



BACHELOR OF TECHNOLOGY
DATA SCIENCE(CSE)
COURSE STRUCTURE & SYLLABUS (R20)
(Batches admitted from the academic year 2020-2021)

**Department of
Computer Science & Engineering
(Emerging Technologies)**



**MALLA REDDY COLLEGE
OF ENGINEERING & TECHNOLOGY**
(AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA)

Affiliated to JNTUH; Approved by AICTE, NBA-Tier 1 & NAAC with A-GRADE | ISO 9001:2015

EAMCET/ECET/PGET/ICET CODE: MLRD



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)



BACHELOR OF TECHNOLOGY

CSE (DATA SCIENCE)

COURSE STRUCTURE & SYLLABUS (R20)

(Batches admitted from the academic year 2020 - 2021)

Department of
COMPUTER SCIENCE & ENGINEERING
(EMERGING TECHNOLOGIES)

M R C E T CAMPUS

(Autonomous Institution – UGC, Govt. of India)

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – ‘A’ Grade - ISO 9001:2015 Certified)

Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.

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Note: The regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- Autonomous Institution /College|- means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- Academic Autonomy -||means freedom to the College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- Commission - means University Grants Commission.
- AICTE - means All India Council for Technical Education.
- University - The Jawaharlal Nehru Technological University, Hyderabad.
- College – means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.
- Program - means:
 - Bachelor of Technology (B.Tech) degree program
 - UG Degree Program: B.Tech
- Branch means specialization in a program like B.Tech degree program in Computer Science and Engineering, B.Tech degree program in Electronics & Communication Engineering etc.
- Course or Subject means a theory or practical subject, identified by its course–number and course-title, which is normally studied in a semester.
- T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

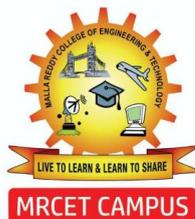
Malla Reddy College of Engineering & Technology (MRCET CAMPUS) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

“A thought beyond the horizons of success committed for educational excellence”

PRINCIPAL



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

Vision of the Department

“To be at the forefront of Emerging Technologies and to evolve as a Centre of Excellence in Research, Learning and Consultancy to foster the students into globally competent professionals useful to the Society.”

Mission of the Department

The department of CSE (Emerging Technologies) is committed to:

- To offer highest Professional and Academic Standards in terms of Personal growth and satisfaction.
- Make the society as the hub of emerging technologies and thereby capture opportunities in new age technologies.
- To create a benchmark in the areas of Research, Education and Public Outreach.
- To provide students a platform where independent learning and scientific study are encouraged with emphasis on latest engineering techniques.

QUALITY POLICY

- To pursue continual improvement of teaching learning process of Undergraduate and Post Graduate programs in Engineering & Management vigorously.
- To provide state of art infrastructure and expertise to impart the quality education and research environment to students for a complete learning experiences.
- Developing students with a disciplined and integrated personality
- To offer quality relevant and cost effective programmes to produce engineers as per requirements of the industry need.

For more information: www.mrcet.ac.in

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
SYLLABUS (R20)**

(Batches admitted from the academic year 2020 - 2021)

COURSE STRUCTURE

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

COURSE STRUCTURE & SYLLABUS (R20)

(Batches admitted from the academic year 2020 - 2021)

B.Tech – I Year – I & II Semesters

**M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA
COURSE STRUCTURE BTECH- CSE (DATA SCIENCE)****I B. Tech CSE (DS) – I Semester (I Year I Semester)**

S.N O	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	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

I B. Tech CSE(DS) – II Semester (I Year II Semester)

S.N O	SUBJECT CODE	SUBJECT	L	T	P	C	MAX MARKS	
							INT	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

II B. Tech CSE(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	R20A0504	Operating Systems	3	0	0	3	30	70
3	R20A0506	Computer Organization	3	0	0	3	30	70
4	R20A6701	Introduction to Data Science	3	0	0	3	30	70
5	R20A0024	Probability and 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	R20A0584	Operating Systems Lab	-	0	3	1.5	30	70
9	R20A0004	Foreign Language: French	2	-	-	0	100	-
TOTAL			20	-	6	21	340	560

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

II B. Tech CSE (DS) – IV Semester (II Year II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0505	Design and Analysis of Algorithms	3	0	0	3	30	70
2	R20A0508	Object Oriented Programming through Java	3	0	0	3	30	70
3	R20A0509	Database Management Systems	3	0	0	3	30	70
4	R20A6702	Data Handling and Visualization	2	0	2	3	30	70
5	R20A0026	Discrete Mathematics	3	0	0	3	30	70
6		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 Systems Lab	-	0	3	1.5	30	70
9	R20A0008*	Global Education & Professional Career	2	-	-	0	100	-
TOTAL			20	-	6	21	340	560

B.Tech –CSE (DATA SCIENCE) R-20 Regulation

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

III B. Tech CSE (DS) – V Semester (III Year I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0510	Computer Networks	3	0	0	3	30	70
2	R20A0513	Artificial Intelligence	3	0	0	3	30	70
3	R20A0028	Statistical Foundations of Data Science	3	0	0	3	30	70
4	R20A1202 R20A0511 R20A0562	Professional Elective-I 1. Automata and Compiler Design 2. Software Engineering 3. Computer Graphics	3	0	0	3	30	70
5	R20A6204 R20A1206 R20A0515	Professional Elective-II 1. Database Security 2. Data Warehousing and Data Mining 3. Scripting Languages	3	0	0	3	30	70
6		Open Elective-II	3	0	0	3	30	70
7	R20A6781	Statistical Foundations of Data Science Lab	0	0	3	1.5	30	70
8	R20A0588	Artificial Intelligence Lab	0	0	3	1.5	30	70
9	R20A6791	Application Development -I	0	0		2	30	70
10	R20A0006*	Technical Communication & Soft Skills	2	-	-	0	100	-
		TOTAL	20	-	6	23	370	630

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

III B. Tech CSE (DS) – VI Semester (III Year II Semester)

S.NO	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A6704	Data Science Tools and Techniques	3	0	0	3	30	70
2	R20A0525	Machine Learning	3	0	0	3	30	70
3	R20A6609 R20A6705 R20A1207	Professional Elective-III 1. Natural Language Processing 2. Web Analytics and Development 3. Mobile Application Development	3	-	0	3	30	70
4	R20A6202 R20A0522 R20A6606	Professional Elective-IV 1. Cyber Security 2. Software Testing Methodologies 3. Human Computer Interaction	3	0	0	3	30	70
5		Open Elective-III	3	0	0	3	30	70
6	R20A6782	Data Science Tools and Techniques Lab	0	0	3	1.5	30	70
7	R20A0590	Machine Learning Lab	0	0	3	1.5	30	70
8	R20A6792	Application Development -II	0	0		2	30	70
9	R20A0007*	Constitution of India	2	-	-	0	100	-
		TOTAL	20	-	6	20	340	560

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

IV B. Tech CSE (DS) – VII Semester (IV Year I Semester)

S.NO	Subject Code	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0519	Big Data Analytics	3	0	0	3	30	70
2	R20A0521	Blockchain Technology	3	0	0	3	30	70
3	R20A6610	Deep Learning	3	0	0	3	30	70
4	R20A6210 R20A7305 R20A0517	Professional Elective-V 1. Digital Forensics 2. Computer Vision 3. Distributed Systems	3	0	0	3	30	70
5	R20A0520 R20A6213 R20A7201	Professional Elective-VI 1. Cloud Computing 2. Ethical Hacking 3. Text Analytics	3	0	0	3	30	70
6	R20A6793	Mini Project	-	-		3	30	70
7	R20A0591	Blockchain Technology Lab	-	-	3	1.5	30	70
8	R20A0592	Big Data Analytics Lab	-	-	3	1.5	30	70
		TOTAL	15	-	6	21	240	560

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

IV B. Tech CSE (DS) – VIII Semester (IV Year II Semester)

S.N O	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0337	Innovation, Start-up, & Entrepreneurship	3	1	-	4	30	70
2	R20A6794	Major Project	-	-	20	10	30	70
		TOTAL	3	1	20	14	60	140

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

LIST OF ELECTIVES:

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

OPEN ELECTIVE II		
S.NO	SUBJECT CODE	SUBJECT
1	R20A1252	MANAGEMENT INFORMATION SYSTEMS
2	R20A0552	JAVA PROGRAMMING
3	R20A1253	SOFTWARE PROJECT MANAGEMENT
4	R20A0452	IOT & 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

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
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(Batches admitted from the academic year 2020 - 2021)

SYLLABUS

M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA

I Year B.Tech. CSE(DS)- I Sem

L/T/P/C

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(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 through theoretical 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 the overall 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 features
- Understanding discourse
- 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.

