunt generator.
7. Swinburne's test on DC shunt machine.
8. Brake test on DC shunt motor.
9. OC &SC tests on single phase transformer.
10. Load test on single phase transformer.

NOTE: Any 10 of above experiments are to be Conducted

COURSE OUTCOMES:
At the end of the course, students would be able to

1. Calculate the branch currents and mesh voltages by conducting KCL and KVL test on given

   circuit.

2. Prove the various circuit theorems like Superposition, Thevenin's, Norton's, Maximum power

   transfer and Reciprocity theorems.

3. Plot the Magnetization characteristics of DC shunt generator.

4. Plot the characteristics of DC shunt motor by conducting Brake Test.

5. Determine the Efficiency of single-phase transformer by conducting OC, SC and Load tests

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(R20A581) PROGRAMMING FOR PROBLEM SOLVING LAB

Program Objectives:

1. To understand the various steps in Program development.

2. To understand the basic concepts in C Programming Language.

3. To learn how to write modular and readable C Programs.

4. To learn to write programs (using structured programming approach) in C to solve problems.

5. To introduce the students to basic data structures such as lists, stacks and queues.

Week 1:

a) Write a program to find sum and average of three numbers

b) Write a program to calculate simple interest(SI) for a given principal (P), time (T), and rate of interest (R)   (SI = P*T*R/100)

Week 2:

a) Write a program to swap two variables values with and without using third variable

b) Write a program to find the roots of a quadratic equation.

Week 3:

a) Write a program to find the sum of individual digits of a given positive integer.

b) Write a 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)

Week 4:

a) Write a program to find both the largest and smallest number in a list of integers.

b) Write a program to find the sum of integer array elements using pointers

Week 5:

a) Write a program to perform addition of two matrices.

b) Write a program to perform multiplication of two matrices.

Week 6:

a) Write a program to find the length of the string using Pointer.

b) Write a program to count the number of lines, words and   characters in a given text.
Week 7:

a) Write a program to find factorial of a given integer using non-recursive function and recursive function.

b) Write program to find GCD of two integers using non-recursive function and recursive function.

Week 8:

a) Write a program using user defined functions to determine whether the given string is palindrome or not.

b) Write a Program to swap the values of two variables using

i) Call by Value ii) Call by Reference

Week 9:

a) Write a program to find the sum of integer array elements using pointers ,use dynamic memory allocation to allocate memory.

b) Write a program to perform subtraction of two matrices, Design functions to perform read ,display and subtract

Week 10:

a) Write a program to create a structure named book and display the contents of a book.

b) Write a Program to Calculate Total and Percentage marks of a student using structure.

Week 11:

a) Write a program that uses functions to perform the following operations:

   i) Reading a complex number   ii) Writing a complex number

   iii) Addition of two complex numbers   iv) Multiplication of two complex numbers

b)Write a program to reverse the first n characters in a file.

 (Note: The file name and n are specified on the command line.)

Week 12:

a) Write a program to copy the contents of one file to another.

b) Write a program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third.

Week 13:

a) Write a program for static implementation of stack

b) Write a program for static implementation of Queue

Week 14:

 Write a program to perform various operations on single list

Week 15:

a) Write a program for dynamic implementation of stack

b) Write a program for Dynamic implementation of Queue

Case Studies

Case 1: Student Record Management System

The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so

thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

- ❖ Add record
- ❖ List record
- ❖ Modify record
- ❖ Delete record

Case 2: Library Management System

This project has 2 modules.

1. Section for a librarian
2. Section for a student

A librarian can add, search, edit and delete books. This section is password protected. That means you need administrative credentials to log in as a librarian.

A student can search for the book and check the status of the book if it is available.Here is list of features that you can add to the project.

1. You can create a structure for a student that uniquely identify each student. When a student borrows a book from

the library, you link his ID to Book ID so that librarian can find how a particular book is borrowed.

2.You can create a feature to bulk import the books from CSV file.

3.You can add REGEX to search so that a book can be searched using ID, title, author or any of the field.

4.You can add the student login section.

TEXT BOOKS

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. Computer programming in C.V.RAjaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers.
4. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers
5. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

Program Outcomes:

1. Ability to apply solving and logical skills to programming in C language.
2. Able to apply various conditional expressions and looping statements to solve problems associated with conditions.

3. Acquire knowledge about role of Functions involving the idea of modularity.

4. Understand and apply the Concept of Array, Strings and pointers dealing with memory management.

5. Acquire knowledge about basic data structures and their implementation.

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(R20A003) HUMAN VALUES AND PROFESSIONAL ETHICS	

COURSE OBJECTIVES:

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way.

3. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT - I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration. Continuous Happiness and Prosperity A look at basic Human Aspirations- Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT - II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT - IV:

Understanding Harmony in the nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature. Inter connectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-

existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT - V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. 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.

TEXT BOOKS:
   1.   R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
   2.   Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:
1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:
 1. Value Education website, http://www.uptu.ac.in
 2. Story of Stuff, http://www.storyofstuff.com
 3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
 4. Charle Chaplin, Modern Times, United Artists, USA
 5. IIT Delhi, Modern Technology - the Untold Story

COURSE OUTCOMES:
 1. The students will be able to obtain happiness and prosperity in their life.
 2. They will develop harmony at all levels.
 3. They can have satisfying human behavior throughout their life.

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(R20A0002) PROFESSIONAL ENGLISH

INTRODUCTION:

English is a tool for global communication and is the dominant language, which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

COURSE OBJECTIVES:

1. To enrich students to express themselves appropriately and fluently in professional contexts.
2. To enhance their employability through regular participation in group discussions and interview skills.
3. To lay foundation with writing strategies for the future workplace needs.
4. To acquaint students with different components of professional presentation skills.
5. To equip students with necessary training in listening to comprehend dialects of English language.

UNIT-I
Listening   - Listening for General Details.
Speaking   - Description of Pictures, Places, Objects and Persons
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - The summary of Asimov's *Nightfall*
Grammar   - If clauses Vocabulary   - Technical VocabularyWriting   - Paragraph Writing
Unit –II
Listening   -Listening for Specific Details
Speaking   - Oral presentations
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - A literary analysis of Asimov's *Nightfall*Grammar   - Transformation of Sentences
Vocabulary   - Idioms
Writing   -Abstract Writing
Unit –III
Listening   - Listening for GistSpeaking   - Mock Interviews
NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - Character sketches of Asimov's *Nightfall's* - protagonists and antagonists - Dr. Susan Calvin, Mike Donovan, Stephen Byerley, Francis Quinn
Grammar   - Transitive and Intransitive Verbs Vocabulary - Standard Abbreviations (Mini Project)
Writing   - Job Application – Cover letter
Unit – IV
Listening   - Listening for Vocabulary

Speaking   - Telephonic Expressions

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Extract   - Theme of Asimov's *Nightfall*

Grammar   - Auxiliary verbs, Degrees of Comparison

Vocabulary   - Word Analogy

Writing   - Job Application - Resume

Unit – V

Listening   - Critical Listening (for attitude and Opinion)

Speaking   - Group discussion

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Extract   -Asimov's *Nightfall*: A Science Fiction

Grammar   - Common Errors, Prepositions

Vocabulary   - Homonyms, homophones and homographs

Writing   - Report Writing

* Isaac Asimov's *Nightfall* for intensive and extensive reading
* Exercises apart from the text book shall also be referred for classroom tasks.

REFERENCE BOOKS:

1. Nightfall, Isaac Asimov; Robert Silverberg, 1990
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES:

Students will be able to:

1. Analyze and interpret a diverse range of engineering concepts through the synthesis ofinformation
2. Understand the impact of professional engineering solutions is societal contexts anddemonstrate its knowledge
3. Achieve communicative ability in their personal and professional relations with clarity of speech and creativity in content
4. Function effectively as an individual and a team; and would be able to prepare themselves to be market ready
5. Comprehend and write effective reports and design documentation, manage projects and make effective presentations.

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(R20A0022) MATHEMATICS-II

COURSE OBJECTIVES:

1. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data, also used to find the roots of an equation and to solve differential equations.
2. The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
3. PDE aims at forming a function with many variables and also their solution methods, Method of separation of variables technique is learnt to solve typical second order PDE.
4. Evaluation of multiple integrals.
5. In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT – I: Solutions of algebraic, transcendental equations and Interpolation
Solution of algebraic and transcendental equations: Introduction, Bisection Method, Method of false position, Newton-Raphson method and their graphical interpretations.
Interpolation: Introduction, errors in polynomial interpolation, Finite differences - Forward differences, Backward differences, Central differences. Newton's formulae for interpolation, Gauss's central difference formulae, Interpolation with unevenly spaced points - Lagrange's Interpolation.

UNIT – II: Numerical Methods
Numerical integration : Generalized quadrature - Trapezoidal rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ rules.
Numerical solution of ordinary differential equations: Solution by Taylor's series method, Euler's method, Euler's modified method, Runge-Kutta fourth order method.
Curve fitting : Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares.

UNIT III: Partial Differential Equations
Introduction, formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equation and non-linear equations, Charpit's method, Method of separation of variables for second order equations and applications of PDE to one dimensional equation (Heat equation).

Unit IV: Double and Triple Integrals
Double and triple integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar).

Unit V: Vector Calculus

Introduction, Scalar point function and vector point function, Directional derivative, Gradient, Divergence, Curl and their related properties, Laplacian operator, Line integral - work done, Surface integrals, Volume integral. Green's theorem, Stoke's theorem and Gauss's Divergence theorems (Statement & their Verification).

TEXT BOOKS:

1. Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Mathematical Methods by S.R.K Iyenger, R.K.Jain, Narosa Publishers.

REFERENCE BOOKS:

1. Elementary Numerical Analysis by Atkinson-Han, Wiley Student Edition.
2. Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.
3. Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

COURSE OUTCOMES:

 After learning the concepts of this paper the student will be able to independently

1. Find the roots of algebraic, non algebraic equations and predict the value at an intermediate point from a given discrete data.
2. Find the most appropriate relation of the data variables using curve fitting and this method of data analysis helps engineers to understand the system for better interpretation and decision making.
3. Solve first order linear and non-linear partial differential equations which are very important in engineering field.
4. Evaluate multiple integrals; hence this concept can be used to evaluate Volumes and Areas of an object.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

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(R20A0011) APPLIED PHYSICS

COURSE OBJECTIVES:

1. To analyze the ordinary light with a laser light and realize the transfer of light through optical fibers.
2. To identify dual nature of the matter and behavior of a particle quantum mechanically.
3. To explore band structure of the solids and classification of materials.
4. To acquire the basic knowledge of various types of semiconductor devices and find the applications in science and technology.
5. To Compare dielectric and magnetic properties of the materials and enable them to design and apply in different fields.

UNIT – I
LASERS & FIBER OPTICS
Lasers: Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, population inversion, meta stable state, types of pumping, lasing action, construction and working of Ruby Laser, Helium-Neon Laser, Semiconductor diode Laser, Applications of lasers.
Fiber Optics: Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and Numerical aperture, Types of Optical fibers - Mode and Propagation through step and graded index fibers ,Losses in optical fiber, Optical Fiber in Communication System, Applications of optical fibers.

UNIT – II
QUANTUM MECHANICS
Wave nature of particles, de Broglie's hypothesis, matter waves, Heisenberg's uncertainty principle, Davisson and Germer's experiment, G.P Thomson experiment, Schrodinger time-independent wave equation-significance of wave function, particle in one dimensional square well potential.

UNIT – III
ELECTRONIC MATERIALS
Free electron theory(Classical & Quantum)- Assumptions, Merits and drawbacks, Fermi level, Density of states, Periodic potential, Bloch's theorem, Kronig – Penny model (qualitative) , E – K diagram, Effective mass, Origin of energy bands in solids, Classification of materials : Metals, semiconductors and insulators.

UNIT-IV
SEMICONDUCTOR PHYSICS
Intrinsic and extrinsic semiconductors, Direct and indirect band gap semiconductors, Carrier concentration in intrinsic and extrinsic semiconductors. Dependence of Fermi level on carrier concentration and temperature, carrier transport: mechanism of diffusion and drift, Formation of PN junction, V-I characteristics of PN diode, energy diagram of PN diode, Hall experiment, semiconductor materials for optoelectronic devices - LED, Solar cell.

UNIT – V:
DIELECTRICS AND MAGNETIC PROPERTIES OF MATERIALS
Dielectrics: Introduction, Types of polarizations (Electronic and Ionic) and calculation of their polarizabilities, internal fields in a solid, Clausius-Mossotti relation.
Magnetism: Introduction, origin of magnetism, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Properties of anti-ferro and ferri magnetic materials, Hysteresis curve based on domain theory, Soft and hard magnetic materials.

TEXT BOOKS:
1. Engineering Physics by Kshirsagar & Avadhanulu, S Chand publications.
2. Engineering Physics- B.K.Pandey, S.Chaturvedi, Cengage Learning.

REFERENCES:
1. Engineering Physics – R.K. Gaur and S.L. Gupta, DhanpatRai Publishers.
2. Engineering Physics, S Mani Naidu- Pearson Publishers.
3. Engineering physics 2nd edition –H.K. Malik and A.K. Singh.
4. Engineering Physics – P.K. Palaniswamy, Scitech publications.
5. Physics by Resnick and Haliday.

COURSE OUTCOMES:
After completion of studying Applied Physics the student is able to
1 Observe the properties of light and its engineering applications of
   laser in fiber opticcommunication systems.
2 Apply the basic principles of quantum mechanics and the importance of behavior of a particle.
3 Find the importance of band structure of solids and their applications in
   various electronicdevices.
4 Evaluate concentration & estimation of charge carriers in
   semiconductors and workingprinciples of PN diode.
5 Examine dielectric, magnetic properties of the materials and apply them in material technology.

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(R20A0401) ANALOG & DIGITAL ELECTRONICS

COURSE OBJECTIVES:
The main objectives of the course are:
1. To familiarize with the principal of operation, analysis and design of pn junction diode.
2. To study the construction of BJT and its characteristics in different configurations.
3. To study the construction and characteristics of JFET and MOSFET.
4. To study basic number systems codes and logical gates.
5. To introduce the methods for simplifying Boolean expressions and design of combinational circuits.

UNIT-I
P-N Junction diode: Qualitative Theory of P-N Junction, P-N Junction as a diode, diode equation, volt-ampere characteristics temperature dependence of V-I characteristic, ideal versus practical, diode equivalent circuits, Zener diode characteristics.

UNIT-II
Bipolar Junction Transistor: The Junction transistor, Transistor construction, Transistor current components, Transistor as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. α and β Parameters and the relation between them, BJT Specifications.

UNIT-III
FIELD EFFECT TRANSISTOR: JFET-Construction, principle of Operation, Volt–Ampere characteristics, Pinch- off voltage. Small signalmodelofJFET. FET as Voltage Variable Resistor, Comparison of BJT andFET. MOSFET- Construction, Principle of Operation and symbol, MOSFET characteristics in Enhancement and Depletionmodes.

UNIT IV:
Number System and Boolean Algebra: Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal, Unit Distance Code, Digital Logic Gates (AND, NAND, OR, NOR, EX-OR, EX-NOR), Properties of XOR Gates, Universal Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form.

UNIT-V
Minimization Techniques: The Karnaugh Map Method, Three, Four and Five Variable Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Multilevel NAND/NOR realizations.
Combinational Circuits: Design procedure – Half adder, Full Adder, Half subtractor, Full subtractor, Multiplexer/Demultiplexer, decoder, encoder, Code converters, Magnitude Comparator.

TEXT BOOKS

1. "Electronic Devices & Circuits", Special Edition – MRCET, McGraw Hill Publications,2017.
2. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGrawHill.
3. Electronic Devices and Circuits, S.Salivahanan,N.Sureshkumar, McGrawHill.
4. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003
5. Switching and Finite Automata Theory- ZviKohavi& Niraj K. Jha, 3rdEdition,Cambridge.

REFERENCE BOOKS
1. Electronic Devices and Circuits,K.Lal Kishore B.SPublications
2. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
3. John F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI,2006
4. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning,2002.
5. Charles H.Roth. Fundamentals of Logic Design, Thomson Learning,2003.

COURSE OUTCOMES
After completion of the course, the student will be able to:
1. Understand the principal of operation, analysis and design of pn junction diode.
2. Understand the construction of BJT and its characteristics in different configurations.
3. Understand the construction and characteristics of JFET and MOSFET.
4. Understand basic number systems codes and logical gates.
5. Understand the methods for simplifying Boolean expressions and design of combinational circuits.

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(R20A0502) PYTHON PROGRAMMING

COURSE OBJECTIVES:
1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures –- lists, tuples, dictionaries.
5. To do input/output with files in Python.

UNIT I
Introduction to Python Programming Language: Introduction to Python Language and installation, overview on python interpreters, working with python, Numeric Data Types: int, float, Boolean, complex and string and its operations, Standard Data Types: List, tuples, set and Dictionaries, Data Type conversions, commenting in python.

UNIT II
Variables and Operators: Understanding Python variables, Multiple variable declarations, Python basic statements, Python basic operators: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.

UNIT III
CONTROL FLOW AND LOOPS
Conditional (if), alternative (if-else), chained conditional (if- elif -else), Loops: For loop using ranges,string, Use of while loops in python, Loop manipulation using pass, continue and break

UNIT IV
Functions
Defining Your Own Functions, Calling Functions, passing parameters and arguments, Python Function arguments: Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Powerful Lambda functions in python.

UNIT V
I/O and Error Handling in Python
Introduction, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods introduction to Errors and Exceptions, Handling IO Exceptions, Run Time Errors, Handling Multiple Exceptions.
Introduction to Data Structures: What are Data structures, Types of Data structures, Introduction to Stacks and Queues.

TEXT BOOKS

1. R. Nageswara Rao, "Core Python Programming", dreamtech
2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:
1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

COURSE OUTCOMES:
Upon completion of the course, students will be able to
1. Read, write, execute by hand simple Python programs.
2. Structure simple Python programs for solving problems.
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, and dictionaries.
5. Read and write data from/to files in Python Programs

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(R20A0082) APPLIED PHYSICS LAB

COURSE OBJECTIVES:
Students can be able to
1 Identify the specific types of elastic and electrical nature of materials in physics lab.
2 Observe concepts of magnetism in physics lab.
3 Analyze propagation of light in various optical devices practically.
4 Examine various opto electronic devices practically
5 Well-equipped with the properties of semiconductor devices in physics lab.

LIST OF EXPERIMENTS:
1. Torsional pendulum-Rigidity modulus of given wire.
2. Melde's experiment –Transverse and Longitudinal modes.
3. Stewart and Gee's method- Magnetic field along the axis of current carrying coil.
4. Spectrometer-Dispersive power of the material of a prism
5. Diffraction grating-using laser -Wavelength of light.
6. Newton's Rings –Radius of curvature of Plano convex lens.
7. LED -Characteristics of LED.
8. Solar cell -Characteristics of a Solar cell.
9. Optical fiber- Evaluation of numerical aperture of optical fiber.
10. Hall Effect –To study Hall effect in semiconducting samples.

REFERENCE BOOKS:
1. Practical physics by Dr. Aparna, Dr K.V Rao, V.G.S.Publications.
2. Engineering physics practical lab manual – MRCET.

COURSE OUTCOMES:
1 Students are able to measure the elastic constants of the given material of the wire and determine the ac frequency f vibrating bar.
2 Students are able to determine the magnetic induction of a circular coil carrying current by applying the principles of terrestrial magnetism.
3 Students are able to frame relativistic ideas of light phenomenon
4 Students are able to achieve the analysis of V-I characteristics of opto electronic devices
5 Students are able to determine the carrier concentration and identify the given semiconductor material with the help of Hall Effect.