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 Heasley. 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

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 written communication
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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I Year B.Tech. CSE(DS)- I Sem

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(R20A0021) MATHEMATICS –I

COURSE OBJECTIVES:

1. The concept of a Rank of the matrix and applying the concept to know the consistency and solving the system of linear equations.
2. The concept of Eigen values, Eigen vectors and Diagonalisation.
3. The maxima and minima of functions of several variables.
4. The Applications of first order ordinary differential equations and methods to solve higher order 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), Diagonalisation 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 $f(x) = e^{ax}$, $\sin ax$, $\cos ax$, 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 ,John Wiley & Sons .

REFERENCE BOOKS

- 1.Advanced Engineering Mathematics by R.K Jain & S R K Iyenger, 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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I Year B.Tech. CSE(DS)- I Sem

L/T/P/C

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(R20A0201) BASIC ELECTRICAL ENGINEERING
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COURSE OBJECTIVES:

1. To understand the basic concepts of electrical circuits & networks and their analysis which is the 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, Maximum Power 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.Bimbira, 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.

(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, Epicycloid 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
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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 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. 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

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(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 Lab for 60 students with 60 systems, one master console, LAN facility and 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

7. Magnetization characteristics of DC shunt generator.
8. Swinburne's test on DC shunt machine.
9. Brake test on DC shunt motor.
10. OC &SC tests on single phase transformer.
11. 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) ($SI = P \cdot T \cdot R / 100$)

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.

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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 complementarity 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. Interconnectedness 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 Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA

2. E. F. Schumacher, 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. Al 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 Vocabulary

Writing - 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 Gist

Speaking - 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 Heasley. 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 of information
2. Understand the impact of professional engineering solutions in societal contexts and demonstrate 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 1/3rd and Simpson's 3/8th 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 optic communication 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 electronic devices.
- 4 Evaluate concentration & estimation of charge carriers in semiconductors and working principles of PN diode.
- 5 Examine dielectric, magnetic properties of the materials and apply them in material technology.

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2/-/3/3

(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 signal model of JFET. FET as Voltage Variable Resistor, Comparison of BJT and FET. MOSFET- Construction, Principle of Operation and symbol, MOSFET characteristics in Enhancement and Depletion modes.

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.S Publications
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”, dream tech
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 of 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.

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 items
- 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 Operating System.

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 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 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 Mail Merge 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 for academics.

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 lamp wiring
3. Stair case wiring
4. Soldering and Desoldering practice – components, devices and circuits using general purpose PCB.

Course Outcomes:

1. Students will able to understand domestic wiring procedures practically.
2. Students will able to do Fluorescent lamp wiring.
3. Students will able to do staircase wiring.
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

CAD -2D, CAD - Isometric

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(R20A0064) FINANCIAL INSTITUTIONS, MARKETS AND SERVICES

COURSE OBJECTIVES:

1. To expose students towards a clear understanding of Financial Markets in India, their operations and relevant development.
2. To lay foundation and equip them with the knowledge of Financial Services, related institutions and their functions.
3. To provide awareness of operations of Financial Markets, Regulators and Shareholders
4. To Provide knowledge in Innovations and technologies of Financial Instruments and Financial Services.
5. To allow them to understand Banking and Non-Banking Institutions operations and their services.

UNIT-I: INTRODUCTION

Financial System and Economic Development - Indicators of Financial Development - Concepts related to Financial Markets, Institutions and Services Regulatory and Promotional Institutions: Functions and Roles of RBI, IRDA, SEBI.

UNIT II: COMMERCIAL BANKS

Functions of Commercial Banks. Performance and Competition of Public and Private Sector banks- NPA's Non-Banking Financial Institutions- Structure and Functions LIC - GIC & Mutual Funds.

UNIT-III: FINANCIAL AND SECURITIES MARKETS

Structure and Functions of Call Money Market. Government Securities Market: T-bills Market - Commercial Bills Market. Securities Market: Organization and Structure - Listing - Trading and Settlement.

UNIT-IV: ASSET/FUND BASED FINANCIAL SERVICES

Lease Finance - Hire Purchase Finance- Bills Discounting - Housing Finance - Venture Capital Financing. Fee-based Advisory Services: Stock Broking - Credit Rating Agencies.

UNIT-V: INVESTMENT BANKING

Introduction, Functions and activities, under writing, bankers to an issue, debenture trustees, portfolio managers.

REFERENCE BOOKS:

1. L. M. Bhole, Financial Institutions and Markets, TMH.
2. M. Y. Khan, Financial Services, TMH.
3. Vasant Desai: Financial Markets and Financial Services, Himalaya.
4. Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services, Pearson.
5. Gomez, Financial Markets, Institutions and Financial Services, PHI.

COURSE OUTCOMES

1. The students will get enormous knowledge on Financial Institutions, Securities Markets, and Financial Services.
2. It allows clear understandings of Banking and Non-Banking Financial Institutions operations.
3. Adequate knowledge to indulge in Investments of financial products and services.
4. Comprehend various policy reforms that impact Financial Markets and Investments.
5. Availability of various fund based and Fee based financial services to get more exposure.

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

COURSE STRUCTURE & SYLLABUS (R20)

(Batches admitted from the academic year 2020 - 2021)

B.Tech

II Year – I - Semester

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(R20A0503) DATA STRUCTURES USING PYTHON
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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 is performed in Python.
4. Understanding how linear and non-linear data structures works.
5. To learn the fundamentals of writing Python scripts.

UNIT – I

Oops Concepts - class, object, constructors, types of variables, types of methods.
Inheritance: single, multiple, multi-level, hierarchical, hybrid, **Polymorphism:** with functions and objects, with class methods, with inheritance, **Abstraction:** abstract classes.

UNIT – II

Data Structures – Definition, Linear Data Structures, Non-Linear Data Structures, Python Specific Data Structures, List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing.

UNIT – III

Arrays - Overview, Types of Arrays, Operations on Arrays, Arrays vs List.

Searching - Linear Search and Binary Search.

Sorting - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

UNIT - IV

Linked Lists – Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists.

Stacks - Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack

Queues: Overview of Queue, Implementation of Queue(List & Linked list), Applications of Queues, Priority Queues.

UNIT -V

Graphs - Introduction, Directed vs Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search.

Trees - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation.

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 code using 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 and David 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 apply Python flow control and functions.
2. Create, run and manipulate Python Programs using core data structures like Lists,
3. Apply 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 and classes

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(R20A0504) OPERATING SYSTEMS

COURSE OBJECTIVES:

This course will enable the students :

1. To understand the fundamental concepts and techniques of Operating Systems.
2. To study the concepts of LINUX OS and process scheduling.
3. To understand the concepts in deadlocks and process management.
4. To understand the techniques in memory managements and IPC mechanism.
5. To study file system concepts and sockets.

UNIT - I

Operating System-Introduction, Structures-Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services.

Introduction to Linux operating system, Linux file system, Linux Utilities

UNIT - II

Linux: Introduction to shell, Types of Shell's, example shell programs.

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

UNIT - III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

UNIT - IV

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory implementation in Linux. Corresponding system calls.

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, kernel support for files, system calls for file I/O operations open, create, read, write, close, l seek, stat, ioctl

Disk Management: Disk Scheduling Algorithms-FCFS, SSTF, SCAN, C-SCAN

TEXT BOOKS:

1. Beginning Linux Programming –Neil Mathew, Richard Stones 4th Edition,Wiley
2. Operating System Principles- Abraham Silberschatz, Peter B. Galvin,Gagne 7th Edition, John Wiley
3. Unix System Programming using C++, T. Chan, PHI.
4. Unix Concepts and Applications, 4th Edition, SumitabhaDas,TMH,2006.
5. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:

At the end of the course students should have:

1. Ability to apply concepts of operating system.
2. Ability to write shell programs and simulate process scheduling algorithms.
3. Skills to analyze memory management and deadlocks situations.
4. An ability to develop programs using system calls and utilities.
5. Capability to compare various file systems.

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II Year B.Tech CSE(DS) I-Sem

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(R20A0506) COMPUTER ORGANIZATION

COURSE OBJECTIVES:

To expose the students to the following:

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism

UNIT I

Basic Functional units of Computers: functional units, basic Operational concepts, Bus structures. Software, Performance, Multiprocessors, Multicomputer. Data Representation:

Signed number representation, fixed and floating point Representations.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms. Error detection and correction codes

UNIT II

Register Transfer Language and Micro Operations: RTL- Registers, Register transfers, Bus and memory transfers. Micro operations: Arithmetic, Logic, and Shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Computer Registers, Computer instructions, Instruction cycle. Instruction codes, Timing and Control, Types of Instructions: Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

UNIT III

Central Processing Unit organization: General Register Organization, Stack organization, Instruction formats, Addressing modes, Data Transfer and Manipulation, Program Control, CISC and RISC processors

Control unit design: Design approaches, Control memory, Address sequencing, micro program example, design of CU. Micro Programmed Control.

UNIT IV

Memory Organization: Semiconductor memory technologies, hierarchy, Interleaving, Main Memory-RAM and ROM chips, Address map, Associative memory-Hardware organization.

Match logic. Cache memory-size vs. block size, Mapping functions-Associate, Direct, Set Associative mapping. Replacement algorithms, write policies. Auxiliary memory-Magnetic tapes etc

UNIT V

Input –Output Organization: Peripheral devices, Input-output subsystems, I/O device interface, I/O Processor, I/O transfers–Program controlled, Interrupt driven, and DMA, interrupts and exceptions. I/O device interfaces – SCII, USB

Pipelining and Vector Processing: Basic concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards. Case Study- Introduction to x86 architecture.

TEXT BOOKS:

1. “Computer Organization and Design: The Hardware/Software Interface”, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. “Computer Organization and Embedded Systems”, 6th Edition by Carl Hamacher, Grew Hill Higher Education.

REFERENCE BOOKS:

1. “Computer Architecture and Organization”, 3rd Edition by John P. Hayes, WCB/McGraw- Hill.
2. “Computer Organization and Architecture: Designing for Performance”, 10th Edition by William Stallings, Pearson Education.
- 3 “Computer System Design and Architecture”, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

COURSE OUTCOMES:

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

1. Student will learn the concepts of computer organization for several engineering applications.
2. Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
3. An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles
4. To impart the knowledge on micro programming
5. Concepts of advanced pipelining techniques.

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II Year B.Tech CSE(DS) – I Sem

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(R20A6701) INTRODUCTION TO DATASCIENCE

COURSE OBJECTIVES:

The course will enable the students to:

1. Understand of the data operations
2. Here an overview of simple statistical models and the basics of machine learning techniques of regression.
3. Understand good practices of data science
4. Learn tools such as python, IDE
5. Understand the basics of the Supervised learning

UNIT-1

Introduction, Toolboxes: Python, fundamental libraries for data Scientists. Integrated development environment (IDE). Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and plotting.

UNIT-2

Descriptive statistics, data preparation. Exploratory Data Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score. Statistical Inference frequency approach, hypothesis testing using confidence intervals, using p-values

UNIT-3

Supervised Learning: First step, learning curves, training-validation and test. Learning models generalities, support vector machines, random forest. Examples

UNIT-4

Regression analysis, Regression: linear regression simple linear regression, multiple & Polynomial regression, Sparse model. Unsupervised learning, clustering, similarity and distances, quality measures of clustering, case study.

UNIT-5

Network Analysis, Graphs, Social Networks, centrality, drawing centrality of Graphs, PageRank, Ego-Networks, community Detection

TEXT/REFERENCES BOOK:

1. Introduction to Data Science a Python approach to concepts, Techniques and Applications, Igual, L;Seghi', S. Springer, ISBN:978-3-319-50016-4
- 2.Data Analysis with Python A Modern Approach, David Taieb, Packt Publishing, ISBN- 9781789950069
- 3.Python Data Analysis, Second Ed., Armando Fandango, Packt Publishing, ISBN: 9781787127487

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. Describe what Data Science is and the skill sets needed to be a data scientist
2. Explain the significance of exploratory data analysis (EDA) in data science
3. Construct the supervised learning, SVM
4. Apply basic machine learning algorithms (Linear Regression)
5. Explore the Network Analysis like PageRank

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(R20A0024) PROBABILITY AND STATISTICS

COURSE OBJECTIVES:

This course will enable the students :

1. To identify a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
2. To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.
3. To build the linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.
4. To interpret the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
5. To give comprehensive knowledge of probability theory to make inferences about a population from large and small samples.

UNIT – I: Random Variables

Single Random Variables -Discrete and Continuous, Probability distribution function, Probability mass and density functions, mathematical expectation and variance.

Multiple Random variables: Discrete and Continuous, Joint probability distribution, Marginal probability density functions, conditional probability distribution function and density functions.

UNIT-II: Probability Distributions

Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution, Normal distribution – mean, variance, median, mode and characteristics of Normal distribution.

UNIT -III: Correlation and Regression

Correlation -Coefficient of correlation, Rank correlation, Regression- Regression coefficients, Lines of regression.

Multiple correlation and regression- Coefficient of multiple Correlation, multiple regression, multiple linear regression equations.

UNIT –IV: Sampling and Testing of Hypothesis for Large Samples

Sampling: Definitions - Types of sampling - Expected values of sample mean and variance, Standard error - Sampling distribution of means and variance. Estimation - Point estimation and Interval estimation.

Testing of hypothesis: Null and Alternative hypothesis - Type I and Type II errors, Critical region - confidence interval - Level of significance, One tailed and Two tailed test.

Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, and difference of proportions.

UNIT-V: Testing of Hypothesis for Small Samples

Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (F-test), Chi-square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. Fundamental of Statistics by S.C. Gupta, 7thEdition,2016.
2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35thEdition,2000.

REFERENCES BOOKS:

1. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M.Ross.
2. Probability and Statistics for Engineers by Dr. J. Ravichandran

COURSE OUTCOMES:

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

1. Evaluate randomness in certain realistic situation which can be either discrete or continuous type and compute statistical constants of these random variables.
2. Provide very good insight which is essential for industrial applications by learning probability distributions.
3. Higher up thinking skills to make objective, data-driven decisions by using correlation and regression.
4. Assess the importance of sampling distribution of a given statistic of a random sample.
5. *Analyze and interpret statistical inference* using samples of a given size which is taken from a population.

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(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 organisations.
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 of Demand: 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, Judgemental 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 Organisation (Sole Trader, Partnership, Joint Stock Company, Cooperative Society, and Public Enterprises).

UNIT-IV

Introduction to Capital and Financial Accounting: Need for Capital, Types of Capital, Working Capital 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:

- Managerial Economics & Financial Analysis, Special Edition-MRCET. McGraw Hill Publications, 2017
- D.N. Dwivedi, Managerial Economics, Vikas Publications.
- Justin Paul, Leena, Sebastian, Managerial Economics, Cengage
- P. L. Mehta, Managerial Economics: Analysis, Problems and Cases, Sultan Chand & Sons.
- S. N. Maheswari & S. K. Maheswari, Financial Accounting, Vikas Publications.
- 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 taking business decisions.
2. Empowers students to comprehend with the production process and technical relationship among factors of production, different cost concepts and optimization of cost.
3. Enables students to know the classification of markets and how firms determine their price output 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 financial accounting is done for smooth business functioning.
5. Equips students with different financial analysis tools and techniques to evaluate financial performance of the business.

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(R20A0583) DATA STRUCTURES USING PYTHON LAB

COURSE OBJECTIVES:

This course will enable the students :

1. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
2. To know how linear data structures work
3. To implement non-linear data structures.
4. To simulate searching and sorting techniques.
5. To develop programs for performing operations on Trees and Graphs .

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 value of each type.

WEEK 2: 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 3: Write a python program to implement method overloading and method overriding.