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(R20A0582) PYTHON PROGRAMMING LAB

COURSE OBJECTIVES:
1. Syntax and Semantics and create Functions in Python.
2. Different data types Lists, Dictionaries in Python.
3. how to execute the programs using loops and control statements
4. Decision Making and Functions in Python
5. Files and exception Handling in Python

Week 1:
A)   Write python program to print Hello World
B)   Write a python program to get string, int, float input from user
C)   Write a python program to add 2 numbers

Week 2:
A) Create a list and perform the following methods
1) insert()   2) remove()   3) append()   4) len()   5) pop()   6) clear()
B) Write a python program to find the length of list?
C) Write a python program to find the smallest and largest number in the list?

Week 3:
A) Create a tuple and perform the following methods
1) Add items   2) len()   3) check for item in tuple   4)Access iems
B) Write a python program using the following methods: 1) count 2) index
C) Write a python program using "+" and "*" operations which resulting a new tuple?

Week 4:
A) Create a dictionary and apply the following methods
1) Print the dictionary items   2) access items 3) use get() 4)change values 5) use len()
B) Write a python code to convert list of tuples into dictionaries?
C) Write python program to store data in list, tuple, set, dictionary and then try to print them.

Week 5:
A) Write a python program to perform arithmetic, assignment, logical and comparison operators?
B) Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)
C) Write a Python program to perform the basic four operators (+, -, *, /)

Week 6:
A) Write a simple python program to declare a variable in different possible ways?
B) Write a python program to show precedence of operators using the expression: z = (v+w) * x / y
C) Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation?

Week 7:

A) Write a python program to print a number is positive/negative using if-else.

B) Write a python program to find largest number among three numbers.

C) Write a python Program to read a number and display corresponding day using if_elif_else?

D)   Write a python program to print list of numbers using range and for loop

Week 8:

A)   Write a python code to print the sum of natural numbers using while loop?

B)   Write a python program to print the factorial of given number?

C)   Write a python program to find the sum of all numbers stored in a list using for loop?

Week 9:

A)   Write a Python function that takes two lists and returns True if they are equal otherwise false

B)   Write python program in which an function is defined and calling that function prints Hello World

C)   Write python program in which an function(with single string parameter) is defined and calling that function prints the string parameters given to function.

D)   Write a python program using with any one of python function argument?

Week 10:

A) Write a program to double a given number and add two numbers using lambda()?

B) Write a program for filter() to filter only even numbers from a given list.

C) Write a program for map() function to double all the items in the list?

D)Write a program to find sum of the numbers for the elements of the list by using reduce()?

Week 11:

A) Write a python program to open and write "hello world" into a file?

   B) Write a python program to write the content "hi python programming" for the existing file.

C) Write a python program to read the content of a file?

Week 12:

A) write a program to implement stack using array.

B) write a program to implement Queue using array.

TEXT BOOKS:

1. R. Nageswara Rao, "Core Python Programming", dream tech

2. Allen B. Downey , " Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.

COURSE OUTCOMES:

After completion of the course, Students will be able to**:**

1. Evaluate Problem solving and programming capability
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
3. Implement conditional and loop for python programs
4. Express different Decision Making statements and Functions
5. Understand and summarize different File handling operations and exceptions

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(R20A0083) ENGINEERING AND IT WORKSHOP LAB

It is consisting of 3 parts:

    Part I: IT Workshop;

    Part-II: Enectrical & Electronics Workshop;

    Part III: Auto CAD Workshop

Part I: IT Workshop:

Objectives:

- Understand the internal structure and layout of the computer system.
- Learn to diagnose minor problems with the computer functioning.
- Know the proper usage and threats of the world wide web.
- Study in detail about the various features of Ms-Word, Excel, PowerPoint.
- Gain an awareness about the tools of LibreOffice.

Task- 1: PC HARDWARE

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripherals. Functions of Motherboard. Assembling and Disassembling of PC. Installing of OS.

Task- 2: TROUBLESHOOTING

Hardware Troubleshooting: Students are to be given a PC which does not boot due to proper assembly or defective peripherals and the students should be taught to identify and correct the problem.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Task 3: INTERNET

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus downloads, Protection from various threats.

MS OFFICE

Task 4: MICROSOFT WORD
Introduction to Word Processor, Editing and Formatting features, overview of toolbars,saving files, Using help and resources, rulers, fonts, styles, format painter, Drop Cap in word, Applying Text

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effects, Using Character Spacing, Borders and colors, Inserting Header and Footer, Using Date and Time option in Word &Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and MailMerge in word.Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

Task 5: MICROSOFT EXCEL

Excel Orientation: The importance of Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Excel formulae &Functions : formulae, logical functions, text functions, statistical functions, mathematical functions, lookup functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions.
Creating a Scheduler (Features:- Gridlines, Format Cells, Summation, auto fill, Formatting)
Calculating GPA (Features:- Cell Referencing, Formulae and functions in excel)

Task 6: MICROSOFT POWER POINT

Basic power point utilities and tools, PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Drawing toolbar-Lines and Arrows, Text boxes, Clipart, Insertion of images, slide transition, Custom animation, Hyperlinks.

Task 7: LIBRE OFFICE

Overview of LibreOffice and its features of Writer, Calc, Impress, Draw, Base, Math, Charts.
Libre office Math: Introduction , Creating & Editing Formulas, formulas as separated documents or files, formulas in office document, Creating formulas, Formula layout
Libre Office Draw : Introduction, Basic shapes, working with objects, flowcharts, organization charts,

Text Books:
1.Introduction to Information Technology,ITL Education Solutions limited, Pearson Education
2.PC Hardware and A+ Handbook-Kate J.Chase PHI(Microsoft)
3. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition
4. Libre Office Documentation : https://documentation.libreoffice.org/en/english-documentation

Outcomes:

- Ability to identify the major components of a computer and its peripherals. They are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
- Students can detect and perform minor hardware and software level troubleshooting.
- Capacity to work on Internet & World Wide Web and make effective usage of the internet foracademics.

PART II:ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

Course Objectives:

1. To get acquaintance with Residential house wiring procedure.

2. To obtain the knowledge about fluorescent lamp wiring procedure.

3. To get familiarized with staircase wiring.

4. To perform soldering and desoldering practice.

List of Experiments:

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.

2. Fluorescent lampwiring

3. Stair casewiring

4. Soldering and Desoldering practice – components, devices and circuits using general purpose PCB.

Course Outcomes:

1. Students will able to understand domestic wiring procedurespractically.

2. Students will able to doFluorescent lamp wiring.

3. Students will able to do staircasewiring.

4. Student will able to soldering and disordering practice.

PART III: AUTOCAD WORKSHOP

1. **Introduction to AutoCAD**

   Design Process, AutoCAD Installation Process, AutoCAD user Interface,Function Keys

2. **Commands:** Drawing Commands,Editing Commands, Drawings aids

3. **D Wireframe Modeling**

4. **CAD Practice Exercises**

5. **CAD -2D, CAD - Isometric**

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(R20A0014) ENVIRONMENTAL SCIENCE

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COURSE OBJECTIVES:

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

1. Distinguish the inter relationship between living organism and environment.
2. Categorize various types of natural resources available on the earth surface.
3. Detectthe causes, and control measures of various types of environmental pollution.
4. Articulate the issues related to solid waste and its management.
5. Explain and understand the importance of sustainable development.

UNIT-I: ECOSYSTEMS:
Definition, Scope, and Importance of ecosystem. Classification, natural and artificial ecosystems, structure - abDSic and bDSic component, functions of an ecosystem, food chains, food webs and ecological pyramids.
Activities: Case studies, poster making.
UNIT-II: NATURAL RESOURCES:
Classification of Resources: Definition of natural resource, renewable and non -renewable resources. Renewable resources: Energy resources: growing energy needs solar energy, hydro energy, biogas, biofuel. Non-Renewable Resources: Fossil fuels, refining of Coal, Petroleum, and natural gas. Use of alternate energy source.
Activities: Case studies, seminars.
UNIT-III: ENVIRONMENTAL POLLUTION AND TECHNIQUES:
Definition, Types of pollution:Air pollution causes, effects,control measures of air pollution and prevention techniques.Water pollution causes, effects, control measures and techniques.
Activities: Debate, seminars
UNIT-IV: SOLID WASTE MANAGEMENT:
Definition of Solid waste, characteristics of solid waste, solid waste management: collection, transportation, processing treatment, disposal methods and e-waste management,3R techniques: reduce, reuse, and recycle.
Activities: Seminars, Case studies.
UNIT-V: SUSTAINABLE DEVELOPMENT:
Definition of sustainable development, concept,sustainable development goals, threats to sustainability, strategies to achieve sustainable development.Introduction to green chemistry, green building concept.
Activities: Worksheets, seminars.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015

REFERENCE BOOKS

1. Environmental Studies by Anubha Kaushik, 4 Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

COURSE OUTCOMES:

The basic concepts included in this course will help the student to:
1. Differentiate between various bDSic and abDSic components of ecosystem.
2. Describe the various types of natural resources.
3. Examine the problems associated with waste management.
4. Evaluate the causes, and apply control measures of various types of environmental pollutions.
5. Develop technologies on the basis of ecological principles on environment which in turn helps in sustainable development.

(R20A0503) DATA STRUCTURES USING PYTHON

COURSE OBJECTIVES:

This course will enable students to
1. Implement Object Oriented Programming concepts in Python.
2. Understand Lists, Dictionaries and Regular expressions in Python.
3. Understanding how searching and sorting in Python.
4. Understanding how liner and non-liner data structures works.
5. To learn the fundamentals of writing Python scripts.

UNIT –I
Oops Concepts-Class, object, types of variables, types of methods, inheritance, Encapsulation,Polymorphism, Abstraction, special functions, constructors.

UNIT -II
Data Structures, Types-User define, predefine, List, List comprehension, Arrays vs. List, Tuples, Set, Dictionaries, Expressions, Slicing, strings, String processing, Python memory model: names, mutable and immutable values.

UNIT -III
Searching-Linear Search and Binary search. **Sorting-** Bubble Sort, Selection Sort, Insertion Sort,Merge sort, Quick sort.

UNIT -IV
Stacks and Queues implementation, Linked List, Double Linked List, Circular Linked list, Heap

UNIT -V
Graphs-Breadth First Search, Depth First Search. **Trees** - Binary search trees: find, insert, delete |Height-balanced binary search trees.

TEXTBOOKS:

1. Data structures and algorithms in python by Michael t. Goodrich
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:

1.   Hands-On Data Structures and Algorithms with Python: Write complex and powerful codeusing the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller andDavid L. Ranum.
4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

COURSE OUTCOMES:

The students should be able to:
1. Examine Python syntax and semantics and be fluent in the use of Python flow control andfunctions.
2. Create, run and manipulate Python Programs using core data structures like Lists,
3. Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Master object-oriented programming to create an entire python project using objects andclasses.

| (R20A7203) COMPUTER ORGANISATION AND OPERATING SYSTEMS |

Course Objectives:

The course objectives are:

- To have a through understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms &implementatio of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchial memory system including cache memories and virtual memory.
- To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.
- To implement a significant portion of an Operating System.

UNIT - I:

Basic Structure of Computers: Computer Types, Functional UNIT, Basic Operational Concepts, Bus, Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating - Point Representation.
Register Transfer Language 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, Instruction Codes, Computer Registers Computer Instructions - Instruction Cycle.
Memory - Reference Instructions, Input - Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT - II:
Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control.
The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual Memories secondary Storage, Introduction to RAID.

UNIT - III:
Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE1394.

UNIT - IV:

Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating System Generation.

Process and CPU Scheduling - Process concepts-The Process, Process State, Process Control Block, Threads, Inter process communication, Process Scheduling-Basic concepts, Scheduling Criteria, Scheduling algorithms

UNIT - V:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memmory, Demand Paging, Page-Replcement Algorithms, Allocation of Frames,

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock

TEXT BOOKS:

1. Computer Organization - Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer System Architecture - M. morismano, 3rd edition, Pearson
3. Operating System Concepts - AbrehamSilberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, John Wiley.

REFERENCE BOOKS:

1. Computer Organization and Architecture - William Stallings 6th Edition, Pearson
2. Structured Computer Organization - Andrew S. Tanenbaum, 4th Edition, PHI
3. Fundamentals of Computer Organization and Design - SivaraamaDandamudi, Springer Int. Edition
4. Operating Systems - Internals and Design Principles, Stallings, 6th Edition - 2009, Pearson Education.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI
6. Principles of Operating System, B. L. Stuart, Cengage Learning, India Edition.

Course Outcomes:

Upon completion of the course, students will have through knowledge about:

- Basic structure of a digital computer
- Arithmetic operations of binary number system
- The organization of the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit.
- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance
- Operating system file system and implementation and its interface.

(R20A0505) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES:
1. To analyze performance of algorithms.
2. To choose the appropriate data structure and algorithm design method for a specifiedapplication.
3. To understand how the choice of data structures and algorithm design methods impacts theperformance of programs.
4. To solve problems using algorithm design methods such as the greedy method, divide andconquer, dynamic programming, backtracking and branch and bound.
5. To understand the differences between tractable and intractable problems and to introduceP and NP classes.

UNIT I
Introduction: Algorithms, Pseudo code for expressing algorithms, performance analysis-Spacecomplexity, Time Complexity, Asymptotic notation- Big oh notation, omega notation, theta notation and little oh notation.
Divide and Conquer: General method. Applications- Binary search, Quick sort, merge sort, Strassen's matrix multiplication.

UNIT II
Disjoint set operations, Union and Find algorithms, Spanning trees, AND/OR graphs, connected components, Bi-connected components.

UNIT III
Greedy method: General method, applications- Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem.
Dynamic Programming: General method, applications- Matrix chained multiplication, Optimal binary search trees, 0/1 Knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT IV
Backtracking: General method, Applications- n-queue problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT V
Branch and Bound: General method, applications- Travelling sales person problem, 0/1 Knapsack problem- LC branch and Bound solution, FIFO branch and Bound solution.
NP-Hard and NP-Complete Problems: Basic concepts, Non deterministic algorithms, NP-Hard and NP-Complete classes, NP-Hard problems, Cook's theorem.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and

Rajasekharan,Universities press

2. Design and Analysis of Algorithms, P. h. Dave,2ndedition,Pearson Education.

REFERENCES:

1. Introduction to the Design and Analysis of Algorithms A Levitin Pearson Education

2. Algorithm Design foundations Analysis and Internet examples, M.T.Goodrich and

RTomassia JohnWiley and sons

3. Design and Analysis of Algorithms, S. Sridhar, Oxford Univ.Press

4. .Design and Analysis of Algorithms,Aho, Ulman and Hopcraft, Pearson Education.

5. Foundations of Algorithms, R. NeapolitanandK.Naimipour, 4th edition

COURSE OUTCOMES:

1.   Ability to analyze the performance of algorithms.

2.   Ability to choose appropriate algorithm design techniques for solving problems.

3.   Ability to understand how the choice of data structures and the algorithm design methods to impact the performance of programs.

4.   Describe the dynamic programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms and analyze them.

5.   Describes the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms and analyze them.

(R20A6701) INTRODUCTION TO DATA SCIENCE

COURSE OBJECTIVES:

The course will enable the students to:
1. Understand the data science processing
2. Selecting the good practices of data science
3. Summarizes simple statistical models
4. Understand Model Development in data Science
5. Analyze Model Evaluation in data Science

Unit – I: Introduction
Introduction to Data Science – Evolution of Data Science –Data Science process – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II: Data Collection and Data Pre-Processing
Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning and Munging – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit – III: Exploratory Data Analysis
Descriptive Statistics – Mean, Median, Mode, Standard Deviation – Categorical Data, ANOVA, Skewness and Kurtosis – Histograms, Box Plots – Cross tabulation, Correlation and Covariance – Scatter plots

Unit – IV: Model Development
Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

Unit – V: Model Evaluation
Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Over fitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

Text Books
1. Data Science from Scratch by Joel Grus by O'Reilly
2. Introducing Data Science BIG DATA, MACHINE LEARNING, AND MORE, USING PYTHON TOOLS DAVY CIELEN, ARNO D. B. MEYSMAN, MOHAMED ALI

REFERENCES

1. Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016.
2. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
3. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Published by John Wiley & Sons, Inc

COURSE OUTCOMES:

The students should be able to:
1. List the steps involved in data science, from data acquisition to insight, and describe the role of each step
2. Distinguish different ways of collecting data, and their impact on the conclusions that can be drawn from the data
3. Demonstrate the significance of EDA in Data science
4. Describe model diagnostic and execution
5. Describe to select appropriate variables for model evaluation

(R20A0026)DISCRETE MATHEMATICS

COURSE OBJECTIVES:

1. Describe mathematical concepts as applied in computer science for solving logicalproblems.
2. Understanding the concepts of sets, functions, relations,recurrence relations and Lattices.
3. Understand the concepts on elementary combinations and permutations.
4. To develop the mathematical skills needed for advanced quantitative courses.
5. Analyze the properties of graphs and trees.

UNIT – I:

Mathematical Logic: Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication; Normal forms: Disjunctive normal forms, conjunctive normal forms, principle disjunctive normal forms, principle conjunctive normal forms.
Predicates: Predicative logic, statement functions, variables and quantifiers, free and bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.

UNIT – II:

Posets and Lattices: Relations and their properties,Properties of binary relations, equivalence, compatibility and partial ordering relations, lattices, Hasse diagram; Functions-Inverse function, composition of functions, recursive functions.

Lattices as partially ordered sets; Definition and examples, properties of lattices, sub lattices, some special lattices.

UNIT - III:

Groups: Algebraic structure, Groupoid, Monoid, Semi groups, Group, Sub groups, Homomorphism and Isomorphism of groups.
Elementary Combinatorics : Basics of counting, The permutations, disarrangements, combinations, permutations and combinations with repetitions, constrained repetitions, the principal of Inclusion-Exclusion, Pigeon hole principle.

UNIT-IV:

Advanced Counting Techniques : Generating Function of Sequences, Recurrence relations, Solving Recurrence Relations by substitution and Generating function ,The method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.

UNIT-V:

Graphs Theory: Introduction to Graphs, Isomorphic graphs, Euler graphs, Hamiltonian graphs, planar graphs, Graph coloring, Directed graphs, weighted digraphs, chromatic numbers.Trees and their properties, Spanning trees, Directed trees, Binary trees Minimal Spanning Trees.

TEXT BOOKS:

1. C. L. Liu, D. P. Mohapatra, —Elements of Discrete Mathematics, Tata Mcgraw-Hill, India,3rdEdition,2008.
2. J. P. Tremblay, R. Manohar, Discrete Mathematical Structures with Applications toComputer Science , Tata McGraw Hill, India, 1stEdition,1997.
3. JoeL.Mott, Abraham Kandel, Theodore P.Baker,—Discrete Mathematics for Computer Scientists

and Mathematicians, Prentice Hall of India Learning Private Limited, New Delhi, India, 2ndEdition,2010.

REFERENCE BOOKS:

1. Kenneth H. Rosen, ―Discrete Mathematics and Its Applications, Tata Mcgraw-Hill, New Delhi,India,6thEdition,2012.
2. Ralph P. Grimaldi, B. V. Ramana, ―Discrete and Combinatorial Mathematics - An AppliedIntroduction, Pearson Education, India, 5thEdition, 2011.
3. D. S. Malik, M. K. Sen, ―Discrete Mathematical Structures: Theory and Applications, ThomsonCourse Technology, India, 1stEdition, 2004.

COURSE OUTCOMES:
After learning the concepts of this paper the student will be able to
Apply Propositional and Predicate logic for a variety of problems in various domains.
1. Understand Set Theory, Venn Diagrams, relations, functions and apply them to Real-worldScenarios.
2. Understand General properties of Algebraic systems and study lattices as partially ordered setsand their applications.
3. Solve the recurrence relations and can be used to optimize algorithms.
4. To identify the basic properties of graphs and trees and use these concepts to model simpleapplications.

(R20A0061)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES:
The main objectives of the course are:
1. To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound economic decision making.
2. To provide inputs on an overall analysis of an individual firm, its production function, cost analysis and break-even-point
3. To make students understand different market structures, pricing of the product or services and different forms of business organizations.
4. To understand capital requirements of the business and basic rule of accounting of the business.
5. To learn analytical techniques and arriving at conclusions from financial information for the purpose of business decision making.

Unit-I
Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics, Micro and Macroeconomic Concepts.
Demand Analysis: Demand Determinants, Law of Demand and exceptions.
Elasticity ofDemand: Definition, Types, Measurement and Significance of elasticity of Demand. **Demand Forecasting:** Factors governing Demand Forecasting, Methods of Demand Forecasting (Survey Methods, Expert Opinion, Test Marketing, Controlled Experience, Judgmental Approach, and Time Series Analysis).

Unit-II
Production & Cost Analysis: Production Function- Isocost and Isoquants, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production Function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost Concepts. Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)

Unit-III
Markets: Types of Competition and Markets, Features of Perfect Competition, Monopoly and Monopolistic Competition;
Pricing: Objectives, Methods of Pricing;
Business: Features of different forms of Business Organization (Sole Trader, Partnership, Joint StockCompany, Cooperative Society, and Public Enterprises).

Unit-IV
Introduction to Capital and Financial Accounting: Need for Capital, Types of Capital, WorkingCapital Analysis, Methods and Sources of raising Finance.

Accounting: Definition, Concepts and Conventions (GAAP); Accounting Cycle; Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

Unit-V

Investment Decision: Capital Budgeting - Features, Objectives, and Methods (Payback Method, Accounting Rate of Return and Net Present Value) - advantages & disadvantages. (Simple Problems)

Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital Structure Ratios and Profitability Ratios. (Simple Problems)

References:

1. Managerial Economics & Financial Analysis, Special Edition-MRCET. McGraw Hill Publications,2017

2. D.N. Dwivedi, Managerial Economics, Vikas Publications.

3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage

4. P. L. Mehta, Managerial Economics: Analysis, Problems and Cases, Sultan Chand & Sons.

5. S. N. Maheswari & S. K. Maheswari, Financial Accounting, Vikas Publications.

6. M. Y. Khan and P. K. Jain, Financial Management, McGraw Hill

COURSE OUTCOMES:

Following are the course outcomes:

1. Makes students understand the concepts and applications of managerial economics in takingbusiness decisions.

2. Empowers students to comprehend with the production process and technical relationshipamong factors of production, different cost concepts and optimization of cost.

3. Enables students to know the classification of markets and how firms determine their priceoutput decisions in different kinds of markets with different forms of business.

4. Allows students to know different sources of capital for the business and how financialaccounting is done for smooth business functioning.

5. Equips students with different financial analysis tools and techniques to evaluate financialperformance of the business.

(R20A0583) DATA STRUCTURES USING PYTHON LAB

COURSE OBJECTIVES:
1. To understand a range of Object-Oriented Programming, as well as in-depth data andinformation processing techniques.
2. To understand the how linear and non-linear data structures works

WEEK 1: Write a Python program for class, Flower, that has three instance variables of type str, int, and float, that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the valueof each type.

WEEK 2: Write a Python program for class that extends the Progression class so that each value in the progression is the absolute value of the difference between the previous two values. You should include a constructor that accepts a pair of numbers as the first two values, using 2 and 200 as the defaults.

WEEK 3: Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area ( ) and perimeter ( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area ( ) and perimeter ( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter.

WEEK 4: Write a Python program that inputs a list of words, separated by whitespace,and outputs how many times each word appears in the list.

WEEK 5: Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list.

Example: Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct
objects: [1, 2] [1, 3] [1, 4] [1, 5]   [7, 8] [7, 9] [8, 9].

WEEK 6: Write a Python program for Linear Search and Binary search

WEEK 7: Write a program to implement Bubble Sort and Selection Sort

WEEK 8: Write a program to implement Merge sort and Quicksort.

WEEK 9: Write a program to implement stacks and Queues

WEEK 10: Write a program to implement linked list

WEEK 11: Write a program to implement Double Linked list

WEEK 12: Write a program to implement Binary search Tree

Reference Books:

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code usingthe latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.

2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.

3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller andDavid L. Ranum.

4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

COURSE OUTCOMES:

1. Student should be able to understand concepts of data structures
2. Ability to explore python especially the object-oriented concepts, and the built-in objects ofPython.

(R20A7282) COMPUTER ORGANISATION AND OPERATING SYSTEMS LAB

COURSE OBJECTIVES:
This course will enable the students :

1. Introduce basic Linux commands, system call interface for process management, inter-process communication
2. Student will learn various process and CPU scheduling Algorithms through simulation programs
3. Student will have exposure to System calls and simulate them
4. implement string handling operations using ALP
5. solve simple problems using ALP&develop programs using procedures

PART A(COMPUTER ORGANISATION LAB)

Exercisesin8086 AssemblyLanguageProgramming (ALP)

WriteanAssemblyLanguagePrograms(ALP)forthefollowingusingGNUAssembler/Microsoft Assembler

WEEK 1 a) WriteanALPtoevaluatetheexpressions:
        i)a= b+c– d*e   ii)z=x*y+w–v+ u/k

          b)WriteanALPtotakeNnumbersas input.And dothefollowingoperations onthem.
        I)Arrangeinascending orderII)Arrangeindescendingorder

WEEK 2: a) WriteanALP totakeNnumbers as inputandfind maximum,minimumandaverage

     b)WriteanALPtotakeastringofas input anddothefollowing operations onit.
i)Findthelength   ii)CheckisitPalindromeor not

WEEK 3: WriteanALPtotakeastringasinputanddothefollowingOperationsonit
        a.FindtheArmstrongnumber   b.FindtheFibonacciseriesfor nnumbers

WEEK 4: Write an ALP to convertgiven lowercase letterto uppercase letter(using ANDLogic Instruction

WEEK5:a) WriteanALPtocomparetwostrings.(Usesubroutine)

        b)WriteanALPtofindthefactorialofagivennumberasaProcedureandcallfrom themainprogramwhichdisplaytheresult.

PART B(OPERATING SYSTEMS LAB)
UseLinuxoperatingsystemandGNUCcompiler.
ListofPrograms:

WEEK 1: Practice File handling utilities, Process utilities, Disk utilities, Networking commands, Filters, Text, Processing utilities and Backup utilities.

WEEK 2: Simulate the following CPUscheduling algorithms

  a)Round Robin   b) SJF   c)FCFS d)Priority

WEEK 3: Simulate all pagereplacement algorithms

 a) FIFO   b) LRU   c) LFU

WEEK 4: a)WriteaCprogramtosimulateBankersAlgorithmforDeadLockAvoidance
b)WriteaCprogramtosimulateBankersAlgorithmforDeadLockPrevention

WEEK5: a) Write a C program that illustrates communication between two process using named pipes or FIFO.

WEEK6 : Write aCprogramstoimplementipcbetweentwounrelatedprocessesusingnamed pipe.

COURSE OUTCOMES:
The student will have the ability to:

1. Introduce basic Linux commands, system call interface for process management, inter process communication.
2. Develop various process and CPU scheduling Algorithms through simulation programs
3. Student will have exposure to System calls and simulate them.
4. implement string handling operations using ALP
5. solve simple problems using ALP & develop programs using procedures

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(R20A0004) FOREIGN LANGUAGE-FRENCH

INTRODUCTION

In view of the growing importance of foreign languages as a communication tool in some countries of the world, French has been identified as one of the most popular languages after English. As a result, Frenchprogram is introduced to develop the linguistic and communicative skills of engineering students andto familiarize them to the French communication skills. This course focuses on basic oral skills.

OBJECTIVES

1. To inculcate the basic knowledge of the French language
2. To hone the basic sentence constructions in day to day expressions for communication intheir vocation
3. To form simple sentences that aids in day-to-day communication
4. To prepare the students towards DELF A1
5. To develop in the student an interest towards learning languages.

UNIT - I:
Speaking:Introduction to the French language and culture –Salutations - French alphabet - Introducing people
Writing:Understand and fill out a form
Grammar:The verbs "to be ' and "to have '' in the present tense of the indicativeVocabulary: The numbers from 1 to 20 - Professions- Nationalities

UNIT - II:
Speaking:Talk about one's family – description of a person - express his tastes and preferences - express possession - express negation
Writing:Write and understand a short
message
Grammar:Nouns (gender and number) - Articles - The–erverbs in the present-Possessive adjectives - Qualifying adjectives
Vocabulary:The family – Clothes-Colors- The numbers from 1 to 100-The classroom

UNIT - III
Speaking:Talk about your daily activities - be in time - ask and indicate the date and time - talkabout sports and recreation - express the frequency
Writing:A letter to a friend
Grammar:The expression of time– The –ir verbs in the present- The verbs do, go, take, come,-Adverbs-Reflexive verbs
Vocabulary: The days and months of the year-   The sports-Hobbies

UNIT - IV
Speaking: Express the quantity - ask and give the price - express the need, the will and the capacity - compare (adjective) - speak at the restaurant / in the shops
Writing: A dialogue between a vendor and a customer at the market
Grammar: Verbs "to want", "to can"- Express capacity / possibility- Express will / desire – the

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future tense
Vocabulary: The food – Meals-Fruits and vegetables– The parts of the body

UNIT - V
Speaking: Express the prohibition and the obligation - describe an apartment - talk about the weather / ask the weather - ask the opinion - give your opinion - express your agreement or disagreement
Writing: Descriptions
Grammar: Demonstrative adjectives- Prepositions- The verb 'must' to indicate obligation and necessity in the present
Vocabulary: Seasons – Holidays-The city– Furniture
NOTE: The students are exposed to simple listening and reading activities.

REFERENCE BOOKS
1. Apprenons le François 1& 2, New Sarasvati House, 2015
2. A propos, A1, Langers International, 2010
3. Easy French Step-by-step by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Course book) By Livid Language
5. Ã L'Aventure: An Introduction to French Language and Francophone Cultures by EvelineCharvier-Berman, Anne C. Cummings.

COURSE OUTCOMES

2. The students will be able to communicate in French at A1 level.
3. The student will have an advantage in the competitive job market.
4. This course benefits the graduates when pursuing study *opportunities* in the countries whereFrench is the official language.

(R20A0511) SOFTWARE ENGINEERING

COURSE OBJECTIVES:
1.   To provide the idea of decomposing the given problem into Analysis, Design,Implementation,Testing and Maintenance phases
2.   To understand software process models such as waterfall and evolutionarymodels andsoftware requirements and SRS document.
3.   To understand different software design and architectural styles & software testingapproachessuch as unit testing and integration testing.
4.   To understand quality control and how to ensure good quality software throughqualityassurance.
5. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenanceprocesses are conducted in an object oriented software projects.

UNIT - I:
Introduction to Software Engineering: The evolving role of software, software characteristics, software Applications.A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).
Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, Agile Development Models.

UNIT - II:
Software Requirements: Functional and non-functional requirements, User requirements, Systemrequirements, Interface specification, the software requirements document.
Requirements engineering process: Feasibilitystudies,   Requirements   elicitation   and   analysis,Requirements validation, Requirements management.
System models: Context Models, Behavioral models, Data models, Object models, structuredmethods.

UNIT - III:
Design Engineering: Design process and Design quality, Design concepts, the design model.
Creating an architectural design: Software architecture, Data design, Architectural styles andpatterns, Architectural Design.
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging
.Case Study software testing tool Junit / Selenium tool

UNIT - IV:
Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMMPlan , Software cost estimation model cocomo model Quality Management: Software Quality, Quality concepts, Software quality

assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

UNIT - V:

Object-Oriented Software Engineering: Object-Oriented Analysis**,** Domain Analysis, Generic Components of the OO Analysis Model, The OOA Process, The Object-Relationship Model, The Object-Behavior Model, Case Study – ATM Management System.

TEXT BOOKS :
1. Software Engineeringa practitioner's Approach, Roger S Pressman, 6th edition. McGrawHillInternational Edition.
2. Software Engineering, Ian Sommerville, 7th edition, Pearson education.

REFERENCE BOOKS :
1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI,2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1:Abstraction and modelling, Diner Bjorner, Springer Internationaledition,2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, SpringerInternational edition2006.
7. Software Engineering Foundations, Yingux Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley & SonsLtd.
9. Software Engineering3: Domains, Requirements, and Software Design, D. Bjorner, SpringerInternational Edition.
10. Introduction to Software Engineering, R. J. Leach, CRC Press.

COURSE OUTCOMES:
1. Ability to decompose the given project in various phases of a lifecycle
2. Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
3. Identify and apply appropriate software architectures and patterns to carry out high leveldesign of a system and be able to critically compare alternative choices.
4. Will have experience and/or awareness of testing problems and will be able to develop a simpletesting report.
5. Ability to apply the knowledge, techniques, and skills in the development of a software product

(R20A0508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

COURSE OBJECTIVES:

1. To understand object oriented principles like abstraction, encapsulation, inheritance, andpolymorphism and apply them in solving problems.
2. To understand the implementation of packages and interfaces.
3. To understand the concepts of exception handling, multithreading and collection classes.
4. To understand how to connect to the database using JDBC.
5. To understand the design of Graphical User Interface using applets and swing controls.

UNIT-I

Java Programming- History of Java, comments, Java Buzz words, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Type conversion and casting, Enumerated types, Control flow- block scope, conditional statements, loops, break and continue statements, arrays, simple java stand alone programs, class, object, and its methods constructors, methods, static fields and methods, access control, this reference, overloading constructors, recursion, exploring string class, garbage collection.

UNIT – II

Inheritance – Inheritance types, super keyword, preventing inheritance: final classes and methods.

Polymorphism – method overloading and method overriding, abstract classes and methods**.**

Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementationsthrough interface references, extending interface, inner class.

Packages- Defining, creating and accessing a package, importing packages.

UNIT-III

Exception handling-Benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception subclasses.

Multithreading – Differences between multiple processes and multiple threads, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer problem.

UNIT-IV

Collection Framework in Java – Introduction to java collections, Overview of java collection framework, commonly used collection classes- Array List, Vector, Hash table, Stack, Lambda Expressions.

Files- Streams- Byte streams, Character streams, Text input/output, Binary input/output, File management using File class.

Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC,Data Access Object (DAO).

UNIT-V

GUI Programming with Swing - The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Overview of some Swing components – Jbutton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow

Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, Examples: HandlingMouse and Key events, Adapter classes.

TEXT BOOK:

1. JavaFundamentals–AComprehensiveIntroduction,HerbertSchildtandDaleSkrien,TMH.
2. Core Java: An Integrated Approach – Dr R Nageswara Rao

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program ,P.J.Deitel andH.M.Deitel,PHI
2. Object Oriented Programming through Java, P.RadhaKrishna, and Universities Press.
3. Thinking in Java, Bruce Eckel,PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford UniversitiesPress.
5. Design Patterns Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides.

COURSE OUTCOMES:

1. A competence to design, write, compile, test and execute straightforward programsusing a highlevel language;
2. An appreciation of the principles of object oriented programming;
3. Be able to make use of members of classes found in the Java API
4. Demonstrate the ability to employ various types of selection constructs in a Javaprogram. Beable to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
5. Able to develop applications using Applet, AWT, JDBC and Swing

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(R20A0509) DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and make use of data manipulation language to query, update and manage databases
3 To develop an understanding of various normalization techniques in DBMS.
4 To Understand Transaction concepts and different types of lock based protocols.
5 To learn about various Recovery mechanisms

UNIT I:
Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction –Instances and Schemas – Database Languages – database Access for applications Programs – Database Users and Administrator – Transaction Management – Database Architecture – Storage Manager – the Query Processor.

Data Models: Introduction to the Relational Model – Structure – Database Schema, Keys – Schema Diagrams. Database design– Other Models, ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design with relevant Examples. Relational Query Languages, Relational Operations.

UNIT II:
Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple Relational Calculus (TRC) – Domain relational calculus (DRC).
Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views, Triggers, Procedures.

UNIT III:
Normalization – Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyce/Codd normal form.
Higher Normal Forms - Introduction, Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form

UNIT IV:
Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- ValidationBased Protocols – Multiple Granularity.
UNIT V:
Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions –

Check Points - Buffer Management – Failure with loss of nonvolatile storage.

TEXT BOOKS:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III th)
2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.

REFERENCE BOOKS:

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.

COURSE OUTCOMES:

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

⬚ Demonstrate the basic elements of a relational database management system
⬚ Ability to identify the data models for relevant problems
⬚ Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries
⬚ Apply normalization for the given database
⬚ Understand the various Recovery Mechanisms.

(R20A0513) ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES:

1. To train the students to understand different types of AI agents.
2. To understand various AI search algorithms.
3. Fundamentals of knowledge representation, building of simple knowledge-based systems andto apply knowledge representation.
4. Fundamentals of reasoning
5. Study of Markov Models enable the student ready to step into applied AI.

UNIT- I:
Introduction:AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT- II:
Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning Basic Knowledge Representation and Reasoning: PropositionalLogic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT- III:
Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Nonmonotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, actingunder Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV:
Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V:
Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOKS:
1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition,PrenticeHall, 2010.

REFERENCES:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hillpublications, Third Edition, 2009. 2. George F. Luger,
2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, PearsonEducation, 6th ed., 2009.

COURSE OUTCOMES:

1. Understand the informed and uninformed problem types and apply search strategies to solvethem.
2. Apply difficult real life problems in a state space representation so as to solve those using AItechniques like searching and game playing.
3. Design and evaluate intelligent expert models for perception and prediction from intelligentenvironment.
4. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decisionmaking techniques.
5. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information anddevelop models within constraints of application area

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(R20A1202) AUTOMATA AND COMPILER DESIGN

COURSE OBJECTIVES:
1. To provide an understanding of automata ,grammars and language translators.
2. To describe the various techniques used in compiler construction
3. To insight the process of semantic analysis
4. To analyze the code optimization techniques
5. To apprehend the code generation techniques

UNIT - I

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata - DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Context Free grammars and parsing, derivation, parse trees, Application of Finite Automata.

UNIT - II

Introduction To Compiler, Phases of Compilation, ambiguity LL(K) grammars and LL(1) parsing.
Bottom up parsing, Handle pruning, LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.
Semantics: Syntax directed translation, S-attributed and L-attributed grammars.

UNIT - III

Intermediate code - abstract syntax tree, translation of simple statements and control flow statements.
Context Sensitive features -Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT - IV

Run time storage: Storage organization, storage allocation strategies scope access to now local names.
Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization.

UNIT - V

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

TEXT BOOKS:
1. Introduction to Theory of computation .Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCE BOOKS:
1. Modern Compiler Implementation in C- Andrew N. Apple, Cambridge University

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Press.
2. Lex &yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
3. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H.
Jacobs,Wileydreamtech.
4. Engineering a Compiler-Cooper & Linda, Elsevier.
5. Compiler Construction, Louden, Thomson.
6. Introduction to Automat a Theory Languages and Computation". Hopcroft H.E. and
Ullman J.D.Pearson Education.