WEEK 4: Write a Python program to illustrate the following comprehensions:

- | | |
|------------------------|------------------------------|
| a) List Comprehensions | b) Dictionary Comprehensions |
| c) Set Comprehensions | d) Generator Comprehensions |

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 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 Quick sort

WEEK 9: Write a program to implement Stacks and Queues

WEEK 10: Write a program to implement Singly Linked List

WEEK 11: Write a program to implement Doubly Linked list

WEEK 12: Write a program to implement Binary Search Tree

COURSE OUTCOMES:

The students should be able to:

1. Examine Python syntax and semantics and apply Python flow control and functions.
2. Create, run and manipulate Python Programs using core data structures like Lists,
3. Apply 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 and classes.

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(R20A0584) OPERATING SYSTEM LAB

COURSE OBJECTIVES:

- 1.To provide an understanding of the design aspects of operating system concepts through simulation DBM.
- 2.Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.
- 3.Students will learn various process and CPU scheduling algorithms through simulation programs.
4. Student will learn about communication using socket programming.
- 5.Student will have exposure to system calls and simulate them.

WEEK 1:

Practice File handling utilities, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

WEEK 2:

- a) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or directory and reports accordingly. Whenever the argument is a file it reports no of lines present in it.
- b) Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

WEEK 3: Simulate the following CPU scheduling algorithms.

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

WEEK 4: Write a C program to simulate producer-consumer problem using Semaphores

WEEK 5: Write a C program to simulate the concept of Dining-philosophers problem.

WEEK 6: Simulate all page replacement algorithms a)FIFO b) LRU c) OPTIMAL

WEEK 7: Simulate Bankers Algorithm for Dead Lock Avoidance.

WEEK 8: Simulate Bankers Algorithm for Dead Lock Prevention.

WEEK 9: Write a C program to simulate disk scheduling algorithms.

- a) FCFS b) SCAN c) C-SCAN

WEEK 10:

Write a C program that takes one or more file/directory names as command line input and reports following information A) File Type B) Number Of Links C) Time of last Access

D) Read, write and execute permissions

WEEK 11:

a) Implement in c language the following Unix commands using system calls

i) cat ii) ls iii) Scanning Directories (Ex: opendir(),readdir(),etc.)

b)Write a C program to create child process and allow parent process to display “parent” and the child to display “child” on the screen

WEEK 12:

a)Write a C program to implement kill(), raise() and sleep()functions.

b)Write a C program to implement alarm(), pause() and abort()functions

c) Write a program that illustrate communication between two process using unnamed pipes

WEEK 13:

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

b)Write a C program that illustrates two processes communicating using Shared memory.

WEEK 14:

a)Write a C program that receives a message from message queue and display them.

b)Write client server programs using c for interaction between server and client process using sockets

COURSE OUTCOMES:

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls.
3. Be able to simulate various system calls.
4. Be able to use various Linux utilities.
5. Be able to use various basic linux commands.

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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, French program is introduced to develop the linguistic and communicative skills of engineering students and to familiarize them to the French communication skills. This course focuses on basic oral skills.

OBJECTIVES

This course will enable the students:

1. To inculcate the basic knowledge of the French language
2. To hone the basic sentence constructions in day to day expressions for communication in their 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 indicative

Vocabulary: 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 - talk about 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 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 Français 1& 2, New Saraswati House, 2015
2. A propos, A1, Langers International, 2010
3. [Easy French Step-by-step](#) by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Coursebook) By Livid Language
5. *À L'Aventure: An Introduction to French Language and Francophone Cultures* by [Evelyne Charvier-Berman](#), [Anne C. Cummings](#).

COURSE OUTCOMES

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

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
SYLLABUS (R20)**

(Batches admitted from the academic year 2020 - 2021)

B.Tech

II Year – II - Semester

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II Year B.Tech. CSE(DS)- II Sem

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(R20A0505) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES:

This course will enable the students :

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

UNIT- I

Introduction: Algorithms, Pseudo code for expressing algorithms, performance analysis- Space complexity, 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.

Greedy method: General method, applications- Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT- III

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, 2nd edition, 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 R
Tomassia John Wiley 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. Neapolitan and K.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.

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(R20A0508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
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COURSE OBJECTIVES:

- The objective of this course is to provide object oriented concepts through which robust, secured and reusable software can be developed.
- To understand object oriented principles like abstraction, encapsulation, inheritance, polymorphism and apply them in solving problems.
- To understand the principles of inheritance and polymorphism and demonstrate how they relate to the design of abstract classes.
- To understand the implementation of packages and interfaces.
- To understand the concepts of exception handling, multithreading and collection classes.
- To understand how to connect to the database using JDBC.
- 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 implementations through 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: Handling Mouse and Key events, Adapter classes.

TEXT BOOK:

1. Java Fundamentals-Comprehensive Introduction, Herbert Schildt and Dale Skrien, 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 and H.M.Deitel, PHI
2. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.
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 programs using a high level language;
2. An appreciation of the principles of object oriented programming;
3. Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
4. Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.

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(R20A0509) DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

This course will enable the students :

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and use data manipulation language to query, update, and manage a database
- 3 To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
- 4 To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
- 5 Familiar with basic database storage structures and access techniques: file and page organizations,

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- Validation- Based 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:

- 1 Demonstrate the basic elements of a relational database management system
- 2 Ability to identify the data models for relevant problems
- 3 Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data
- 4 Familiar with basic database storage structures and access techniques: file and page organizations,
- 5 Apply normalization for the development of application software's

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(R20A6702) DATA HANDLING AND VISUALIZATION

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 like Numpy, pandas and matplotlib.
- To know the functionalities and usages of Seaborn.

UNIT I

Introduction to Statistics : Introduction to Statistics, Difference between inferential statistics and descriptive statistics, Inferential Statistics- Drawing Inferences from Data, Random Variables, Normal Probability Distribution, Sampling, Sample Statistics and Sampling Distributions.

R overview and Installation- Overview and About R, R and R studio Installation, Descriptive Data analysis using R, Description of basic functions used to describe data in R.

UNIT II

Data manipulation with R: Data manipulation packages-dplyr, data.table, reshape2, tidyr, Lubridate, Data visualization with R.

Data visualization in Watson Studio: Adding data to data refinery, Visualization of Data on Watson Studio.

UNIT III

Python: Introduction to Python, How to Install, Introduction to Jupyter Notebook, Python scripting basics, Numpy and Pandas-Creating and Accessing Numpy Arrays, Introduction to pandas, read and write csv, Descriptive statistics using pandas, Working with text data and date time columns, Indexing and selecting data, groupby, Merge / Join datasets

UNIT IV

Data Visualization Tools in Python- Introduction to Matplotlib, Basic plots Using matplotlib, Specialized Visualization Tools using Matplotlib, Advanced Visualization Tools using Matplotlib- 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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(R20A0026) DISCRETE MATHEMATICS

COURSE OBJECTIVES:

1. Describe mathematical concepts as applied in computer science for solving logical problems.
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 to Computer Science , Tata McGraw Hill, India, 1st Edition,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, 2nd Edition,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 Applied Introduction, Pearson Education, India, 5th Edition,2011.
3. D. S. Malik, M. K. Sen, –Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, India, 1st Edition,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-world Scenarios.
2. Understand General properties of Algebraic systems and study lattices as partially ordered sets and 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 simple applications.
5. Understand the concept of various graph

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<p style="text-align: center;">OPEN ELECTIVE - I (R20A1251) WEB DESIGNING TOOLS</p>

COURSE OBJECTIVES:

- 1) To learn the basics of web & html programming
- 2) To introduce CSS and its style
- 3) To introduce Java Scripting & Dynamic Html
- 4) To introduce web server software AJAX & Php
- 5) Ability to create a own web design using of Ajax

Unit I

Web Basics- Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser,HTML-Introduction HTML-Basic Formatting Tags , HTML- Grouping Using Div Span, HTML-Lists, HTML-Images, HTML-Hyperlink, HTML-Table, HTML- Iframe,HTML – Form HTML – Headers, HTML-Miscellaneous using tool Dreamweaver/ Visual studio

Unit II

CSS –Introduction, Syntax, CSS-Selectors, CSS-Color Background Cursor, CSS-Text Fonts, CSS-Lists Tables, CSS -Box Model, CSS-Display Positioning, CSS Floats. Using tool using tool Dreamweaver/ Visual studio, Net Bean

Unit III

Introduction of Java Script, JavaScript characteristics, Objects in Java Script, Dynamic HTML with Java Script. XMLHttpRequest- Introduction, XMLHttpRequest, The XMLHttpRequest Object, Events for the XMLHttpRequest Object, Request Object for XMLHttpRequest, Response Object for XMLHttpRequest. Using tool using tool Visual studio, Net Bean & Eclipse

Unit IV

AJAX Introduction- Introduction, AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, CSS to Define Look and Feel, Understand the XML Mark-up, XMLHttpRequest. AJAX using XML and XML HttpRequest- Introduction, Ajax Using XML and XMLHttpRequest, Accessing, Creating and Modifying XML Nodes, Loading XML Data into an HTML Page, Receiving XML Responses, Handling Response XML. Using tool using tool Visual studio, Net Bean & Eclipse

Unit V

PHP Introduction- PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX with Database- Introduction, AJAX Database, Working of AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query. Using tool using tool Visual studio, Net Bean & Eclipse.