COURSE OUTCOMES:
At the end of the course the students are able to:
1. Express the necessity and types of different language translators in use.
2. Apply the techniques and design different components (phases)of a compiler.
3. Implement practical aspects of automata theory.
4. Classify the different optimization techniques
5. Use the tools Lex, Yacc in compiler construction

II Year B.Tech. AI&DS- II Sem   **L/T/P/C**

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(R20A0585) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

COURSE OBJECTIVES:
1. To prepare students to become familiar with the Standard Java technologies ofJ2SE
2. To prepare students to excel in Object Oriented programming and to succeed as a Java Developer through global rigorous education.
3. To provide Students with a solid foundation in OOP fundamentals required to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP, JavaScript
4. To inculcate in students professional and ethical attitude, multidisciplinary approach and an ability to relate Java programming issues to broader application context.
5. To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful professional career.

Week 1:
a) Write a java program to find the Fibonacci series using recursive and non-recursive functions
b) Write a   program to multiply two given matrices.
c) Write a   program for Method overloading and Constructor overloading

Week 2:
a) Write a program to demonstrate execution of static blocks ,static variables & static
   methods.
b) Write a   program to display the employee details using Scanner class
c) Write a program for sorting a given list of names in ascending order

Week 3:
a) Write a program to implement single and Multi level inheritance
b) Write a program to implement Hierarchical Inheritance.
c) Write a program to implement method overriding.

Week 4:
a) Write a   program to create an abstract class named Shape that contains two integers and an empty method named printArea (). 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 printArea () that prints the area of the given shape.
b) Write a   program to implement Interface .
c) Write a program to implement multiple and Hybrid Inheritance

Week 5:
a) Write a   program to create inner classes
b) Write a   program to create user defined package and demonstrate various access modifiers.
c) Write a   program to demonstrate the use of super and final keywords.

Week 6 :
a) Write a   program if number is less than 10 and greater than 50 it generate the exception

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out of range. else it displays the square of number.
b) Write a   program with multiple catch Statements.
c) write a   program to implement nested try

Week 7:
a) Write a   Program to implement simple Thread by extending Thread class and
   implementing runnable interface.
b) Write a   program that implements a multi-thread application that has three threads
c) Write a program to set and print thread priorities

Week 8:
Write a   program to implement following collections
a) Array List   b) Vector
c) Hash table d)Stack

Week 9:
a) Write a program to demonstrate lambda expressions.
 b)Write a   program for producer and consumer problem using Threads

Week 10:
 a) Write a   program to list all the files in a directory including the files present in all its
   subdirectories.
b) Write a   Program to Read the Content of a File Line by Line
Week 11:
a) Write a   program that connects to a database using JDBC display all records in a table.
b) Write a   program to connect to a database using JDBC and insert values into it.
c) Write a   program to connect to a database using JDBC and delete values from it

Week 12:
Write a   program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits
and for the + - * % operations. Add a text field to display the result.

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to:
1. Analyze the necessity for Object Oriented Programming paradigm and over structured programming
   and become familiar with the fundamental concepts in OOP.
2. Demonstrate an ability to design and develop Java programs, analyze, and interpret object oriented
   data and report results.
3. Analyze the distinguish between various types of inheritance.
4. Demonstrate an ability to design an object oriented system, AWT components or multithreaded
   process as per needs and specifications.
   Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console
   and windows applications for standalone programs.

(R20A0586) Database Management Systems Lab

COURSE OBJECTIVES:
1. To familiarize database design concepts using ER modeling and Relational model.
2. To enable students to use SQL to query database and perform all types of operations and understanding normalization and effective database design principles
3. To enable students to use Non-Relational DBMS and understand the usage of Document oriented and distributed databases.
4. To enable the students to use TCL and DCL Commands and perform all states of Transaction operations.
5. To familiarize issues of concurrency control and transaction management
A. Practice on SQL Queries to acquire knowledge on RDBMS.
B. Case Study:
Objective: This lab enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing, develop ing and querying a database in the context of example database -Roadway travels". Students are expected to use "Mysql" database.
Roadway Travels: "Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.
The company wants to computerize its operations in the following areas:
⬜ Reservations and Ticketing
● Cancellations
● Reservations & Cancellation:
Reservations are directly handled by booking office. Reservations can be made 30 days in advance and tickets issued to passenger. One Passenger/person can book many tickets (to his/her family).
Cancellations are also directly handed at the booking office.
In the process of computerization of Roadway Travels you have to design and develop a Database which consists the data of Buses, Passengers, Tickets, and Reservation and cancellation details. You should also develop query's using SQL to retrieve the data from the database.
The above Process involves many steps like 1. Analyzing the problem and identifying the Entitites and Relationships, 2. E-R Model, 3. Relational Model 4. Normalization 5. Creating the database 6. Querying. Students are supposed to work on these steps week wise and finally create a complete "Database System" to Roadway Travels. Examples are given at every experiment for guidance to students.
 WEEK 1: E-R Model
Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.
Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.
Example:
Entities:
1. BUS

2. Ticket
3. Passenger
Relationships:
1. Reservation
2. Cancellation
PRIMARY KEY ATTRIBUTES:
1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)
3. Bus_No(Bus Entity)
Apart from the above mentioned entities you can identify more. The above
mentioned are few.
Ex: Bus Entity
Ex: Reservation relationship
Note: The student is required to submit a document by writing the Entities and Keys
to the lab teacher
WEEK 2: Concept design with E-R Model Note: -
Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong
entities and weak entities (if any). Indicate the type of relationships (total/partial).Try to
incorporate Generalization, Aggregation,
Specialization etc wherever required.
Note: The student is required to submit a document by drawing the E-R diagram to the lab
teacher.
WEEK 3: Relational Model
Represent all the entities (Strong, Weak) in tabular fashion.
Represent relationships in a tabular fashion. There are different ways of representing
relationships as tables based on the cardinality. Represent attribute as columns in tables or
as tables based on the requirement. Different types of attributes (Composite, Multi-valued
and Derived) have different way of Representation.
Example: The Passenger table looks as like below...
Note: You can add more attributes based on your E-R-Model
This is not normalized table.
Passenger Name Age Gender Address Ticket_Id Passport_Id
Note: The student is required to submit a document by represent relationships in a
tabular fashion to the lab teacher.
WEEK 4: Normalization
Database normalization is a technique for designing relational database tables to minimize
duplication of information and, in so doing, to safeguard the database against certain
typesof logical or structural problems, namely data anomalies. For example, when multiple
instances of a given piece of information occur in a table, the possibility exists that these
instances will not be kept consistent when the data within the table is updated, leading to a
loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of
this kind, because its structure reflects the basic assumptions for when multiple instances of
the same information should be represented by a single instance only.
For the above table in the First normalization we can remove the multi valued
attribute Ticket_id and place it in another table along with the primary key of
passenger.
First Normal Form: The above table can be divided into two tables as shown below.
Passenger Name Age Gender Address Passport_Id
Note: Apply the second and third normal forms for the same example (if required you can

consider more attributes)

Passport_Id Ticket_id

WEEK 5: Installation of Mysql / MongoDB and practicing DDL, commands

Installation of MySql / MongoDB. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases if not required. You will also try truncate, rename commands etc.

5.a) Example for creation of a normalized "Passenger" table. CREATE TABLE Passenger (Passport_id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL,Age Integer Not NULL,SexChar,Address VARCHAR (50) Not NULL);

Similarly create all other tables.

Note: Detailed creation of tables is given at the end.

5.b) Installation of MongoDB

Installation of MongoDB on Windows,MongoDB is a cross-platform, document oriented database that provides, high performance, high availability, and easy scalability. MongoDB works on concept of collection and document. In this week You will Learn with MongoDB. How to create Database, Collection, Document, Field, Embedded Documents. Relationships in MongoDB represent how various documents are logically related to each other. Relationships can be modeled via Embedded and Referenced approaches.

Example: MongoDB db.createCollection(name, options) is used to create collection.

Basic syntax of createCollection() method

>use test

switched to db test

>db.createCollection("mycollection")

{ "ok" : 1 }

>

 created collection by using the command show collections.

>show collections

mycollection

system.indexes

Experiment 6: Practicing DML commands

DML commands are used to for managing data within schema objects. Some examples:

●SELECT - retrieve data from the a database

●INSERT - insert data into a table

●UPDATE - updates existing data within a table

●DELETE - deletes all records from a table, the space for The records remain

Inserting values into "Bus" table:

Insert into Bus values(1234,'hyderabad', 'tirupathi');

Insert into Bus values (2345,'hyderabd' 'Banglore');

Insert into Bus values (23,'hyderabd','Kolkata');

Insert into Bus values (45,'Tirupathi,'Banglore');

Insert into Bus values (34,'hyderabd','Chennai');

Inserting values into "Passenger" table:

Insert into Passenger values (1, 45,'ramesh', 45,'M', 'abc123');

Insert into Passenger values (2, 78,'geetha', 36,'F','abc124');

Insert into Passenger values (45, 90,' ram', 30,'M','abc12');

Insert into Passenger values (67, 89,' ravi', 50,'M','abc14');

Insert into Passenger values (56, 22,'seetha', 32,'F','abc55');

Few more Examples of DML commands:

Select * from Bus; (selects all the attributes and display) UPDATE BUS SET Bus No = 1 WHERE

BUS NO=2;

WEEK 7: Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Practice the following Queries:

Display unique PNR_no of all Passengers. Display all the names of male passengers. Display the ticket numbers and names of all the passengers.

Find the ticket numbers of the passengers whose name start with 'r' and ends with 'h'. Find the names of passengers whose age is between 30 and 45.

Display all the passengers names beginning with 'A' Display the sorted list of passengers names

WEEK 8 and WEEK 9:

1) You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

2) Write a Query to display the Information present in the Passenger and cancellation tables. Hint: Use UNION Operator.

3) Display the number of days in a week on which the 9W01 bus is available.

4) Find number of tickets booked for each PNR_no using GROUP BY CLAUSE. Hint: Use GROUP BY on PNR_No.

5) Find the distinct PNR numbers that are present.

6) Find the number of tickets booked by a passenger where the number of seats is greater than 1.Hint: Use GROUP BY, WHERE and HAVING CLAUSES.

7) Find the total number of cancelled seats.

WEEK 10: Triggers

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

Eample: CREATE TRIGGER updcheck BEFORE UPDATE ON passenger FOR EACH ROW

BEGIN

IF NEW.Tickent N0 > 60 THEN

SET New.Tickent no = Ticket no;

ELSE

SET New.Ticket no = 0;

END IF;

END;

WEEK 11: STORED PROCEDURES

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

Eample: CREATE PROCEDURE myProc()

BEGIN

SELECT COUNT(Tickets) FROM Ticket WHERE age>=40; End;

WEEK 12: DCL Commands

DCL commands are used to for granting the permissions for security of data within the users.

REFERENCE BOOKS:

1. Introduction to SQL, RickF. VanderLans,Pearson education..

2. Oracle PL/SQL, B.Rosenzweig and E.Silvestrova,Pearson education.

3. SQL & PL/SQL for Oracle 10g,B lack Book, Dr.P.S.Deshpande, Dream Tech.

4. Ora cle D atab a se 11 g P L/S QL P rogramming, M .M c Laughlin,TMH.

5. SQL Fundamentals, J.J.Patrick,Pearson Education.

COURSE OUTCOMES:

The students will be able:

1 To design a database based on the requirements by applying ER and Relational model.

2 To use normal forms for Schema Refinement and Transaction Management and SQL to interact with database to perform all types of DB operations.

3 To analyze the business requirements and produce a viable model for the implementation of document oriented and distributed databases.

4 To apply TCL and DCL Commands and to visualize all states of transaction operations.

6   Analyze and Select storage and recovery techniques of database system

(R20A0008) GLOBAL EDUCATION AND PROFESSIONAL CAREER

Introduction

In every era of human life, studying abroad has allowed one to experience another part of oneselfin a different setting. Additionally, if all that hurry is geared towards success in one's career, international education will most definitely be worth one's time. It is not only an expedition of self- discovery but also an investment in one's resume.

The world, today, is redefining knowledge and great leadership to encompass critical values that are key to meeting modern career challenges. To meet the current requirements, a study delineating Global Education is of utmost importance towards prospective growth.

Course Objectives:

1. To assist students to understand the broad scope of engineering.
2. To equip the students to study the academic subjects with better perspective of theexpectations of the international standards
3. To familiarize students with the financial requirements and ways to receive monetary aid
4. To enable students' understanding of the various admission tests
5. To acquaint them with their own skill set and train the students towards skills development

Unit 1

Importance and relevance of Engineering in today's and futuristic contexts.

The jobs that will thrive in the market in the coming decades. For eg., Robot Manufacturer &serviceManagement, Big Data & AI Scientists, Artificial Bodies Manufacturer, Gene Designers, etc

Unit 2

Countries and their entry requirements

Non-immigrant student visas, Work Permit visas

Unit 3

Admission tests to colleges and universities world-

overPSAT, SAT, TOEFL, AP, IELTS…

Unit 4

Financial capacity requirements

Scholarships, Full scholarships, merit scholarships, on-campus jobs

Unit 5

Skills Mapping

Match one's skills with jobs, Skills development

COURSE OUTCOMES

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

1. Comprehend the usage of engineering in various fields and disciplines.

2. Identify the right college and country to pursue higher education.

3. Prepare themselves for the skill-oriented academics and prospective growth.

4. Plan for their future education with the precise financial management.

5. Discover and discuss their skill set and the jobs that map their skills.

(R20A6601) MACHINE LEARNING

COURSE OBJECTIVES:
The students will be able:

1. To introduce the basic concepts and techniques of machine learning and the need for Machine   learning techniques for real world problem
2. To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms
3.To learn, predict and classify the real world problems
4. To understand, learn and design simple artificial neural networks for the selected problem
5.To understand mathematical models or techniques

UNIT-1 INTRODUCTION
Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering, find-S: finding a maximally specific hypothesis, version spaces -- candidate elimination algorithm, inductive bias.
 Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-2
Supervised Learning: – Regression: Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods, SVM, Random Forest
Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT-3
Bayesian learning : Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM

UNIT-4
Artificial Neural Networks - **Artificial Neural Networks-1**– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.
Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.
UNIT-5
Hidden Markov Models Introduction, discrete Markov processes, hidden Markov models, three basic problems of HMMs evaluation problem, finding the state sequence, learning model parameters, continuous observations, the HMM with input, model selection in HMM

Text Books

1. Tom M. Mitchell, Machine Learning, McGraw Hill , 2017.
2. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, 2015

References
1. Aurelien Geron, Hands-On Machine Learning WithScikit-Learn and Tensorflow, O'Really publication 2019
2. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning, Cambridge University Press. 2017
3. T. Hastie, R. Tibshirani, J. H. Friedman, Introduction to Statistical Machine Learning 1/e, Springer, 2017.
4. M NarasimhaMurty, Introduction to Pattern Recognition and Machine Learning, World Scientific Publishing Company, 2015

Course Outcomes:
1. Be able to recognize the basic concepts techniques and the need for Machine learning techniques for solving real world problems
2. To illustrate the use of supervised learning algorithms
3. apply classification techniques to make good predictions
4. To understand, learn and design simple artificial neural networks for the selected problem
5. illustrate the relation between a sequence of observations and a sequence of hidden classes or hidden states that explain the observations

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(R20A0510) COMPUTER NETWORKS

OBJECTIVES:
1. To introduce the fundamental types of computer networks.
2. To demonstrate the TCP/IP & OSI model merits &demerits.
3. To know the role of various protocols in Networking.
4. To know about different error and flow controls
5. To know about Application layers

UNIT - I:
Introduction: Network, Uses of Networks, Types of Networks, Reference Models: TCP/IPModel, The OSI Model, and Comparison of the OSI and TCP/IP reference model.
Physical Layer: Guided transmission media, Wireless transmission media, Switching

UNIT - II:
Data Link Layer - Design issues, Error Detection & Correction, Elementary Data Link Layer Protocols, and Sliding window protocols.Multiple Access Protocols - ALOHA, CSMA, CSMA/CD, CSMA/CA, Collision free protocols,Ethernet- Physical Layer, Ethernet Mac Sub layer.

UNIT - III:
Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks, routing algorithms: optimality principle, shortest path, flooding,Distance Vector Routing, Count to Infinity Problem, Link State Routing, Path Vector Routing, Hierarchical Routing; Congestion control algorithms,IP addresses, CIDR, Sub netting, Super Netting, IPv4, Packet Fragmentation, IPv6 Protocol, Transition from IPv4 to IPv6, ARP, RARP.

UNIT - IV:
Transport Layer: Services provided to the upper layers elements of transport protocol, addressing, connection establishment, Connection release, Error Control & Flow Control, Crash Recovery.
The Internet Transport Protocols: UDP, Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Sliding Window, The TCP Congestion Control Algorithm.

UNIT - V: Application Layer- Introduction, providing services, Applications layer paradigms: Client server model, HTTP, E-mail, WWW, TELNET, DNS.

TEXT BOOKS:
1. Computer Networks - Andrew S Tanenbaum, 4th Edition, PearsonEducation.
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

REFERENCES BOOKS:

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1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W.Ross, 3rd Edition, PearsonEducation.

COURSE OUTCOMES:
1. Students should be understand and explore the basics of Computer Networks and VariousProtocols.
2. Student will be in a position to understand the World Wide Web concepts.
3. Students will be in a position to administrate a network and flow of information further.
4. Student will be in position know various application layers.
5. Student will be know how work with error handlings.

(R20A0517) FULL STACK WEB DEVELOPMENT

COURSE OBJECTIVES:

1. To learn the core concepts of both the frontend and backend programming course.

2. To get familiar with the latest web development technologies.

3. To learn all about databases.

4. To learn complete web development process

5. To provide an in-depth study of the various web development tools

UNIT - I:
Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Versioncontrol - Git & Github HTML, CSS

UNIT - II:
Frontend Development: Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc.JSON data format.

UNIT - III:
REACT JS: Introduction to React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication

UNIT- IV:
Java Web Development:JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVCArchitecture using Spring RESTful API using Spring Framework Building an application using Maven

UNIT - V:
Databases & Deployment:Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud

TEXT BOOKS:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript forWeb Developers Book by Nicholas C. Zakas

2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites byRobin Nixon

3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BY AZAT MARDAN

REFERENCE BOOKS:

1. Full-Stack JavaScript Development by Eric Bush.
2. Mastering Full Stack React Web Development Paperback – April 28, 2017 by TomaszDyl , Kamil Przeorski , Maciej Czarnecki

COURSE OUTCOMES:

1. Develop a fully functioning website and deploy on a web server.
2. Gain Knowledge about the front end and back end Tools
3. Find and use code packages based on their documentation to produce working results in a project.
4. Create webpages that function using external data.
5. Gain an understanding about the databases.

(R20A6202) CYBER SECURITY
PROFESSIONAL ELECTIVE - I

COURSE OBJECTIVES:

1.   To familiarize various types of cyber-attacks and cyber-crimes
2.   To give an overview of the cyber laws
3.   To study the defensive techniques against these attacks
4.   To study cyber security challenges and implications.
5.   To know about Cyber Security.

UNIT - I:
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II:
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III: Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT - IV:
Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.
Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in

different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini- Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain

TEXT BOOKS*:*

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, ComputerForensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles,Algorithm,
Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCE BOOKS:
1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

COURSE OUTCOMES:

Student will be able to
1. Understand basic concepts ofCyber Crimes.
2. Ability to identify the attacks in CyberCrimes
3. Able to specify the suitable methods used in CyberCrime
4. Ability to face cyber securitychallenges
5. Understand Cyber laws

(R20A07302) INFORMATION RETRIEVAL SYSTEMS
PROFESSIONAL ELECTIVE - I

Objectives:

· To provide the knowledge on information retrieval system capabilities.

· To introduce different computational search problems and evaluate search engines.

· To introduce different applications of informational retrieval techniques in the internet or Web environment.

· To discuss about information visualization and system evaluation.

Unit-1   Introduction to Information Retrieval Systems

Introduction: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

Unit-2   Cataloging and Indexing

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

Unit-3   Automatic Indexing

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

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Unit-4   User Search Techniques

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext

Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

Unit-5   Text Search Algorithms

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCES

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.

2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.

3. Modern Information Retrieval By Yates and Neto Pearson Education.

Outcomes:

Students will be able to

· Understand various functionalities and capabilities of Information Retrieval System.

· Gain knowledge on cataloging and data structure methodology for IRS.

· Differentiate various clustering algorithms and indexing.

· Differentiate various user search techniques and system search techniques.

· Understand the concepts of information visualization and text search.

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(R20A6703) DATA HANDLING & VISUALIZATION
PROFESSIONAL ELECTIVE - I

COURSE OBJECTIVES:
☐ To learn different statistical methods for Data visualization.
☐ To understand the basics of R and Python.
☐ To learn usage of Watson studio.
☐ To understand the usage of the packages likeNumpy, pandas and matplotlib.
☐ To know the functionalities and usages of Seaborn.

UNIT I
Introduction to Statistics : Introduction to Statistics, Difference between inferential statistics and descriptivestatistics, Inferential Statistics- Drawing Inferences fromData, RandomVariables, Normal ProbabilityDistribution, Sampling, Sample Statistics and SamplingDistributions.
R overview and Installation- Overview and About R, R and R studio Installation, Descriptive Data analysis using R, Description of basic functions used to describe data in R.

UNIT II
Data manipulation withR: Data manipulation packages-dplyr,data.table, reshape2, tidyr, Lubridate, Data visualization withR.
Data visualization in Watson Studio: Adding data to datarefinery, Visualization of Data on WatsonStudio.

UNIT III
Python: Introduction toPython, How toInstall, Introduction to JupyterNotebook, Python scriptingbasics, NumpyandPandas-Creating and Accessing Numpy Arrays, Introduction to pandas, read and write csv, Descriptive statistics using pandas, Working with text data and datetime columns, Indexing and selecting data, groupby, Merge / Join datasets

UNIT IV
Data Visualization Tools inPython- Introduction to Matplotlib, Basic plots usingmatplotlib, Specialized Visualization Tools usingMatplotlib, Advanced Visualization Tools usingMatplotlib- WaffleCharts, WordClouds.

UNIT V
Introduction to Seaborn: Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

TEXT BOOKS:
1. Core Python Programming - Second Edition,R. Nageswara Rao, Dreamtech Press.
2. Hands on programming with R by Garrett Grolemund,Shroff/O'Reilly; First edition
3. Fundamentals of Mathematical Statistics by S.C. Gupta, Sultan Chand & Sons

REFERENCE BOOKS:
1. Learn R for Applied Statistics: With Data Visualizations, Regressions, and Statistics by Eric Goh Ming Hui, Apress
2. Python for Data Analysis by William McKinney, Second Edition, O'Reilly Media Inc. \
3. The Comprehensive R Archive Network- https://cran.r-project.org
4. https://seaborn.pydata.org/
5. https://dataplatform.cloud.ibm.com/

Course Outcomes:
At Completion of this course, students would be able to -
☐ Apply statistical methods for Data visualization.
☐ Gain knowledge on R and Python
☐ Understand usage of various packages in R and Python.
☐ Demonstrate knowledge of Watson studio.
☐ Apply data visualization tools on various data sets.

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(R20A0527) SCRIPTING LANGUAGES
(PROFESSIONAL ELECTIVE-I)

COURSE OBJECTIVES:
1. To study the basics of scripting languages like Java script, Perl, PHP and Ruby
2. To understand the requirements of Scripting Languages
3. To identify the uses of Scripting Languages
4. To introduce in-depth knowledge of programming features of Perl and Angular JS
5. To state the implementation and applications of Scripting.

UNIT I
Introduction to Scripts and Scripting Language – Scripts and Programs, Origins of Scripting, Uses for Scripting Languages, Web Scripting.
JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements,Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects.

UNIT II
JavaScript programming of reactive web pages elements - Events, Event handlers, Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms. Introduction to Angular JS – Development Tools, Basic Program, Angular Modules and Controllers.

UNIT III
Introduction to PERL- Names and Values, Variables and Assignments, Scalar Expressions, Control Structures, Built-in Functions, Collections of Data, Arrays and Lists, Hashes, Strings, Patterns, and Regular Expressions.

UNIT IV
Advanced PERL: Finer points of looping, data structures, Security Issues
PHP Basics - Features, Data Types, Variables, Operators, Arrays, Strings, Control structures, Loops, Functions, Date & Time, File Handling, Form handling.
UNIT V
Ruby – Features, Classes and Objects, Variables, Operators, Comments, If-else, Loops, Methods,Blocks, Modules, Arrays, Strings, Hashes, Date & Time, Ranges, Iterators, File I/O, Exceptions

TEXT BOOKS:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating DynamicWebsites 3rd Edition, O'Reilly Publications

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REFERENCE BOOKS:

The Ruby Programming Language, David Flanagan and Yukihiro Matsumoto, O'Reilly Publications
3. AngularJS Programming by Example (Kindle Edition) by Kurniawan, AgusKurniawan
4. Beginning JavaScript with Dom scripting and AJAX, Russ Ferguson, Christian Heilmann, Apress.

COURSE OUTCOMES:

Students will be able to:
1. To differentiate the typical scripting languages and application programming languages.
2. To implement the design of programs for simple applications.
3. To classify the Angular Modules
4. To specify the Controllers used in Angular JS
5. To create software systems using scripting languages such as Perl, PHP, and Ruby

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(R20A7305) COMPUTER VISION
PROFESSIONAL ELECTIVE - II

COURSE OBJECTIVES

1. To introduce various components of image processing techniques for computer vision.
2. To understand filters and computing Image Gradient.
3. To understand segmentation, model fitting and tracking
4. To impart knowledge about object registration and object matching
5. To implement various techniques available for object recognition.

UNIT-I

IMAGE FORMATION: Geometric Camera Models, Intrinsic and Extrinsic Parameters, Geometric Camera Calibration – Linear and Non – linear approach, Light and Shading - Inference from, Modeling Inter reflection, Human Color Perception.

UNIT-II

EARLY VISION: Linear Filters - Convolution, Fourier Transforms, Sampling and Aliasing, Filters as Templates, Correlation, Local Image Features - Computing the Image Gradient, Gradient-Based Edge Detectors, Orientations, Texture - Local Texture Representations Using Filters, Shape from Texture.

UNIT-III

MID-LEVEL VISION: Segmentation by Clustering - Basic Clustering Methods, The Watershed Algorithm, Segmentation Using K-means, Grouping and Model Fitting - Fitting Lines with the Hough Transform, Fitting Curved Structures, Tracking - Tracking by Detection, Tracking Translations by Matching, Tracking Linear Dynamical Models with Kalman Filters.

UNIT-IV

HIGH-LEVEL VISION: Registration, Registering Rigid and Deformable Objects, Smooth Surfaces and Their Outlines - Contour Geometry, Koenderink's Theorem, The Bitangent Ray Manifold, Object Matching using Interpretation Trees and Spin Images, Classification, Error, and Loss.

UNIT-V

OBJECT DETECTION AND RECOGNITION: Detecting Objects in Images - The Sliding Window Method, Face Detection, Detecting Humans, Boundaries and Deformable Objects, Object Recognition – Categorization, Selection, Applications – Tracking People, Activity Recognition.

TEXT BOOKS:

1. Forsyth, Jean Ponce David A. "Computer Vision: A Modern Approach", Second Edition,PearsonEducation Limited 2015.
2. Szeliski, Richard, "Computer vision: algorithms and applications", Springer Science &BusinessMedia, 2010.

REFERENCE BOOKS:

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1. Hau, Chen Chi, "Handbook of pattern recognition and computer vision", World Scientific, FifthEdition, 2015.
2. Muhammad Sarfraz, "Computer Vision and Image Processing in Intelligent Systems and MultimediaTechnologies", IGI Global, 2014.
3. Theo Gevers, ArjanGijsenij, Joost van de Weijer, Jan-Mark Geusebroek "Color in Computer Vision:Fundamentals and Applications", Wiley, 2012.
4. Kale, K. V, Mehrotra S.C, Manza. R.R., "Advances in Computer Vision and Information Technology",IK International Pvt Ltd, 2013.

COURSE OUTCOMES:

1. Understand various image formation models.

2. Extract shape, texture and edge based features.

3. Detect region of interest using image segmentation and object localization techniques.

4. Identify and recognize objects using image registration and classification.

5. Explore various case studies on vision based applications.

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(R20A0522) COMPUTER GRAPHICS
(PROFESSIONAL ELECTIVE-II)

COURSE OBJECTIVES:

1. To make students understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.
2. To make the student present the content graphically

Unit-1:
Introduction - History of computer graphics, applications, graphics pipeline, video-display devices, raster-scan systems, random scan systems, and input devices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood fill algorithms.
Unit-2:
Introduction to OpenGL - OpenGL architecture, primitives and attributes, simple modeling and rendering of two- and three-dimensional geometric objects, indexed and RGB color models, frame buffer, double buffering, 2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions.
Unit-3:
Geometric transformations- Homogeneous coordinates, affine transformations (translation, rotation, scaling, shear), concatenation, matrix stacks and use of model view matrix in OpenGL for these operations.
Unit-4:
Viewing - Classical three dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations; Visibility- z-Buffer, BSP trees, Open-GL culling,
hidden-surface algorithms.
Shading - Light sources, illumination model, Gouraud and Phong shading for polygons.
Rasterization- Line segment and polygon clipping, 3D clipping, scan conversion.
Unit-5:
Representation and Visualization- Bezier curves and surfaces, B-splines, visualization, interpolation, marching squares algorithm. Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Text Books:
1. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), Pearson Education, 2008.
2. Donald Hearn and Pauline Baker, Computer Graphics with OpenGL (third edition),

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Prentice Hall, 2003.

3. F. S. Hill Jr. and S. M. Kelley, Computer Graphics using OpenGL (third edition), Prentice Hall, 2006.

4. Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010

Web Resources: http://www.graphicsforum.in This website contains several resources relevant to this course; May be beneficial to both students /instructors.

Outcomes:
1. Students can animate scenes entertainment.
2. Will be able to work in computer aided design for content presentation..
3. Better analogy data with pictorial representation.

(R20A6604) SOFT COMPUTING
PROFESSIONAL ELECTIVE - II

Course Objectives:
1. Familiarize with soft computing concepts
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
4. Learn the concepts of Genetic algorithm and its applications
5. Acquire the knowledge of Rough Sets.

UNIT - I
Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II
Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III
Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV
Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V
Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:
1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:
1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995
Course Outcomes:

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

1. Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
2. Understand fuzzy logic and reasoning to handle and solve engineering problems
3. Apply the Classification and clustering techniques on various applications.
4. Understand the advanced neural networks and its applications
5. Perform various operations of genetic algorithms, Rough Sets.
6. Comprehend various techniques to build model for various applications

(R20A0524) CLOUD COMPUTING
PROFESSIONAL ELECTIVE - II

OBJECTIVES:

1.   To understand the various distributed system models and evolving computing paradigms
2.   To gain knowledge in virtualization of computer resources
3.   To realize the reasons for migrating into cloud
4.   To introduce the various levels of services that can be achieved by a cloud.
5.   To describe the security aspects in cloud and the services offered by a cloud.

UNIT- I

Systems Modeling: Distributed System Models and Enabling Technologies- Scalable Computing over the Internet- System Models for Distributed and Cloud Computing- Software Environments for Distributed Systems and Clouds-- Performance, Security, and Energy Efficiency

Computer Clusters for Scalable Parallel Computing: Clustering- Clustering for Massive Parallelism- Computer Clusters and MPP Architectures-Design Principles of Computer Clusters-Cluster Job and Resource Management.

UNIT- II

Virtualization: Virtual Machines and Virtualization of Clusters and Data Centers-Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms- Virtualization of CPU, Memory, and I/O Devices-Virtual Clusters and Resource Management- Virtualization for Data-Center Automation

UNIT- III

Foundations: Introduction to Cloud Computing- Migrating into a Cloud-The Enterprise Cloud Computing Paradigm.

UNIT- IV

Infrastructure as a Service (IAAS)& Platform (PAAS):Virtual machines provisioning and Migration services-On the Management of Virtual machines for Cloud Infrastructures-Aneka—Integration of Private and Public Clouds

UNIT- V

Software as a Service (SAAS)&Data Security in the Cloud:

Google App Engine – Centralizing Email Communications- Collaborating via Web-Based Communication Tools-An Introduction to the idea of Data Security- The Current State of Data Security in the Cloud- Cloud Computing and Data Security Risk- Cloud Computing andIdentity.

TEXT BOOKS:

1. DistributedandCloudComputing,KaittwangGeoffreyC.FoxandJackJDongrra,Els evierIn di a2012.

2. MasteringCloudComputing-RajKumarBuyya,ChristianVecchiolaandS.TanuraiSelvi,TMH,2012.

3. Michael Miller, Cloud Computing: Web-Based Applications That Change the WayYouWork and Collaborate Online, Que Publishing, August2008.

REFERENCE BOOKS:

1. Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter,Tata McGraw Hill,rp2011.

2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press,2010.

3. Cloud Computing: Implementation, Management and Security, JohnW.Rittinghouse, Jame

4. Cloud Application Architectures: Building Applications and Infrastructure in theCloud, GeorgeReese, O'reilly, SPD,rp2011.

5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, TimMather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD,rp2011.

COURSE OUTCOMES:

1. To distinguish the different models and computing paradigms.
2. To explain the levels of virtualization and resources virtualization
3. To analyze the reasons for migrating in to cloud
4. To effectively use the cloud services in terms of infrastructure and operatingplatforms.
5. To apply the services in the cloud for real world scenarios

(R20A0589) FULL STACK DEVELOPMENT LAB

COURSE OBJECTIVES:
1. Systematic Introduction to Web Designing
2. Getting familiar with the front and back end tools
3. Creating applications using HTML,CSS,Javascript
4. Implementing various applications using JQuery
5. Creating Websites

Week-1. Write a program to create a simple webpage using HTML.

Week-2. Write a program to create a website using HTML CSS and JavaScript?

Week-3. Write a program to build a Chat module using HTML CSS and JavaScript?

Week-4. Write a program to create a simple calculator Application using React JS

Week-5. Write a program to create a voting application using React JS

Week-6. Write a program to create and Build a Password Strength Check using Jquery.

Week-7. Write a program to create and Build a star rating system using Jquery.

W**eek-8.**Create a project on **Project Management application**

This is going to be the toughest of all with a lot of features. They should have a framework of a basic social media site with users being able to communicate with each other. Users should be able to create projects and tasks within projects.

Users must be able to assign tasks to other users and must be able to comment on it just like on a social media post. To start with, each user can have a calendar view and a kanban style board. Users must be able to close and archive tasks as well as projects when completed.

Week-9.Create a project on Content Management System for a blog
Using the CMS users must be able to design a web page using the drag and drop method. Users should be able to add textual or media content into placeholders that are attached to locations on the web page using drag and drop method.

Week-10. Create a project on **Grocery delivery application**

Assume this project is for a huge online departmental store. Assume that they have a myriad of grocery items at their godown. All items must be listed on the website, along with their

quantities and prices.

Users must be able to sign up and purchase groceries. The system should present him with delivery slot options, and the user must be able to choose his preferred slot. Users must then be taken to the payment page where he makes the payment with his favourite method.

Week-11.*Create a project* **e-commerce portal for used furniture sales**

Assume this project is for a startup that is acquiring used furniture from users at a price, refurbishing them and selling them off at a margin. The website must display second-hand furniture that is currently being sold.

Users must be able to sign up on the site and set up their profile. Users must be able to search for their required products and checkout to the payment page. Once payment is successful, the expected time of product arrival must be communicated to the user via email as well as displayed on the order page.

Users must also be able to sell used furniture to the company. Users must be able to upload pictures of the items they intend to sell. Based on the images, company admins must be able to decide whether to buy or not.

COURSE OUTCOMES:
Students will be able to understand
1. Usage of various front and back end Tools

2. They can understand and create applications on their own

3. Demonstrate and Designing of Websites can be carried out.

4. Hands on experience on Databases.

5. Capable of working on both front and back end Tools

(R20A6681) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LABORATORY

Lab Objectives

1. Familiarity with the Prolog programming environment & Systematic introduction to Prolog programming constructs
2. Learning basic concepts of Prolog through illustrative examples and small exercises & Understandinglist data structure in Prolog.
3. To introduce students to the basic concepts and techniques of Machine Learning.
4. To become familiar with regression methods, classification methods, clustering methods.
5. To become familiar with Dimensionality reduction Techniques.

Study of PROLOG; Write the following programs using PROLOG

Week 1: Implementation of DFS for water jug problem using PROLOG

Week 2: Implementation of BFS for tic-tac-toe problem using PROLOG

Week 3: Solve 8-puzzle problem using best first search

Week 4: Write a program to solve 8 queens problem

Week 5: Implementation of TSP using heuristic approach using Prolog

Week 6: Implementation of Simulated Annealing Algorithm using PROLOG

Week 7: Implementation of Hill-climbing to solve 8- Puzzle Problem

Machine Learning Laboratory

Week-1
Data Extraction, Wrangling
1. Loading different types of dataset in Python
2. Arranging the data

Week-2

Data Visualization
1. Handling missing values
2. Plotting the graphs

Week-3
Supervised Learning
1. Implementation of Linear Regression
2. Implementation of Logistic regression

Week-4
Supervised Learning
1. Implementation of Decision tree classification
2. Implementation of K-nearest Neighbor

Week-5
Supervised Learning
1. Implementation of Naïve Bayes classifier algorithm
2. Implementation of SVM Classification

Week-6
Dimensionality Reduction
1. Implementation of PCA
2. Implementation of LDA

Week-7
Unsupervised Learning
1. Implementing K-means Clustering
2. Implementing Hierarchical Clustering

Lab Outcomes
1. Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)
2. Understand the fundamentals of knowledge representation, inference and theorem proving using AItools
3. Gain knowledge about basic concepts of Machine Learning
4. Identify machine learning techniques suitable for a given problem & Solve the problems using variousmachine learning techniques
5. Apply Dimensionality reduction techniques
6. Design application using machine learning techniques.

(R20A0006) TECHNICAL COMMUNICATION AND SOFT SKILLS

INTRODUCTION:

'Technical Communication and Soft skills'focus on enhancing students' communication skills. Various technical writing styles and skills are developed. Students' placementneeds met by giving them an exposure to group discussions and mock interviews. Soft skills such as building positive relationships and teamwork are also emphasized.

The trainee hones these skills under the guidance ofthe instructor whose constant evaluation helps in the professional development of students. This course fulfils the need of the aspirants in acquiring and refining the skills required for placements and professional success.