TEXT BOOKS:

1. Web Programming ,Building Internet Applications, CHRIS BATES II Edition, Wiley Dreamtech.
2. Programming world wide web ,SEBESTA,PEARSON.

REFERENCE BOOKS:

1. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson
2. Ajax: The Complete Reference By Thomas Powell
3. PHP: The Complete reference-STEVEN HOLZNER Tata McGraw-Hill.
4. An Introduction to web Design and Programming –Wang-Thomson
5. Web Warrior Guide to Web Programming -Bai/Ekedaw-Thomas
6. Beginning Web Programming-Jon Duckett WROX

COURSE OUTCOMES:

- 1) Ability to learn to web application.
- 2) To develop a own style sheet
- 3) Ability to create a own java scripting web application.
- 4) Ability to create a own web design using of Ajax
- 5) Ability to create a own web design using of Php

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<p style="text-align: center;">OPEN ELECTIVE - I (R20A0551) INTRODUCTION TO DBMS</p>
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COURSE OBJECTIVES

- 1) To understand the basic concepts and the applications of database systems
- 2) To Master the basics of SQL and construct queries using SQL
- 3) To understand the relational database design principles
- 4) To become familiar with the basic issues of transaction processing and concurrency control
- 5) To become familiar with database storage structures and access techniques

UNIT I: INTRODUCTION

Database: Purpose of Database Systems, File Processing System Vs DBMS, History, Characteristic-Three schema Architecture of a database, Functional components of a DBMS. DBMS Languages-Database users and DBA.

UNIT II: DATABASE DESIGN

ER Model: Objects, Attributes and its Type. Entity set and Relationship set-Design Issues of ER model-Constraints. Keys-primary key, Super key, candidate keys. Introduction to relational model-Tabular, Representation of Various ER Schemas. ER Diagram Notations- Goals of ER Diagram- Weak Entity Set- Views.

UNIT III: STRUCTURED QUERY LANGUAGE

SQL: Overview, The Form of Basic SQL Query -UNION, INTERSECT, and EXCEPT- join operations: equi join and non equi join-Nested queries - correlated and uncorrelated-Aggregate Functions- Null values.Views, Triggers.

UNIT IV - DEPENDENCIES AND NORMAL FORMS

Importance of a good schema design,- Problems encountered with bad schema designs, Motivation for normal forms- functional dependencies, -Armstrong's axioms for FD's- Closure of a set of FD's,- Minimal covers-Definitions of 1NF,2NF, 3NF and BCNF- Decompositions and desirable properties -

UNIT V:

Transactions: Transaction concept, transaction state, System log, Commit point, Desirable Properties of a Transaction, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, Testing for serializability, Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan,|| Database System Concepts||, McGraw- Hill, 6th Edition , 2010.
2. Fundamental of Database Systems, by Elmasri, Navathe, Somayajulu, and Gupta, Pearson Education.

REFERENCE BOOKS:

- 1) Raghu Ramakrishnan, Johannes Gehrke, -Database Management System||, McGraw Hill., 3rd Edition 2007.
- 2) Elmasri&Navathe,||Fundamentals of Database System,|| Addison-Wesley Publishing, 5th Edition, 2008.
- 3) Date.C.J, -An Introduction to Database||, Addison-Wesley Pub Co, 8th Edition, 2006.
- 4) Peterrob, Carlos Coronel, -Database Systems – Design, Implementation, and Management||, 9th Edition, Thomson Learning, 2009.

COURSE OUTCOMES:

- 1) Demonstrate the basic elements of a relational database management system
- 2) Ability to identify the data models for relevant problems
- 3) Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data

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OPEN ELECTIVE - I

(R20A0351) INTELLECTUAL PROPERTY RIGHTS

COURSE OBJECTIVES:

- To understand the concepts IPR
- To understand Trademarks, Trade Secretes and GI of goods.
- To understand Copyrights, Patents and Industrial Designs.
- To learn about how to manage IP rights and legal aspects.
- To understand the concepts of Cyber laws in IPR.

UNIT – I:

Introduction: Introduction to Intellectual Property Rights, types of intellectual property, importance of intellectual property rights, Evolution of IP acts and treaties (WIPO & TRIPS), Agencies responsible for IPR registrations, Role and value of IP in international commerce, Issues affecting IP internationally.

UNIT – II

Trade Marks: Purpose and function of trademarks, Acquisition of trade mark rights, transfer of rights, Selecting and evaluating trademark, registration of trademarks, claims.

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriation of trade secrets, trade secret litigation.

Geographical Indications of Goods: Basic aspects and need for the registration

UNIT – III

Copyrights: Fundamentals of copyright law, originality of material, right of reproduction, right to perform the work publicly, copyright ownership issues, notice of copyright.

Patents: Foundation of patent law, patent searching process, Basic Criteria of Patentability

Industrial Designs: Kind of protection provided in Industrial design

UNIT – IV:

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, **Protecting IP Rights:** non disclosure agreement, cease and desist letter, settlement memorandum. **Transferring IP Rights:** Assignment contract, license agreement, deed of assignment

UNIT- V

Introduction to Cyber law: Information Technology Act, cyber crime and e-commerce, data security, confidentiality, privacy, international aspects of computer and online crime.

COURSE OUTCOMES:

- Learner should be able to demonstrate understanding of basic concepts of IPR.
- Able to differentiate between Trademarks, Trade secrets and GI of goods.
- Able to understand Copyrights, Patents and Industrial Designs..
- Able to manage and protect IP
- Will gain Knowledge on Cyber law

TEXT BOOKS:

1. Intellectual property right by Deborah E Bouchoux
2. Cyber law, Text and cases South western special topics collection.
3. Intellectual property rights by N.K Acharya
4. Fundamentals of IPR for engineers, BY komal bansal

REFERENCES:

Intellectual property rights by P. Radhakrishnan.

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OPEN ELECTIVE – I

(R20A0051) ENTERPRISE RESOURCE PLANNING

COURSE OBJECTIVES

- To know the basics of ERP
- To understand the key implementation of ERP
- To know the business modules of ERP
- To evaluate the current and future trends in ERP

UNIT 1

INTRODUCTION: Overview and Benefits of ERP, ERP Related Technologies- Business Process Reengineering (BPR), Online Analytical Processing (OLAP), Supply chain Management (SCM). Applications of ERP.

UNIT II

ERP IMPLEMENTATION: Implementation and Product Lifecycle, Implementation Methodology, Planning Evaluation and selection of ERP systems, Organizing the Project Management and Monitoring. Case Study on Manufacturing.

UNIT III

ERP MODULES: Business modules in an ERP Package- Manufacturing, Human Resources, Plant Maintenance, Materials Management, Data Warehousing, Data Mining, Quality Management, Sales and Distribution. Case Study in Banking Sector.

UNIT IV

POST IMPLEMENTATION: Overview of ERP software solution. Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of ERP Implementation. Case Study of Success Story and Failure of Processing Sector.

UNIT V

EMERGING TRENDS IN ERP: Extended ERP system, ERP add-ons –Customer Relations Management (CRM), Customer satisfaction (CS). Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies. Case Study in Service Sector.