COURSE OBJECTIVES:

1. To make the students recognize the role of technical English in their academic and professional fields
2. To improve language proficiency and to develop the required professional ethics
3. To equipstudents, organize, comprehend, write, and present, short and long forms of any technical work within the broad framework of the Scientific Method
4. To facilitate communication about projects and ideas throughout the industry and also to the non-technical people
5. To display professional behaviors and body language

UNIT I – **Effective Presentations**
Just-a-Minute sessions, Formal versus informal communication, Non-verbal communication; Concord**:**Subject-verb agreement
UNIT 2 - **Professional Communication**
Role Plays, Persuasion techniques, Presentation aids, Body language, Importance of listening in effective communication; Email Writing, Business Letter Writing, Letters of complaint, enquiry, responses; Memo Writing; Transformation of Sentences
UNIT 3 – **Career Planning**
Oral Presentations, Techniques of Listening Skills, types of Group discussions; Etiquette, Protocol; Resume Writing, Cover letter, Writing a statement of purpose; Tenses
UNIT 4 - **Technical Writing**
Group Discussion, Principles of Effective Writing; Paragraph writing, Advanced Essay Writing, Expansion for or against the essay, Narrative essay, Descriptive essay; Technical Report Writing, Format &Style; Active & Passive Voice
UNIT 5 – **Academic Writing**
Mock Interview sessions, facing interviews; Correction of Sentences

REFERENCE BOOKS:
1. R.K. Narayan, The Guide, Viking Press, 1958
2. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004
3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

6. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, New Delhi 2012.

7. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)

8. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.

9. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

COURSE OUTCOMES:

After completion of the course, the Students will be able to

1. Understand information which assists in completion of the assigned job tasks more successfully.
2. Communicate his ideas by writing projects, reports, instructions, diagrams and many other forms ofprofessional writing.
3. Adhere to ethical norms of scientific communication.
4. Strengthen their individual and collaborative work strategies.
5. Successfully market themselves and sell themselves to the employer of their choice.

(R20A1205) DATA WAREHOUSING AND DATA MINING

COURSE OBJECTIVES:

1. Study data warehouse principles
2. Study and its working learn data mining concepts
3. Understand association rules mining.
4. Discuss classification algorithms
5. Learn how data is grouped using clustering techniques.

UNIT-I

Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi- Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT-II

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major issues in Data Mining.
Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration &Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT-III

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

UNIT-IV

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

UNIT-V

Clustering: Clustering Overview, A Categorization of Major Clustering Methods,
Partitioning Methods, Hierarchical Methods, , Partitioning Clustering-K-Means Algorithm, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Key Issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection.

TEXT BOOKS:

1. Data Mining- Concepts and -1.chniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers,Elsevier, 2 Edition, 2006.

2. Introduction to Data Mining, Psng-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Educatior.

REFERENCE BOOKS:

1. Data Mining Techniques, Arun KPujari, 3rd Edition, Universities Press.

2. Data Warehousing Fundament's, Pualraj Ponnaiah, Wiley Student Edition.

3. The Data Warehouse Life CycleToolkit — Ralph Kimball, Wiley Student Edition.

4. Data Mining, Vikaram Pudi, P Rddha Krishna, Oxford University Press

OUTCOMES:

1. Student should be able to understand why the data warehouse in addition to database systems.

2. Ability to perform the pre-processing of data and apply mining techniques on it.

3. Ability to identify the association rules,

4. Ability to identify classification techniques.

5. Ability to identify clusters in large data sets.

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(R20) BIG DATA ANALYTICS

Course Objective:
1. To study about design of Data and Management for Analysis
2. To introduce about the work place safety.
3. To introduce big data tools & Information Standard formats.
4. To study about Machine Learning Algorithms & Data Visualization.

UNIT I
INTRODUCTION TO BIG DATA AND ANALYTICS
Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Basically Available Soft State Eventual Consistency - Top Analytics Tools

UNIT II
INTRODUCTION TO TECHNOLOGY LANDSCAPE
NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

UNIT III
INTRODUCTION TO MONGODB AND MAPREDUCE PROGRAMMING
MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language
MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

UNIT IV
INTRODUCTION TO HIVE AND PIG
Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having - RCFile Implementation - Hive User Defined Function - Serialization and Deserialization. Pig: Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution - Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive

UNIT V
INTRODUCTION TO DATA ANALYTICS WITH R
Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Machine Learning Algorithms: Regression Model, Clustering, Collaborative Filtering, Associate Rule Making, Decision Tree, Big Data Analytics with BigR.

Text Book:

1. Seema Acharya, SubhashiniChellappan, "Big Data and Analytics", Wiley Publications, First Edition,2015

Reference Book:

1. Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, "Big data for dummies", John Wiley & Sons, Inc. (2013)
2. Tom White, "Hadoop The Definitive Guide", O'Reilly Publications, Fourth Edition, 2015
3. Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, "Hadoop For Dummies", Wiley Publications, 2014
4. Robert D.Schneider, "Hadoop For Dummies", John Wiley & Sons, Inc. (2012)
5. Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012 Chuck Lam, "Hadoop In Action", Dreamtech Publications, 2010

Course Outcomes:

Upon completion of this course, student shall be able to

1. Design the Data for Data Analytics
2. Understand the work place Safety Features
3. Work on the tools like Hadoop, Scala
4. Obtain fair knowledge on Information standard formats
5. Understand the Machine learning algorithms and visualize the data

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(R20A0525) BLOCKCHAIN TECHNOLOGIES
PROFESSIONAL ELECTIVE - III

COURSE OBJECTIVES

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

1. Understand how blockchain systems (mainly Bitcoin and Ethereum)work,

2. To securely interact with them,

3. Design, build, and deploy smart contracts and distributed applications,

4. Integrate ideas from blockchain technology into their ownprojects.

Unit I: Basics:

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance.Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

Unit II: Blockchain:

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Publicblockchain.

Unit III: Distributed Consensus:

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

Unit IV: Cryptocurrency:

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO,Solidity- Smart Contract,Truffle, GHOST, Vulnerability, Attacks, Sidechain, Namecoin comparing Bitcoin scripting vs.

Ethereum Smart Contracts

Unit V: Cryptocurrency Regulation:

Stakeholders, Roots of Bit coin, Legal Aspects- Currency, Token,

Tokenizing,Crypto currency Exchange, Black Market and Global Economy.

Text Book

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

2. Draft version of "S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, 'Blockchain Technology: Cryptocurrency and Applications', Oxford University Press, 2019.

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking DigitalCryptocurrencies

2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic CashSystem

3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper.2014.

4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smartcontracts

COURSE OUTCOMES

1. Explain design principles of Bitcoin and Ethereum.

2. Explain Nakamoto consensus.

3. Explain the Simplified Payment Verification protocol.

4. List and describe differences between proof-of-work and proof-of-stake consensus.

5. Evaluate security, privacy, and efficiency of a given blockchain system.

(R20A7201) TEXT ANALYTICS
PROFESSIONAL ELECTIVE - III

COURSE OBJECTIVES:
1. Describe text extraction techniques.
2. Differentiate clustering and classification techniques on text.
3. Analyze visualization methodologies.
4. Illustrate about event detection methods and embedding semantics in models.
5. Compare feature extraction methods

UNIT - I: TEXT EXTRACTION
Text Extraction: Introduction, Rapid automatic keyword extraction: candidate keywords, keyword scores, adjoining keywords, extracted keywords, Benchmark evaluation: precision and recall, efficiency, stop list generation, Evaluation on new articles.

UNIT - II: CLUSTERING
Clustering: Multilingual document clustering: Multilingual LSA, Tucker1 method, PARAFAC2 method, LSA with term alignments, LMSA, LMSA with term alignments.

UNIT - III: CLASSIFICATION
Classification: Content-based spam email classification using machine-learning algorithms, Utilizing nonnegative matrix factorization for email classification problems, Constrained clustering with k-means type algorithms.

UNIT - IV: ANOMALY AND TREND DETECTION
Anomaly and trend detection: Text Visualization techniques such as tag clouds, authorship and change tracking, Data Exploration and the search for novel patterns, sentiment tracking, visual analytics and Future Lens, scenario discovery, adaptive threshold setting for novelty mining.

UNIT - V: TEXT STREAMS
Text streams: Introduction, Text streams, Feature extraction and data reduction, Event detection, Trend detection, Event and trend descriptions, Embedding semantics in LDA topic models: Introduction, vector space modeling, latent semantic analysis, probabilistic latent semantic analysis, Latent Dirichlet allocation, embedding external semantics from Wikipedia, data-driven semantic embedding.

TEXT BOOKS:
1. Michael W. Berry & Jacob Kogan ,"Text Mining Applications and Theory", Wiley publications.
2. Aggarwal, Charu C., and Cheng Xiang Zhai, eds. mining text data. Springer Science & Business Media, 2012.

REFERENCE BOOKS:
1. Miner, Gary, et al. Practical text mining and statistical analysis for non-structured text data applications. Academic Press, 2012.
2. Srivastava, Ashok N., and Mehran Sahami. Text mining: Classification, clustering, and applications, Chapman and Hall/CRC, 2009.
3. Buitelaar, Paul, Philipp Cimiano, and Bernardo Magnini, eds. Ontology learning from text: methods, evaluation and applications. Vol. 123. IOS press, 2005.

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Design text extraction techniques.
2. Design clustering techniques for text.
3. Design classification techniques for text
4. Practice visualization methodologies using tools.
5. Practice feature extraction using tools

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(R20A6611) DESIGN PATTERNS USING PYTHON
PROFESSIONAL ELECTIVE - III

Course Objectives:
1. Understand the python programming concepts
2. Understand the concept of Design patterns and its importance .
3. Understand the behavioral knowledge of the problem and solutions.
4. Relate the Creational, Structural , behavioral Design patterns.
5. Apply the suitable design patterns to refine the basic design for given context.

UNIT I:
A Brief Introduction to Python : Variables and Syntax in Python , Making Decisions in Python , Development Environments , Python Collections and Files , Functions , Running Python programs
Introduction: Introduction to Objects, Visual Programming in Python, Visual Programming of Tables of Data, What Are Design Patterns

UNIT II
Creational Patterns: The Factory Pattern, the Factory Method Pattern, the Abstract Factory Pattern, the Singleton Pattern, the Builder Pattern, the Prototype Pattern

UNIT III
Structural Patterns: The Adapter Pattern , The Bridge Pattern , The Composite Pattern , The Decorator Pattern , The Façade Pattern , The Flyweight Pattern , The Proxy Pattern ,

UNIT IV
Behavioral Patterns I: Chain of Responsibility Pattern , The Command Pattern , The Interpreter Pattern , The Iterator Pattern , The Mediator Pattern , The Memento Pattern

UNIT V
Behavioral Patterns II: The Observer Pattern, the State Pattern, the Strategy Pattern, the Template Pattern, the Visitor Pattern

Text Book:
Python Programming with Design Patterns BY James W. Cooper, Addison- Wesley publisher

References:
1. Design patterns by Erich gamma, Pearson Education publisher
2. Mastering Python Design Patterns: A Guide to Creating Smart, Efficient, and Reusable Software, 2nd Edition by Kamon Ayeva and Sakis Kasampalis

Course Outcomes:
1. Demonstrate python programming concepts
2. Identify the appropriate design patterns to solve object oriented design problems.
3. Develop design solutions using creational patterns.
4. Apply structural patterns to solve design problems.
5. Construct design solutions by using behavioral patterns.

(R20A7303) HEALTH CARE ANALYTICS
(PROFESSIONAL ELECTIVE-III)

OBJECTIVES:

1: Understand the health data formats, health care policy and standards
2: Learn the significance and need of data analysis and data visualization
3: Understand the health data management frameworks
4: Learn the use of machine learning and deep learning algorithms in healthcare
 5: Apply healthcare analytics for critical care applications

 UNIT I INTRODUCTION TO HEALTHCARE ANALYSIS :

 Overview - History of Healthcare Analysis Parameters on medical care systems- Health care policy- Standardized code sets – Data Formats – Machine Learning Foundations: Tree Like reasoning , Probabilistic reasoning and Bayes Theorem, Weighted sum approach.

UNIT II ANALYTICS ON MACHINE LEARNING :

 Machine Learning Pipeline – Pre-processing –Visualization – Feature Selection – Training model parameter – Evaluation model : Sensitivity , Specificity , PPV ,NPV, FPR ,Accuracy , ROC , Precision Recall Curves , Valued target variables –Python: Variables and types, Data Structures and containers , Pandas Data Frame :Operations – Scikit – Learn : Pre-processing , Feature Selection.

UNIT III HEALTH CARE MANAGEMENT :

 IOT- Smart Sensors – Migration of Healthcare Relational database to NoSQL Cloud Database – Decision Support System – Matrix block Cipher System – Semantic Framework Analysis – Histogram bin Shifting and Rc6 Encryption – Clinical Prediction Models – Visual Analytics for Healthcare.

UNIT IV HEALTHCARE AND DEEP LEARNING :

 Introduction on Deep Learning – DFF network CNN- RNN for Sequences – Biomedical Image and Signal Analysis – Natural Language Processing and Data Mining for Clinical Data – Mobile Imaging and Analytics – Clinical Decision Support System.

 UNIT V CASE STUDIES :

 Predicting Mortality for cardiology Practice –Smart Ambulance System using IOT –Hospital Acquired Conditions (HAC) program- Healthcare and Emerging Technologies – ECG Data Analysis.

TEXT BOOKS:
 1. Chandan K.Reddy, Charu C. Aggarwal, "Health Care data Analysis", First edition, CRC, 2015.
2. Vikas Kumar, "Health Care Analysis Made Simple", Packt Publishing, 2018.

REFERENCES:
1. Nilanjan Dey, Amira Ashour , Simon James Fong, Chintan Bhatl, "Health Care Data Analysis and Management, First Edition, Academic Press, 2018

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2. Hui Jang, Eva K.Lee, "HealthCare Analysis : From Data to Knowledge to Healthcare Improvement", First Edition, Wiley, 2016.
3. Kulkarni , Siarry, Singh ,Abraham, Zhang, Zomaya , Baki, "Big Data Analytics in HealthCare", Springer, 2020.

OUTCOMES:

CO1: Use machine learning and deep learning algorithms for health data analysis
CO2: Apply the data management techniques for healthcare data
CO3: Evaluate the need of healthcare data analysis in e-healthcare, telemedicine and other critical care applications
CO4: Design health data analytics for real time applications
CO5: Design emergency care system using health data analysis

(R20A7202) AI IN SPEECH PROCESSING
(PROFESSIONAL ELECTIVE-IV)

Course Objectives

- To understand acoustic theory behind the human speech production and speech perception systems.
- To analyze the methods of speech recognition.
- To understanding the speech detection and pattern comparison.
- To learn source coding techniques for recognition enhancement.
- To understand the AI based algorithms used for speech modeling.

UNIT –I
Fundamentals in Speech Recognition: Introduction, Brief History of Speech Recognition, The Process of Speech production and perception, Speech production process, , Speech sound and features-the vowels, diphthongs, semivowels, nasal consonants.

UNIT -II
Speech signal processing methods for speech recognition: Introduction -Spectral analysis model, The bank-of-filters front end processor, Linear predictive coding model for Speech recognition, Vector Quantization, Auditory- Based Spectral Analysis model.

UNIT-III
Pattern Comparison techniques: Introduction, Speech (Endpoint) Detection, Distortion Measures-Mathematical considerations, Distortion Measures-Perceptual Considerations, Time Alignment and Normalization.

UNIT-IV
Speech Recognition System Design and Implementation: Application of source coding techniques to recognition, Template training methods, Performance analysis and recognition enhancement.

UNIT-V
Implementation of Hidden Markov model: Introduction, Discrete-Time Markov processes-Extension to hidden markov model, Types of HMMs-Basic problems in HMMs, Implementation issues for HMMs, HMM

system for isolated word recognition.

Text Books

1. 'Fundamentals of Speech Recognition', L. Rabiner, Biing-Hwang Juang and B. Yegnanarayana, Pearson Education Inc.2009.
2. 'Speech Communication', Douglas O'Shaughnessy, University Press, 2001.

Reference Books

1. 'Discrete Time Speech Signal Processing', Thomas F Quatieri, Pearson Education Inc., 2004

Course Outcomes

The students will be able to:
- Understand the acoustics of speech production and perception.
- Analyze different speech recognition models.
- Classify various patterns of speech detection.
- Interpret different coding techniques for recognition enhancement.
- Illustrate the Hidden Markov model

(R20A7203) BUSINESS INTELLIGENCE
(PROFESSIONAL ELECTIVE-IV)

Course Objectives:

1. Explain the Decision Support systems and Business Intelligence framework.
2. Illustrate the significance of computerized Decision Support, and understand the Mathematical modelling behind decision support.
3. Explain Data warehousing, its architecture and Extraction, Transformation, and Load (ETL) Processes.Explore knowledge management, explain its activities, approaches and its implementation.
4. Describe the Expert systems , areas suitable for application of experts system

UNIT 1
Decision Support and Business Intelligence: Opening Vignette, Changing Business Environments andComputerized Decision Support, Managerial Decision Making, Computerized Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems (DSS), A framework for Business Intelligence (BI), A Work System View of Decision Support.

UNIT 2
Computerised Decision Support: Decision Making, Models, Phases of the DecisionMaking Process, TheIntelligence Phase, The Design Phase, The Choice Phase, The Implementation Phase, How Decisions AreSupported.Modelling and Analysis:Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, andRisk, Management Support Systems, Multiple Goals, Sensitivity Analysis, What-If Analysis, andGoal Seeking

UNIT 3
Data Warehousing: Data Warehousing Definitions and Concepts, Data Warehousing Process Overview, DataWarehousing Architectures, Data Integration and the Extraction, Transformation, and Load (ETL) Processes.

UNIT 4
Knowledge Management: Introduction to Knowledge Management, Organizational Learning andTransformation, Knowledge Management Activities, Approaches to Knowledge Management, InformationTechnology (IT) In Knowledge Management, Knowledge Management Systems Implementation.

UNIT 5
Expert Systems: Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of ExpertSystems, Knowledge Engineering, Problem Areas Suitable for Expert Systems, Development of Expert Systems,Benefits, Limitations, and Critical Success Factors of Expert Systems.

Textbooks:
1. Business Intelligence, A managerial Perspective on Analytics.Sharda, R, Delen D,Turban E.Pearson. 2014

Reference Books:

1. Data Mining Techniques. For Marketing, Sales and Customer Relationship Management Berry M.&Linoff G. Wiley Publishing Inc 2004
2. Data Science for Business, Foster Provost and Tom Fawcett, O'Reilly Media,Inc2013

Course outcomes:

The students should be able to:

1. Apply the basics of data and business to understand Decision Support systems and Business Intelligence framework.
2. Describe the significance of 73omputerized Decision Support, apply the basics of mathematics to understand the mathematical modelling behind decision support.
3. Explain Data warehousing , its architecture and Extraction, Transformation, and Load (ETL) Processes.
4. Analyze the importance of knowledge management and explain its activities, approaches and its implementation.
5. Describe the Expert systems and analyze its development , discuss areas suitable forapplication of experts system.

(R20A6601) IMAGE PROCESSING
(PROFESSIONAL ELECTIVE-IV)

OBJECTIVES:

1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processingconcepts.
2. Provides the knowledge of imageacquisition;samplingandquantization.
3. Preprocessing and enhancement.
4. Image restoration, and segmentation.
5. Knowledge of different image compression techniques.

UNIT - I
Digital ImageFundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels, Gray Level to Binary Image Conversion, Sampling and Quantization, Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT andSVD.