TEXT BOOKS:

Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008

Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000

Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.

REFERENCE BOOKS:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
2. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India, 2nd edition, 2006.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.

COURSE OUTCOMES:

- 1) To know the strategic importance of Enterprise Resource Planning
- 2) To Understand and implement ERP in various Sectors.

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OPEN ELECTIVE – I

(R20A0451) BASICS OF COMPUTER ORGANIZATION

COURSE OBJECTIVES:

- 1) To understand basic components and operations in a system.
- 2) To understand the execution of an instruction in a computer.
- 3) To acquire the knowledge to design of CPU.
- 4) To explore the memory organization.
- 5) To explore I/O organization and parallel processing in depth.

UNIT I

Basic Structure of Computers: Computer Types, Functional Units, Computer Registers, 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: RTL- Register transfers, Bus and Memory Transfers. **Micro operations:** Arithmetic, Logic, Shift micro operations, Arithmetic logic shift unit.

UNIT-II

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms. Error detection and Correction Codes

Basic Computer Organization and Design: Instruction codes, Timing and Control, Computer Instructions: Memory Reference Instructions, Register Transfer Instructions, Input – Output Instructions, Instruction cycle. Interrupt and Interrupt cycle, Complete Computer Description

UNIT III

Central Processing Unit organization: General Register Organization, Stack organization, Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, **CISC** and **RISC** processors.

Control Unit Design: Control Memory, Address sequencing, Design of CU: Micro Programmed Control, Hardware Control, Micro Program example. **Case Study-** Introduction to x86 architecture.

UNIT IV

Memory Organization: Memory Hierarchy, Memory Interleaving, **Main Memory**-RAM and ROM chips, **Associative Memory**-Hardware Organization, Match logic. Mapping functions- Associate, Direct, Set Associative Mapping. **Cache Memory:** Hit Ratio,

Cache Coherence, Cache writes policies. **Auxiliary memory:** Magnetic Disks, Magnetic Tapes Optical devices, Page Replacement Algorithms.

UNIT V

Input –Output Organization: Peripheral Devices, Input-Output Subsystems, I/O Device Interface, I/O Processor, I/O Transfers–Program Controlled, Interrupt Driven, and DMA, Interrupts and Exceptions. I/O Device Interfaces – SCII, USB.

Pipelining and Vector Processing: Basic Concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards. Vector Processing: Applications, an Example for Vector Processing.

TEXT BOOKS:

1. Computer System Architecture|| by M. Morris Mano, 3rd Edition.
2. Computer Organization and Design: The Hardware/Software Interface||, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3. Computer Organization and Embedded Systems||, 6th Edition by CarlHamacher, McGraw Hill Higher Education.

REFERENCE BOOKS:

1. Computer Architecture and Organization||, 3rd Edition by John P. Hayes,WCB/McGraw-Hill
2. Computer Organization and Architecture: Designing for Performance||, 10th Edition by William Stallings, Pearson Education.
3. Computer System Design and Architecture||, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

COURSE OUTCOMES:

- 1) Able to understand functional components and micro operations in a computer.
- 2) Able to understand arithmetic operations and computer instructions.
- 3) Able to understand CPU organization and design of control unit.
- 4) Able to understand the Memory organization.
- 5) Able to understand I/O Transfer and Parallel Processing.
- 6) Able to analyze and apply the computer organization concepts to get the best performance of a computer.

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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 of J2SE
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 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 objectoriented 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.
5. Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications for standalone programs.

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(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

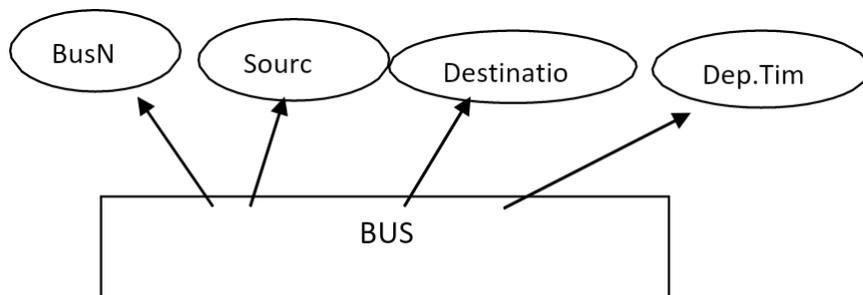
Relationships:

- 1. Reservation
- 2. Cancellation

PRIMARY KEY ATTRIBUTES:

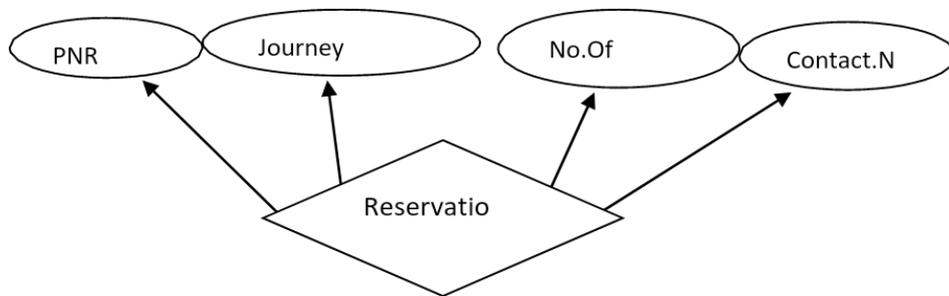
- 1. Ticket ID (Ticket Entity)
- 2. Passport ID (Passenger Entity)
- 3. Bus_No(Bus Entity)

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	<u>Passport_Id</u>
----------------	-----	--------	---------	-----------	--------------------

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 types of 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	<u>Passport_Id</u>
----------------	-----	--------	---------	--------------------

<u>Passport_Id</u>	Ticket_id
--------------------	-----------

Note: Apply the second and third normal forms for the same example (if required you can consider more attributes)

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

Installation of MySql / MongoDB / NoSQL . 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, Sex Char, 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
```

5.c) Installation of NoSQL

NoSQL is a non-relational database management Systems, different from traditional relational database management systems. It is designed for distributed data stores where very large scale of data storing needs.for example Google or Facebook which collects terabits of data every day for their users. Stands for Not Only SQL , No declarative query language, No predefined schema, Key-Value pair storage, Column Store, Document Store, Graph databases, Eventual consistency rather ACID property, Unstructured and unpredictable data, CAP Theorem, Prioritizes high performance, high availability and scalability, BASE Transaction

Key Value Pair Based

Data is stored in key/value pairs. It is designed in such a way to handle lots of data and heavy load.

Key-value pair storage databases store data as a hash table where each key is unique, and the value can be a JSON, BLOB(Binary Large Objects), string, etc.

For example, a key-value pair may contain a key.

Key	Value
Name	Joe Bloggs
Age	42
Occupation	Stunt Double
Height	175cm
Weight	77kg

Redis, Dynamo, Riak are some examples of key-value store DataBases. They are all based on Amazon's Dynamo paper.

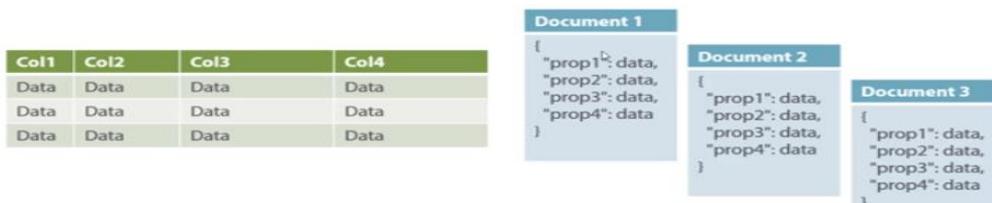
Column-based NoSQL databases are widely used to manage data warehouses, business intelligence, CRM, Library card catalogs,

ColumnFamily			
Row Key	Column Name		
	Key	Key	Key
	Value	Value	Value
	Column Name		
	Key	Key	Key
	Value	Value	Value

HBase, Cassandra, HBase, Hypertable are examples of column based database.

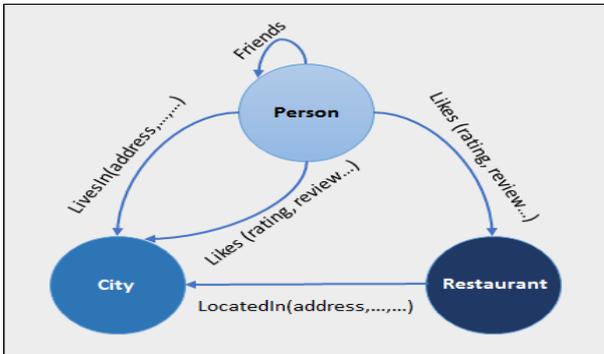
Document-Oriented:

Document-Oriented NoSQL DB stores and retrieves data as a key value pair but the value part is stored as a document. The document is stored in JSON or XML formats. The value is understood by the DB and can be queried.



Graph-Based

A graph type database stores entities as well the relations amongst those entities. The entity is stored as a node with the relationship as edges. An edge gives a relationship between nodes. Every node and edge has a unique identifier.



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,'hyderabad' 'Banglore');

Insert into Bus values (45,'Tirupathi','Banglore'); Insert into Bus values (34,'hyderabad','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.

Example: CREATE TRIGGER updcheck BEFORE UPDATE ON passenger FOR EACH ROW BEGIN

```
IF NEW.Tickent NO > 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.

Example: CREATE PROCEDURE myProc()

BEGIN

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

WEEK 12: PL/SQL

In this session you are going to learn PL/SQL programs with Oracle Database

WEEK 13: DCL Commands

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

REFERENCE BOOKS:

1. Introduction to SQL,Rick F.Vander Lans,Pearson education..
2. Oracle PL/SQL, B.Rosenzweig and E.Silvestrova,Pearson education.
3. Oracle PL/SQL Programming,Steven Feuerstein,SPD.
4. SQL & PL/SQL for Oracle 10g,B lack Book, Dr.P.S.Deshpande, Dream Tech.
5. Ora cle D atab a se 11 g P L/S QL P ro gra m ming, M .M c Laughlin,TMH.
6. 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.
- 5 Analyze and Select storage and recovery techniques of database system

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II YEAR B. TECH CSE (DS)- II SEM

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(R20A0008) GLOBAL EDUCATION AND PROFESSIONAL CAREER

Introduction

In every era of human life, studying abroad has allowed one to experience another part of oneself in 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 the expectations 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 & service Management, 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-over

PSAT, 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.

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
SYLLABUS (R20)**

(Batches admitted from the academic year 2020 - 2021)

B.Tech

III Year – I - Semester

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III Year B.Tech CSE(DS) – I Sem

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(R20A0510) COMPUTER NETWORKS

COURSE OBJECTIVES:

1. To know the fundamentals of computer networks, TCP/IP & OSI model.
2. To know Data link layer Issues, Protocols.
3. To know Network layer Protocols, IP addressing.
4. To know end to end communication & various things in Transport layer.
5. To know various user services in a network

UNIT - I:

Introduction: Network, Uses of Networks, Types of Networks, Reference Models: TCP/IP

Model, The OSI Model, 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, 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, Pearson Education.
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

REFERENCES BOOKS:

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, Pearson Education.

COURSE OUTCOMES:

1. Independently understand basic computer network technology, enumerate the layers of the OSI model and TCP/IP, understand the functions of each layer.
2. Understand the different types of protocols in data link layer
3. Able to understand network topologies and protocols, Identify the different types of network devices and their functions within a network
4. Understand end to end communication, port addressing and congestion control
5. Student will be in a position to understand the World Wide Web concepts.

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(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 and to 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: Propositional Logic, 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, Acting Under 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 Hill publications, Third Edition, 2009. 2. George F. Luger,
2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

COURSE OUTCOMES:

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

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III Year B.Tech CSE(DS) – I Sem

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(R20A0028) STATISTICAL FOUNDATION OF DATA SCIENCE

COURSE OBJECTIVES:

- 1.To learn different statistical methods in Data Science
- 2.To understand Probability Distribution, Sampling , Hypothetical Analysis
- 3.To understand the sampling distributions, hypothesis
- 4.To understand statistical inference
- 5.Acquire knowledge on different packages to generate the statistical analysis in Data Science and generate and analyze the different graphs/plotting using R and Python

Unit-I:

Introduction to data: Types of variables, data collection principles, types of studies.

Introduction to Statistics: Introduction, Inferential statistics and Descriptive statistics, Inferential Statistics- Drawing Inferences from Data, cumulative distribution functions.

Unit-II:

One dimensional change of variable, joint distributions, Probability Distribution: Normal Probability Distribution, Probability models, their properties, combinatorial principle, conditional probability, independence of events.

Unit-III:

Sampling distributions; Point estimation - estimators, minimum variance unbiased estimation, maximum likelihood estimation, method of moments, consistency; Interval estimation; Testing of hypotheses - tests and critical regions, likelihood ratio tests; Linear regression. Monte Carlo approximations.

Unit-IV:

Statistical inference. Models for inference. Data collection: finite population, simple random sampling, histograms, survey sampling. Likelihood inference. Maximum likelihood estimation, inference based on MLE. Bayesian Inference, prior and posterior distributions, inference estimation, Bayesian computations, optimal inference.

Unit-V:

Model checking, sample model, residual probability plots, distribution, Markov chains. Poisson processes.

Text/References:

1. Hastie, Trevor, et al., The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010.
3. Probability and Statistics The Science of Uncertainty Second Ed., Michael J. Evans and Jeffrey S. Rosenthal.
4. B. L. S. Prakasa Rao, A First Course in Probability and Statistics, World Scientific/Cambridge University Press India, 2009.
5. R. V. Hogg, J. W. McKean and A. Craig, Introduction to Mathematical Statistics, 6th Ed., Pearson Education India, 2006.

COURSE OUTCOMES:

At Completion of this course, students would be able to –

1. Apply statistical methods for Data Science.
2. Gain knowledge of probability distribution using R and Python.
3. Able to write algorithms or programs based on statistical principles.
4. Understand the Inferences, Sampling, Scaling, Hypothesis.
5. Understand usage of various packages used in R and Python to analyze the data.

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III Year B.Tech. CSE(DS)- I Sem

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PROFESSIONAL ELECTIVE – I
(R20A1202) AUTOMATA AND COMPILER DESIGN

COURSE OBJECTIVES:

This course will enable the students :

1. To provide an understanding of automata, grammars, language translators.
2. To know the various techniques used in compiler construction.
3. To learn about language classes & grammars relationship among them with the help of Chomsky hierarchy.
4. To be aware of the process of semantic analysis.
5. To analyse the code optimization & 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 non 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 Press.
2. Lex & yacc – John R. Levine, Tony Mason, Doug Brown, O’reilly Modern Compiler Design-Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dream tech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Loudon, Thomson.
5. Introduction to Automata Theory Languages and Computation”. Hopcroft H.E. and Ullman J.D. Pearson Education.

COURSE OUTCOMES:

Upon completion of this course, the student should be able to:

1. Explain deterministic and non-deterministic machines.
2. Design a deterministic finite-state machine to accept a specified language.
3. Determine a language’s location in the Chomsky hierarchy (regular sets, context-free, context-sensitive, and recursively enumerable languages).
4. Explain how a compiler can be constructed for a simple context free language.
5. Apply the code optimization & code generation techniques.

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III Year B.Tech CSE(DS) I-Sem

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PROFESSIONAL ELECTIVE – I
(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 evolutionary models and software requirements and SRS document.
3. To understand different software design and architectural styles & software testing approaches such as unit testing and integration testing.
4. To understand quality control and how to ensure good quality software through quality assurance .
5. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in an object oriented software projects.

UNIT -I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT-II:

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods, UML Diagrams.

UNIT-III:

Design Engineering: Design process and Design quality, Design concepts, the design model. **Creating an architectural design:** Software architecture, Data design, Architectural styles and patterns, Architectural Design.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

UNIT-IV:

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. **Risk management:** Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement RMMM, RMMM Plan.

UNIT-V:

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.

Case Study – ATM Management System.