UNIT - II
Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement inFrequency Domain, Image Smoothing, Image Sharpening.

UNIT - III
Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean SquareFilters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV
Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, RegionOriented Segmentation.

UNIT - V
Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOKS:

1. Digital Image Processing: **R.C. Gonzalez & R. E. Woods**, Addison Wesley/ Pearson Education, 2 Ed,2004.

REFERENCES:

1. Fundamentals of Digital Image Processing: **A. K. Jain** ,PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins:Pearson Education India,2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rdEdition,2004.
4. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, aclav Hlavac andRoger Boyle, Cengage learning.
5. Digital Image Processing, W.K.Pratt, 4theditionJohnwiley&sons.
6. Digital ImageProcessing, S.Jayaraman, S.Esakkirajan, T.Veerakumar,TMH.
7. Digital Image Processing, S.Sridhar, Oxford UniversityPress

COURSE OUTCOMES:

1. Understand the theoretical and mathematical foundations of Digital Image Processing.
2. Explain different image acquisition, sampling and quantization methods;
3. Perform Preprocessing and image enhancement operations on given images
4. Apply different Image restoration, and segmentation techniques.
5. Perform different image compression techniques.

(R20A6608) REINFORCEMENT LEARNING
PROFESSIONAL ELECTIVE - IV

COURSE OBJECTIVES:
1. Learn the concepts of reinforcement learning, Multi Armed bandits problem, Finite Markov Decision Process.
2. Provide approximate solutions methods for Reinforcement learning.
3. Introduce Dynamic programming, Monte Carlo methods and Temporal-Difference Learning.
4. Excel with Tabular Methods and Prediction with Approximation.
5. Familiarize with applications and case studies of reinforcement learning

UNIT – I:
Learn the concepts of reinforcement learning, Multi Armed bandits problem, Finite Markov Decision Process.
Introduction and Basics of RL, Defining RL Framework, Probability Basics: Probability Axioms, Random Variables, Probability Mass Function, Probability Density Function, Cumulative Distribution Function and Expectation. Introduction to Agents, Intelligent Agents – Problem
Solving – Searching, Logical Agents.

UNIT – II:
Finite Markov Decision Process:Basics, The Agent-Environment Interface, Goals and Rewards, Returns and Episodes, Unified Notation for Episodic and Continuing Tasks, Policies and Value Functions, Optimal Policies and optimal Value Functions, Optimality and Approximation.

UNIT – III:
Dynamic Programming:Definition, Policy Evaluation (Prediction), Policy Improvement, Policy Iteration, Value Iteration, Asynchronous dynamic programming, Generalized Policy Iteration, Efficiency of dynamic programming.
Monte Carlo Methods:Definition,Monte Carlo Prediction, Monte Carlo Estimation of Action values, Monte Carlo Control, Monte Carlo Control without Exploring Starts, Off-policy prediction via Importance Sampling, Incremental implementation.

UNIT – IV:
Temporal-Difference Learning: TD Prediction, Advantages of TD Prediction Methods, Optimality of TD(0), Sarsa: On-policy TD control, Q-learning Off-policy TD control.

UNIT – V:

Planning and Learning with Tabular Methods: Models and Planning, Dyna: Integrated Planning, acting and learning, Prioritized Sweeping, Expected vs Sample updates, Trajectory sampling, Real-time dynamic programming, Planning at decision time, Heuristic search, Rollout algorithms, Monte carlo tree search.

TEXT BOOKS:
1. Richard S. Sutton and Andrew G. Barto,"Reinforcement Learning: An Introduction", 2nd Edition

REFERENCE BOOKS:
1. Daniel Jurafsky & James H Martin,Speech and Natural Language Processing - Pearson Publications.
2. Alberto Leon-Garcia, "Probability, Statistics, and Random Processes for Electrical Engineering", 3rd Edition,
3. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective".

COURSE OUTCOMES:
1. Understand the concepts of Reinforcement Learning to solve real world problems.
2. Solve problems using Finite Markov Decision process and dynamic program.
3. Apply Monte Carlo, Temporal Difference methods for policy evaluation and prediction.
4. Analyze the Tabular Methods and On-policy Prediction with Approximation.
5. Solve problems using deep reinforcement learning.
6. Recognize current advanced techniques and applications using RL

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(R20A1282) DATA WARE HOUSING AND DATA MINING LAB

COURSE OBJECTIVES:

1. Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration and Pentaho Business Analytics)
2. Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA), Understandthe data sets and data preprocessing
3. Demonstrate the working of algorithms for data mining tasks such association rule mining,classification,clustering and regression,
4. Exercise the data mining techniques with varied input values for different parameters.

LIST OF EXPERIMENTS: -

Experiments using Weka & Clementine Tool

WEEK 1: Data Processing Techniques:

(i)Data cleaning (ii) Data transformation – Normalization

iii)Dataintegration

WEEK 2: Data Warehouse schemas – star, snowflake,fact

constellation

WEEK 3: Data cube construction –OLAP operations

WEEK 4: Data Extraction, Transformations &Loading operations

WEEK 5: Implementation of Attribute oriented induction algorithm

WEEK 6: Implementation of apriori algorithm

WEEK 7: Implementation of FP –Growth algorithm

WEEK 8: Implementation of Decision Tree Induction

WEEK 9: Calculating Information gain measures

WEEK 10: Classification of data using Bayesian approach

WEEK 11: Classification of data using K – nearest neighbor approach
WEEK 12: Implementation of K –means algorithm

WEEK 13: Implementation of PAM algorithm

COURSE OUTCOMES:
- Ability to add mining algorithms as a component to theexisting tools
- Ability to apply mining techniques for realistic data.

III Year B.Tech. AI&DS- II Sem   L/T/P/C
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(R20A0593) BIGDATA ANALYTICS LAB

Course Objectives:

List of Experiments:

1. Implement the following Data structures in Java
   A. Linked Lists
   B. Stacks
   C. Queues
   D. Set
   E. Map
2. Perform setting up and Installing Hadoop in its three operating modes:
   Standalone, Pseudo distributed, Fully distributed.
3. Implement the following file management tasks in Hadoop:
   A.   Adding files and directories
   B.   Retrieving files
   C.   Deleting files
   Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5. Write a Map Reduce program that mines weather data. Weather Report POC- Map Reduce Program to analyse time-temperature statistics and generate report with max/min temperature.
6. Implement Matrix Multiplication with Hadoop Map Reduce
7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
9. Solve some real life big data problems.

Course Outcomes:

(R20A0007) CONSTITUTION OF INDIA

INTRODUCTION

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

This course "Indian Constitution" has been designed to develop understanding of the Indian Constitution among the students.

COURSE OBJECTIVES:

1.   To enrich the students' understanding of the constitution's origin and its power
2.   To facilitate students to analyze the political principles
3.   To assist the students to be aware of their fundamental rights and duties
4.   To enable learning about the federal structure Parliamentary form of government
5.   To be acquainted with the historical perspectives of the constitutional amendments

The following course content is prescribed for this course.

UNIT –I
Meaning of constitution law and constitutionalism Historical perspective of the constitution of India
Salient features and characteristics of the constitution of India

UNIT –II
Scheme of fundamental rights
The scheme of the fundamental duties and its legal status
The Directive Principles of State Policy-its importance and implementation

UNIT–III
Federal structure and distribution of legislative and financial powers between the Union and the States, Parliamentary Form of Government in India-the constitution powers and status of the
president of India, Amendment of the Constitutional Powers and Procedure

UNIT –IV
The historical perspectives of the constitutional amendments in India., Emergency provisions: National Emergency, President Rule, Financial Emergency, Local self government-Constitutional scheme in India

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UNIT –V
Scheme of fundamental Right to quality Scheme of fundamental Right to certain Freedom under Article19Scope of the Right to Life and Personal Liberty under Article 21

COURSE OUTCOMES:
After completion of the course, Students will be able to:
1. Improve their knowledge about Indian constitution
2. Value their identity and exercise their fundamental rights
3. Comprehend how differently government bodies function
4. Define their rights as voters of the country
5. Analyze the constitution and become responsible citizens

(R20A6612) NEURAL NETWORKS

COURSE OBJECTIVES:

1. To understand the concepts of Artificial Neuron and its architecture.

2. Student will able to implement MLP with Back Propagation Methods

3. Student can able to understand fuzzy logic and its properties.

4. Student can able to implement fuzzy controllers

5. Student will be exposed to genetic algorithm procedures and implementation.

UNIT-1

Neural Networks-I (Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.

Various learning techniques: perception, convergence rule, and Auto-associative,hetro-associative memory.

UNIT-2

Neural Networks-II (Back propagation networks): Architecture: Perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting back propagation training, applications.

UNIT-3

Fuzzy Logic-I (Introduction): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT-4

Fuzzy Logic –II (Fuzzy Membership, Rules) : Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications

UNIT-5

Genetic Algorithm(GA): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

TEXT BOOKS:

1.   S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.

2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press. Reference Books:

3. Siman Haykin,"Neural Netowrks"Prentice Hall of India

4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

5. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

COURSE OUTCOMES:

1. Student can Implement artificial neuron with different architectures
2. Student can able to develop a neural network system with back propagation
3. Student can able to implement fuzzy to crisp conversion
4. Student can able to apply fuzzy logic in various applications
5. Student can able to apply genetic algorithm in various applications

(R20A6609) NATURAL LANGUAGE PROCESSING

COURSE OBJECTIVES:
1. Introduce to some of the problems and solutions of NLP and their relation to linguistics andstatistics.
2. To understand linguistic phenomena and learn to model them with formal grammars.
3. To Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems.
4. To learn how to manipulate probabilities, construct statistical models over strings and trees
5. To estimate parameters using supervised and unsupervised training methods.
6. To design, implement, and analyze NLP algorithms. Able to design different languagemodelingTechniques.

UNIT – I:
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT – II:
Lexical syntax: Hidden Markov Models (Forward and Viterbi algorithms and EM training).
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT – III:
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT – IV:
Predicate-Argument Structure, Meaning Representation Systems, Software.
Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure

UNIT – V:
Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

TEXT BOOKS:
1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, PearsonPublication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

REFERENCE BOOKS:

Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

COURSE OUTCOMES:
1. Show sensitivity to linguistic phenomena and an ability to model them with formalgrammars.
2. Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems.
3. Able to manipulate probabilities, construct statistical models over strings and trees
4. Will be able to estimate parameters using supervised and unsupervised training methods.
5. Able to design, implement, and analyze NLP algorithms. Able to design different language modeling Techniques.

(R20A6610) DEEP LEARNING

OBJECTIVES:

1. To acquire the knowledge of Deep Learning Concepts
2. To gain knowledge to apply Optimization strategies.
3. To be capable of performing experiments in deep learning using real world data
4. To improve the performance of the deep learning.
5. To learn supervised and unsupervised models.

UNIT-I:

INTRODUCTION TO DEEP LEARNING : Historical Trends in Deep Learning, Deep Feed- forward networks, Gradient -Based learning, Hidden Units ,Architecture Design, Back- Propagation and other Differentiation Algorithms.

UNIT-II:

DEEP NETWORKS: History of Deep Learning-A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization-VC Dimension and Neural Nets- Deep Vs Shallow Networks -Conventional Networks-Generative Adversarial Networks (GAN), Semi-Supervised Learning.

UNIT-III

 DIMENTIONALITY REDUCTION LINEAR (PCA, LDA) manifolds, metric learning-Autoencoders and dimensionality reduction in networks-Introduction to convert-architectures

-AlexNet, VGG, Inception, ResNet-Training a convert: weights initialization ,batch normalization, hyperparameter optimization.

UNIT- IV

OPTIMIZATION AND GENERALIZATION : Optimization in Deep Learning-Non –convex optimization for deep networks-stochastic optimization Generalization in neural networks
-spatial transformer networks-recurrent networks, LSTM-recurrent neural network language models-world-level RNNs & deep Reinforcement learning-computational & artificial neuroscience.

UNIT- V

CASE STUDY AND APPLICATIONS : Imagenet- Detection –Audio WaveNet-Natural Language Processing Word2Vec-joint Detection-Bioinformatics-Face Recognition-Scene Understanding-Gathering Image Captions.

TEXT BOOKS:

1. Cosma Rohilla   Shalizi,Advanced Data Analysis   from an ElementaryPoint ofView,2015.
2. Deng & Yu,Deep Learning:Methods and Applications,Now Publishers,2013
3. Deep Learning : An MIT Press Book by Ian Goodfellow and Yoshua Bengio Aaron Courville.
4. Michael Nielson,Neural Networks and Deep Learning,Determination Press,2015.
5. Satish kumar,Neural networks:A classroom Approach,Tata McGraw-Hill Education,2004

OUTCOMES:

1. Ablity to select the Learning Networks in modeling real world systems.
2. Build own deep learning project.
3. Differentiate between machine learning, deep learning and artificial Intelligence.
4. Ability to use an efficient algorithm for Deep Models.
5. Ability to learn deep neural network implementation using the TensorFlow and Keras.

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(R20A7204) R PROGRAMMING
PROFESSIONAL ELECTIVE - V

Course objectives:

UNIT – I
Introduction: R – OVERVIEW-Evolution of R -Features of R 2. R – ENVIRONMENT SETUP -Local Environment Setup- BASIC SYNTAX -R Command Prompt - Script File - R – DATA TYPES -Vectors -Lists - Matrices –Arrays Factors -Data Frames - R – VARIABLES -Variable Assignment -Data Type of a Variable Finding Variables -Deleting Variables

UNIT - II
OPERATORS: R – OPERATORS -Types of Operators -Arithmetic Operators-Relational Operators-Logical Operators Assignment Operators-Miscellaneous Operators - R – DECISION MAKING -R - If Statement-R – If...Else Statement -The if...else if...else -Switch Statement - R – LOOP-R - Repeat LoopR - While Loop -R – For Loop -Loop Control Statements-R-Break statement -R – Next Statement . R – FUNCTION -Function Definition -Function Components -Built-in Function –User-defined Function Calling a Function -Lazy Evaluation of Function –User-defined Function -Calling a Function

UNIT – III
 LISTS AND FRAMES: LISTS- LISTS -Creating a -Naming List Elements - Accessing List Elements - Manipulating List Elements -Merging Lists Converting List to Vector - R – MATRICES -Accessing Elements of a Matrix - Matrix Computation-ARRAYS -Naming Columns and Rows -Accessing Array Elements-Manipulating Array Elements - R – FACTORS -Factors in Data Frame -Changing the Order of Levels -Generating Factor Levels 16. R – DATA FRAMES -Extract Data from Data Frame

UNIT – IV
FACTORS AND TABLES: Common Functions Used with Factors- The tapply() Function - The split() Function -The by() Function - Working with Tables- Matrix/Array-Like Operations on Tables- Extended Example: Extracting a Subtable- Extended Example: Finding the Largest Cells in a Table- Table-Related Functions- The aggregate() Function- The cut() Function

UNIT - V
R PROGRAMMING STRUCTURES : Control Statements- Loops- Looping Over Nonvector Sets - if-else- Arithmetic and Boolean Operators and Values- Default Values for Argument- Return Values- Deciding Whether to Explicitly Call return() - Returning Complex Object- Functions Are Objects..

TEXT BOOKS
 1. Matloff, Norman. The art of R programming: A tour of statistical software design. No Starch Press, 2011.

REFERENCE BOOKS
1. Crawley, Michael J. The R book. John Wiley & Sons, 2012.

Course outcomes:

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

1. Learn about R fundamentals
2. Know to implement R operator and R functions
3. Learn to work with Lists and Frames
4. Be able to work with Tables
5.   Know about basic Programming Structures in R

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(R20A7209) OPTIMIZATION TECHNIQUES
PROFESSIONAL ELECTIVE - V

Course Objectives:

1. To illustrate the importance of optimization techniques in theory and practice.
2. To formulate and solve engineering design problems in the industry for optimal results
3. To test the analytical skills in solving real engineering problems by applying appropriate optimization technique. To demonstrate various advanced optimization techniques being developed in recent times.
4. To develop and promote research interest in problems of Engineering and Technology

UNIT I
INTRODUCTION
Concept of optimization – classification of optimization – problems.

UNIT II
LINEAR PROGRAMMING
Examples of linear programming problems – formulation simplex methods variable with upper bounds – principleduality -dual simplex method - sensitivity analysis – revised simplex procedure – solution of the transportation problem – assignment – network minimization – shortest route problem – maximal two problem – L.P. representation of networks.

UNIT III
QUEUING THEORY
Queuing Model, poison and exponential distributions -Queues with combined arrivals and departures-random and series queues.

UNIT IV
UNCONSTRAINED OPTIMIZATION
Maximization and minimization of convex functions. Necessary and sufficient conditions for local minima – speed and order of convegence – unibariate search – steepest and desent methods- metcher reeves method -conjugate gradient method.

UNIT V
CONSTRAINED OPTIMIZATION
Necessary and sufficient condition – equality constraints, inequality constraints -kuhu – tucker conditions – gradient projection method – penalty function methods – cutting plane methods of sibel directions.

TEXT BOOK(S)
1. Rao S.S,"Optimization – Theory and applications", Wiley Easter Ltd., 1979.

REFERENCE BOOKS:
1. David G.Luerbeggan, "Introduction to Linear and Non Linear Programming", Addison Wesley Publishing Co. 1973.

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2. Hadley G. "Nonlinear and – dynamic programming" Addison Wesley Publishing Co. 1964.
3. Cordan C.C. Beveridge and Robert S. Schedther, "Optimization, Theory and Practice" McGraw Hill Co.1970.
 4. HarndyA.Tahh. "operations Research, An Introduction", Macmillan Publishers Co.NewYork,1982.
5. Beightferand S. others, "Foundations of Optimization Pill", New Delhi, 1979.

Course Outcomes:
1. Classify optimization problems and apply classical optimization techniques to solve NLPPs having differentiable functions
2. Apply the concept of uni-modal function to solve one dimensional minimization problems
3. Solve any multi variable optimization problems
4. Solve any complex optimization problem as a dynamic programming problem and analyze its solution
5. Recognize the significance of integer and/or binary solutions and apply a suitable algorithm for better decision making

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(R20A7205) SOCIAL NETWORK ANALYTICS
PROFESSIONAL ELECTIVE - V

Course Objectives:

UNIT – I
SOCIAL NETWORK ANALYSIS
Network analysis- Development of Social network analysis- Key concepts and measures in network analysis -The global structure of networks - The macro-structure of social networks - Personal networks.

UNIT – II
WEB SEMANTICS IN SOCIAL NETWORK APPLICATIONS
Electronic sources for network analysis - Electronic discussion networks - Blogs and online communities - Web-based networks - Knowledge Representation on the Semantic Web - Ontologies and their role in the Semantic Web Ontology languages for the Semantic Web - The Resource Description Framework (RDF) and RDF Schema - The Web Ontology Language (OWL) - Comparison to the Unified Modelling Language (UML) - Comparison to the Entity/Relationship (E/R) model and the relational model -Comparison to the Extensible Markup Language (XML) and XML Schema.

UNIT – III
MODELLING AND AGGREGATING SOCIAL NETWORK DATA
State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Representing identity - On the notion of equality - Determining equality - Reasoning with instance equality- Evaluating smushing

UNIT – IV
DEVELOPING SOCIAL-SEMANTIC APPLICATIONS
Building Semantic Web applications with social network features - The generic architecture of Semantic Web applications -Sesame – Elmo – GraphUtil - The features of Flink - System design – open academia: distributed, semantic-based publication management - The features of open academia - System design**.**

UNIT – V
EVALUATION OF SOCIAL NETWORK ANALYSIS
Evaluation of web-based social network extraction - Data collection - Preparing the data - Optimizing goodness of fit - Comparison across methods and networks - Predicting the goodness of fit - Evaluation through analysis - Semantic-based Social Network Analysis in the sciences - Data acquisition - Representation, storage and reasoning- Visualization and Analysis – Results - Descriptive analysis - Structural and cognitive effects on scientific performance .

TEXT BOOKS
1. Peter Mika , Social Networks and the Semantics Web",Springer, 2007

REFERENCE BOOKS
1. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

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

1. Understand a social network analysis
2. Understand the Web data and semantics in social network applications
3. Model and aggregate the social network data
4. Develop social–semantic applications
5. Evaluate the social network extraction with case studies

(R20A7307) RECOMMENDER SYSTEMS
PROFESSIONAL ELECTIVE - V

COURSE OBJECTIVES:

This course will enable students to:
*   Describe the purpose of recommendation systems.
*   Understand the different Recommendation Techniques
*   Understand the Applications ofRecommendation System
*   Understand theKnowledge-based recommendation system
*   Develop a deeper technical understanding of common techniques used in Recommendation System

UNIT-I
Introduction-Recommender Systems Function, Data and Knowledge Sources, Recommendation Techniques, Application and Evaluation, **Collaborative Recommendation**-User-based nearest neighbor recommendation, Better similarity and weighting metrics, Neighborhood selection, Item-based nearest neighbor recommendation, About rating.

UNIT-II
Content-based recommendation- Content representation and content similarity, Similarity-based retrieval, Other text classification methods, **Knowledge-based recommendation-** Knowledge representation and reasoning, Interacting with constraint-based recommenders, Interacting with case-based recommenders, Example applications

UNIT-III
Hybrid recommendation approaches- Opportunities for hybridization, Monolithic hybridization design, Parallelized hybridization design, Pipelined hybridization design, Discussion and summary.

UNIT-IV
Applications
Data Mining Methods for Recommender Systems- Introduction, Data Preprocessing, Classification, Cluster Analysis,**Evaluating Recommendation Systems** – Introduction, Experimental Settings, Recommendation System Properties

UNIT-V
Matching Recommendation Technologies and Domains- Introduction, Related Work, Knowledge Sources, Domain, Knowledge Sources, Mapping Domains to Technologies, Recommender Systems in Technology Enhanced Learning .

TEXTBOOKS:
1. Recommender Systems: An Introduction BY Dietmar Jannach (Author), Markus Zanker (Author), Alexander Felferni
2. Recommender Systems Handbook BY Francesco Ricci · Lior Rokach · Bracha Shapira · Paul B. Kantor

REFERENCES :
*   Recommender Systems HandbooK by**Charu_C._Aggarwal**

COURSE OUTCOMES:

- An ability to understand basic concepts of recommendation systems.
- An ability to understand different types of Recommendation Techniques
- An ability to understand the Applications ofRecommendation System
- An ability to understand theKnowledge-based recommendation system
- An ability to understand the common techniques used in Recommendation System

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(R20A1210) VIRTUAL & AUGUMENTED REALITY
PROFESSIONAL ELECTIVE - VI

COURSE OBJECTIVES:

1. To understand the concepts of Virtual Reality and its applications.
2. To perceive the concepts in Augmented Reality and Virtual Reality (AR &VR).
3. To imbibe the basic concept and framework of virtual reality.
4. To gain an understanding in the fundamental issues of virtual reality.
5. To study about Virtual Hardware and Software.

Unit 1
Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality.
Primary Features and Present Development on Virtual Reality. Multiple Models of Input and
Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement
Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory / Haptic
Devices

Unit 2
Visual Computation in Virtual Reality: Fundamentals of Computer Graphics. Software and
Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management
of Large Scale Environments & Real TimeRendering. Interactive Techniques in Virtual
Reality: Body Track, Hand Gesture, 3D Manus, Object
Grasp.

Unit 3
Development Tools and Frameworks in Virtual Reality: Frameworks of Software
Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc.
Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR
Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by
VR.

Unit 4
Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality,
difference between AR and VR, Challenges with AR, AR systems and functionality.

Unit 5
Augmented reality methods, visualization techniques for augmented reality, wireless
displays in educational augmented reality applications, mobile projection interfaces,

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marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

TEXTBOOKS:
1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press,2003/2006.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications,Morgan Kaufmann,2013.

REFERENCEBOOKS:
1. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications,Foundations of Effective Design, Morgan Kaufmann, 2009.

COURSE OUTCOMES:
The students will be able:
□ To create geometric modeling and Virtualenvironment.
□ To realize the virtual reality experience.
□ To develop Virtual Realityapplications.
□ To differentiate Augmented Reality and Virtual Reality (AR &VR).
□ To comprehend the Augmented reality methods.

(R20A0529) MICROSERVICES
PROFESSIONAL ELECTIVE - VI

OBJECTIVES

The objective of this course is to
  ➢ provide a detailed understanding Microservices Architecture based solutions
  ➢ Microservices principles to specific business Requirements

Unit 1 – Motivation to Microservices, Monolithic Application, Components in Monolith Application , Advantages and Disadvantages of Monolithic Architecture, Scaling your Application, Domain-Driven Design, Everyone vision is Cloud Native : Evolutionary design – Concept of minimum viable product (MVP)

Key Benefits of Microservices , Service-Oriented Architecture , Microservice different than Service-Oriented Architecture, Microservice Architecture, Characteristics of Microservices Architecture, Dealing with Complexity, Complexity of Microservices, Microservice Security, Authentication and Authorization, Service-to-Service Authentication and Authorization

Unit 2 - API Management and Gateways : API Management, Microservices, SOA, and APIs combined : Deep Integration , Service Exposure , REST API, The Future of Microservices,
Microservices Governance, Centralized Versus Decentralized Governance, decentralization of Data Stores.

Unit 3 - : Getting Started with NodeJS , Sample Project using Node Express command prompt, Nodeclipse plugin, Basic Routing, File System, Global Objects,
View Templates, Serving Static Content, Handling HTTP and HTTPS, Connecting to Database, Connectivity, MongoDB Installation & Setup, NodeJS Mongo Driver, Performing CRUD Operations, Connection Pooling, Connection Pooling using NodeJS Mongo driver

Unit 4 - Containers and Docker: Docker: A shipping container for code, Benefits of using containers, Virtual machines versus containers, Dev versus Ops, Docker Mission, Docker Adoption, Docker Basic Concepts, Docker Architecture, Docker Typical Workflow,Docker Shared and Layered File Systems Technology,ContainerEcosystem, Container Orchestration

Unit 5 – Kubernetes, Kubernetes Strengths , Kubernetes Architecture, Master Node Components, Worker Node Components, Kubernetes Building Blocks, Deploying Applications on Kubernetes, Helm, Application Center Components, Pod Health Checking,
Health Check Examples, Kubectl Commands, Kubectl Commands – Examples, Cloud Application Component Architecture, Benefits of using Kubernetes with IBM Containers

TEXT BOOKS:
1.Building Microservices By Sam Newman O'Reilly Publications
2.Microservice From Theory To Practice Red Books
3.The Docker And Container Ecosystem By Alex Williams

4.kubernetes Microservices With Docker By Deepak Vohra

Learning Outcomes

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

➢ Identify the characteristics of popular microservices, and understand the design differences.

➢ Decompose a monolithic application on a single server into a containerized application on multiple cloud instances

➢ You will be able to recognize the various elements of the Docker architecture.

  ➢ Perform basic kubectl commands

(R20A7206) ARTIFICIAL NEURAL NETWORK
PROFESSIONAL ELECTIVE - VI

Course objectives:
1. To understand the architecture, learning algorithm and issues of various neural networks.
2. Analyze ANN learning, Error correction learning, Memory-based learning, Competitive learning and Boltzmann learning
3. To adopt gradient - descent techniques in real time applications
4. Provide knowledge on Generalization and function approximation and various architectures of building an ANN
5. Implement and learn the applications of Self-organization Map

Unit I:
An Introduction to Neural Networks: Introduction, The Basic Architecture of Neural Networks, Training a Neural Network with Back propagation, Practical Issues in Neural Network Training, Common Neural Architectures.

Unit II:
Shallow Neural Networks: Neural Architectures for Binary Classification Models, Neural Architectures for Multiclass Models, Autoencoder: Basic Principles, Neural embedding with continuous bag of words, Simple neural architectures for graph embeddings.

Unit III:
Deep Neural Networks: Introduction, Backpropagation, Setup and Initialization Issues, Gradient-Descent strategies, the bias-variance trade-off, Generalization Issues in Model Tuning and Evaluation, Ensemble Methods

Unit IV:
Attractor Neural Networks: Associative Learning, Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.

Unit V:
Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps, Application of SOM.

Text Books(s) :
1. Neural Networks and Deep Learning - Charu C. Aggarwal, Springer International Publishing AG, part of Springer Nature 2018 (Chapters 1, 2, 3)
2. Neural Networks A Classroom Approach– Satish Kumar, McGraw Hill Education (India) Pvt. Ltd, Second Edition. (Chapters 4, 5)

Reference Book(s) :
1. Neural Networks: A Comprehensive Foundation - Simon Haykin PHI, 2nd Edition 2005.
2. Introduction to Artificial Neural Systems-J.M. Zurada, Jaico Publications 1994.

3. Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

Course Outcomes:

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

1. Understand the origin, ideological basics, Learning process and various Neural Architectures of ANN. 2. Understand the concepts and techniques of Shallow neural networks through the study of important neural network models.
3. Training Deep Neural Networks and Teaching Deep Learners to Generalize.
4. Apply Attractor neural networks to particular application.
5. Design a self-organizing system that are capable of extracting useful information from the environment within which they operate.

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| (R20A6607) AGILE METHODOLOGIES |
| PROFESSIONAL ELECTIVE - VI |

Course Objectives:

 i. To introduce characteristics of an agile development process.
ii. To understand agile software development process models and plan driven process models.
iii. To understand software project characteristics that would be suitable for an agile process.
iv. To impart and Identify software project characteristics that would not be suitable for an agile process.
v. To implement a small scale software project using the Scrum process methodology

Unit 1:
History of Agile Methodologies, Agile and Lean Software Development: Basics and Fundamentals, Extreme Programming, Scrum, Agile and Scrum Principles Agile Manifesto, Twelve Practices of XP
Unit 2:
Agile Estimation & Planning ,Agile Requirements,User Stories, Backlog Management, Agile Architecture
Unit 3:
Tracking Agile Projects, Lean Software Development, Agile Risk management,
Unit 4:
Agile Project Tools, Continuous Integration (CI)
Unit 5:
Agile Testing, Scaling Agile for Large Projects

Text Books:
1) Agile Development with Scrum, Ken Schwaber & Mike Beedle, Prentice Hall, 2001
2) Integrating Agile Development in the Real World, Peter Schuh, Charles River Media, 2005 (on Books 24x7)

References:
1) Agile Software Development – The Cooperative Game (2nd Edition), Alistair Cockburn, 2007
2) Succeeding With Agile, Software Development Using Scrum, Mike Cohn, Addison Wesley, 2010
SDLC 3.0 Beyond a Tacit Understanding of Agile, Mark Kennaley, Fourth Medium Press, 2010
Course Outcomes:
Upon completion of the course, the student will be able to:
i. Define the common characteristics of an agile development process.

ii. List and contrast state of the practice agile methodologies.
iii. Contrast agile software development process models and plan driven process models.
iv. Identify software project characteristics that would be suitable for an agile process.
v. Identify software project characteristics that would not be suitable for an agile process.
vi. Plan and implement a small scale software project using the Scrum process methodology.

(R20A6683) DEEP LEARNING LAB

Course Objectives:

1. To learn the principles and practices of supervised learning and deep learning

2. To learn how to use neural networks

3. To learn how to use keras and TensorBoard

4. Will be able to gain knowledge about learning systems TensorFlow which will beintroduced with working examples

5. To learn mathematics and programming for deep learning.

WEEK-1 : Installation of Tensorflow & Keras(Tensorflow (v1.0.0), TFLearn, Keras, and many other pre-installed python libraries (Numpy, pandas)

WEEK-2: Data Manipulation (Numpy library) Operations Broadcasting Indexing and slicing

WEEK-3: Data PreprocessingReading the Dataset Handling Missing Data Conversion to the Tensor Format **WEEK-4:** Linear Algebra Tensors Tensor arithmetic Implementing matrix multiplication

WEEK-5: Looping in Tensorflow

1. Gradient Implementation with chain rule and without chain rule

WEEK-6

Forward pass with matrix multiplication Forward pass with hidden layer (matrix multiplication)Forward pass with matrix multiplication with Keras

Forward pass with hidden layer (matrix multiplication)with Keras

WEEK-7

fcNN with only one neuron and plottingfcNN with one hidden layer and

plottingCase study:MNIST digit classification with and without hidden layers

WEEK-8

A simple CNN

Make a train and validation dataset of images with vertical and horizontal

imagesDefining the CNN to predict the knowledge from image

classification

Visualizing the learned CNN Model

WEEK-9: MNIST digit classification before and after

shufflingTrain CNN on Original Data

Train CNN on shuffled data

WEEK-10: Cifar10 classification with and without

normalizationCNN as classification model for the

Cifar10 dataset

CNN as classification model for the Cifar10 dataset

WEEK-11 : Using a pretrained Imagenet network to predict images into one of the 1000Imagenet classes

WEEK-12

Implementation of Simple RNN,GRU RNN,LSTM

RNNImplementation of Deep RNN

WEEK-13

Case study of RNN shapes in image

Captioning Case study of RNN

shapes in Text Translation **COURSE**

OUTCOMES:

- Students will be exposed to various Technologies using Tensorflow & Keras
- Students will be exposed to Data wrangling and processing
- Implementing various Neural Network architectures such as CNN, RNN.
- Student will able to implement digit classification and recognition.
- Student will able to implement Image & Video Processing and Text Translation

(R20A6684) NATURAL LANGUAGE PROCESSING LAB

Course Objectives:

1. Be able to discuss the current and likely future performance of several NLP applications;
2. Be able to describe briefly a fundamental technique for processing language for severalsubtasks, such as morphological processing.
3. Implement parsing, word sense disambiguation and etc.;
4. understand how these techniques draw on and relate to other areas of computer science;
5. Understand the basic principles of designing and running an NLP experiment.

LIST OF EXPERIMENTS:

WEEK 1
Implement latent semantic indexing. Work on British National Corpus. Link: http://www.natcorp.ox.ac.uk/ Construct the term document incidence matrix for this corpus. Now do the SVD using some inbuilt function/code/library. There is facility available in mat lab. You can do the assignment in any language. Java also has some package for the same.

WEEK-2
Use the Stanford named Entity recognizer to extract entities from the documents. Use it programmatically and output for each document which named entities it contains and of which type. You may first try the command line or demo version.

WEEK-3
Choose any corpus available on the internet freely. For the corpus, for each document, count how many times each stop word occurs and find out which are the most frequently occurring stop words. Further, calculate the term frequency and inverse document frequency as (Log of no of documents / no of documents having the term). The motivation behind this is basically to find out how important a document is to a given query. For e.g.: If the query is say: "The brown crow". "The" is less important. "Brown" and "crow" are relatively more important. Since "the" is a more common word, its tf will be high. Hence we multiply it by idf, by knowing how common it is to reduce its weight.

WEEK-4
Use lucene for indexing the documents in a corpus. Choose any corpus available on the internet freely. Please get your corpus approved from me before working on it. Fire a query and get the output as to whether the term is present in the document or not present in the document i.e. in other words documents containing the term as output.

WEEK 5
Read what is N-gram retrieval. Generate character 5 grams from the tokens extracted out of a corpus. Choose any corpus available on the internet freely. Generate a log-log plot of frequency vs rank order. Do the 5-grams follow Zipf's law? If so, what is the approximate value of alpha?

WEEK 6

Suppose that we are designing a program to simulate the search in a dictionary. Words appear with different frequencies, however and it may be the case that a frequently used word which is in the stop list like "the" appear far from the root if they are sorted lexicographically while a rarely used word such as consciousness appears near the root. We want that the words that occur frequently in the text to be placed nearer to the root. Moreover, there may be words in the dictionary for which there is no definition. Organize an optimal binary search tree that simulates the storage and search of words in a dictionary.

WEEK 7

Study and use the Stanford Part of speech tagger on a suitable corpus available freely. The corpus should be of decent size and get it approved before proceeding with experiments.

WEEK 8

Solve the following text classification problem: Given a sentence identify whether the preposition used in it has a spatial sense or not. Use appropriate features.

WEEK 9

You are given sets of questions in pairs. You have to identify whether the two questions are semantically same or not using supervised learning. Contact me for the dataset for this problem.

WEEK 10

Choose any corpus available on the internet freely. Not necessary to create an inverted index. Just generate the vocabulary. Download and run Porter Stemmer. Execute the stemmer over terms in the vocabulary to create sets of equivalent terms, all of which stem to the same root form. Which set is largest? Identify a few sets that are inappropriately conflated by the stemmer.

COURSE OUTCOMES

1.   Student will be able to implement LSI,NER

2.   Student will be able to implement TD-IDF method and Ngram models

3.   Develop a Part of speech tagger.

4.   Student can able classify the text based on part of speech tagger

5.   Student can able to implement several NLP applications

B.Tech IV Year II Sem -AI&DS   **L/T/P/C**
                                                                                              3/1/0/4

(R20A0337) INNOVATION, STARTUPS AND ENTERPRENEURSHIP

COURSE OBJECTIVES:

1. To understand the concept of innovation, new product development

2. To know the startup opportunities and startup equation

3. To understand new venture creation opportunities, its resources, and Requirements

4. To understand the Entrepreneurial Mindset and new trends in entrepreneurship

5. To understand the strategic perspectives in entrepreneurship

UNIT-I

Innovation Management: Concept of Innovation- Levels of Innovation- Incremental Vs Radical Innovation-Inbound and Outbound Ideation- Open and Other Innovative Ideation Methods-Theories of outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

UNIT-II

Startup opportunities: The New Industrial Revolution – The Big Idea- Generate Ideas with Brainstorming Business Startup - Ideation- Venture Choices - The Rise of The startup Economy -The Six Forces of Change- The Startup Equation

UNIT-III

Startup Capital Requirements and Legal Environment: Identifying Startup capital Resource Requirements - estimating Startup cash requirements - Develop financial assumptions- Constructing a Process Map - Positioning the venture in the value chain - Launch strategy to reduce risks- Startup financing metrics – Business plan-The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures.

UNIT-IV

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship-The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs -Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

UNIT-V

Strategic perspectives in entrepreneurship - Strategic planning - Strategic actions strategic positioning- Business stabilization - Building the adaptive firms - Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures. Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship.

TEXT BOOKS:

REFERENCE BOOKS

1. Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning, 2016 Anjan Raichaudhuri, Managing New Ventures Concepts and Cases, Prentice Hall International, 2010.

2. Innovation Management, C.S.G. Krishnamacharyulu, R. Lalitha, Himalaya Publishing House, 2010.

3. S. R. Bhowmik & M. Bhowmik, Entrepreneurship, New Age International, 2007.

4. Stuart Read, Effectual Entrepreneurship, Routledge, 2013

5. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012.

6. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013

COURSE OUTCOMES:

Students will be able to understand the concept of innovation and new product development;
startup opportunities and startup equation; new venture creation opportunities, its resources, and Requirements; the Entrepreneurial Mindset and new trends in entrepreneurship; strategic perspectives in entrepreneurship.