TEXT BOOKS :

1. Software Engineering A practitioner's Approach, Roger S Pressman, 6th edition. McGrawHill International 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 International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition 2006.
7. Software Engineering Foundations, Yingux Wang, Auerbach Publications, 2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley & Sons Ltd.
9. Software Engineering3: Domains, Requirements, and Software Design, D. Bjorner, Springer International 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 level design 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 simple testing report.
5. Ability to apply the knowledge, techniques, and skills in the development of a software product

PROFESSIONAL ELECTIVE – I

(R20A0562) COMPUTER GRAPHICS

COURSE OBJECTIVES:

1. The computer graphics will give you *hands-on experience* at developing interactive, real-time rendering applications using OpenGL.
2. A major use of computer graphics is in design processes, particularly for engineering and architectural systems, but almost products are now computer designed.
3. To study the fundamental concepts of graphics like line drawings to advanced concepts like rendering , ray tracing to computer animation
4. To Changes in orientation, size and shape are accomplished with geometric transformations that alter the coordinate descriptions objects.
5. To study the visible surface detection methods for identifying visible surfaces and eliminating hidden surfaces.

UNIT I :

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations 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 II

2-D geometrical transformations : Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT III

3-D object representation : Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering Methods.

3-D Geometric transformations : Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3-D viewing : Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT IV

Visible surface detection methods : Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.

UNIT V

Computer animation : Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

TEXT BOOKS :

1. “Computer Graphics *C version*”, Donald Hearn and M.Pauline Baker, Pearson Education.
2. “Computer Graphics Principles & practice”, second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

REFERENCES :

1. “Computer Graphics”, second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. “Computer Graphics Second edition”, Zhigand xiang, Roy Plastock, Schaum’s outlines, Tata Mc- Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. “Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

COURSE OUTCOMES:

- 1 Students will demonstrate an understanding of contemporary graphics hardware and software.
- 2 Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces.
- 3 Students will write program functions to implement graphics primitives and demonstrate geometrical transformations.
- 4 Students will demonstrate an understanding of the use of object hierarchy in graphics applications.
- 5 Students will write program functions to implement visibility detection
Students will write programs that demonstrate computer graphics animation.

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PROFESSIONAL ELECTIVE – II

(R20A6204) DATABASE SECURITY

COURSE OBJECTIVES:

1. Give an Overview of information security
2. Give an overview of Access control of relational databases
3. To learn the security of databases
4. To learn the design techniques of database security
5. To learn the secure software design

UNIT - I

The Web Security, The Web Security Problem, Risk Analysis and Best Practices
Cryptography and the Web: Cryptography and Web Security, Working Cryptographic
Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and
Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers,
Securing Web Applications

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for
XML, Database Issues in Trust Management and Trust Negotiation, Security in Data
Warehouses and OLAP Systems

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database
Watermarking for Copyright Protection, Trustworthy Records Retention, Damage
Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current
Capabilities and

UNIT - V

Future Trends Privacy in Database Publishing: A Bayesian Perspective, Privacy-
enhanced Location based Access Control, Efficiently Enforcing the Security and
Privacy Policies in a Mobile Environment

TEXTBOOKS:

1. Web Security, Privacy and Commerce Simson GARfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia

COURSE OUTCOMES:

Students should be able to

- 1.Understand the Web architecture and applications
- 2.Understand client side and service side programming
- 3.Understand how common mistakes can be bypassed and exploit the application
- 4.Identify common application vulnerabilities

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PROFESSIONAL ELECTIVE – II

(R20A1206) 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; APRIORI 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

COURSE 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. Ability to solve real world problems in business and scientific information using data mining

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PROFESSIONAL ELECTIVE-II

(R20A0515) SCRIPTING LANGUAGES

COURSE OBJECTIVES:

Student should be able:

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 Dynamic Websites 3rd Edition, O'Reilly Publications

Reference books:

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

COURSE OUTCOMES:

The students will be able:

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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OPEN ELECTIVE – II

(R20A1252) MANAGEMENT INFORMATION SYSTEMS
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COURSE OBJECTIVES:

1. To understand the importance of MIS, structure and types of MIS
2. To learn business applications of Information Systems
3. To learn about the Management of Information Systems
4. To learn how to build Information Systems
5. To know about Cyber crime

UNIT-I:

Introduction : MIS importance, definition, nature and scope of MIS, Structure and Classification of MIS, Information and Systems Concept, Types of Information, Information systems for competitive advantage.

Case Study: MIS at any business establishment.

UNIT-II:

Business Applications of Information Systems: E-Commerce, ERP Systems, DSS, Business Intelligence and Knowledge Management System.

Case Study: Knowledge Management Systems at an Enterprise.

UNIT-III:

Management of IS: Information system planning, system acquisition, systems implementation, evaluation & maintenance of IS, IS Security and Control.

Effectiveness of MIS: A Case Study.

UNIT-IV:

Building of Information Systems: System Development Stages, System Development Approaches. Systems Analysis and Design-Requirement Determination, Strategies for Requirement Determination. Structured Analysis Tools, System Design – Design Objectives, Conceptual Design, and Design Methods. Detailed system design.

UNIT-V:

Introduction to Cyber Crime: Cyber Crime Definition and origin of the word, cyber crime and information security, cyber criminals. Classification of cyber criminals-Legal Perspectives-Indian Perspectives-Cyber crimes and Indian ITA 2000, Global perspective on cybercrime-Cybercrime era.(Refer : Nina Godbole et al)

TEXT BOOK

1) D P Goyal, Management Information Systems–Managerial Perspective, MacMillan, 3rd Edition, 2010.

REFERENCE:

1. Nina Godbole & Sunit Belapure “ Cyber Security” Wiley india 2012.
2. Jawadekar, MIS Text and Cases, TMH, 2012.
3. Dr Milind M Oka “Cases in Management Information system ‘Everest, 2012.
4. A K Gupta, Sharma “Management of Systems” Macmillan, 2012.
5. Sandra Senf “Information Technology Control and Audit” 3e, CRC Press, 2012.
6. Apache OFBiz for Ecommerce and ERP – <https://ofbiz.apache.org/>
7. Magento for Ecommerce (B2B Commerce) – <https://magento.com/>
8. Adempiere – ERP : <http://www.adempiere.net/web/guest/welcome>
9. Analytica – DSS – <http://www.lumina.com>
10. OpenRules – Business Rules and Decision Management system – <http://openrules.com/>

COURSE OUTCOMES:

1. Understand the importance of MIS, structure and types of MIS
2. Understand business applications of Information Systems
3. Learning about the Management of Information Systems
4. Learning about how to build Information Systems
5. Knowing about Cyber crime

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OPEN ELECTIVE – II

(R20A0552) JAVA PROGRAMMING

COURSE OBJECTIVES:

This subject aims to introduce students to the Java programming language. Upon successful completion of this subject, students should be able

- 1) To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism;
- 2) Use data types, arrays and strings;
- 3) Implement error-handling techniques using exception handling,
- 4) To know about Applets and Event Handling
- 5) Create and event-driven GUI using AWT components.

UNIT I

OOP Concepts: Data abstraction, encapsulation, inheritance, Polymorphism, classes and objects, Procedural and object oriented programming paradigms.

Java Basics History of Java, Java buzzwords, data types, variables, constants, scope and life time of variables, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, arrays, strings, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, Buffered Reader class, Scanner class, StringTokenizer class, inner class.

UNIT II

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

Polymorphism – Dynamic binding, method overriding, abstract classes and methods. Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, extending interface.

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

UNIT III

Exception handling - Concepts of exception handling, benefits of exception handling, exception hierarchy, and usage of try, catch, throw, throws and finally, checked exceptions and unchecked exceptions, built in exceptions.

Multi threading: Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, inter thread communication.

UNIT IV

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Event Handling: Events, Handling mouse and keyboard events, Adapter classes. Files-Streams- Byte streams, Character streams, Text input/output.

UNIT V

GUI Programming with Java – AWT class hierarchy, component, container, panel, window, frame, graphics. AWT controls - Labels, button, text field, check box, and graphics. Layout Manager – Layout manager types: border, grid and flow. Swing – Introduction, limitations of AWT, Swing vs AWT.

TEXT BOOKS:

1. Java- the complete reference, 7th edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.
3. Core Java an integrated approach, dreamtech publication, 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 and H.M.Deitel, PHI
2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.

COURSE OUTCOMES:

- 1) An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements;
- 2) A competence to design, write, compile, test and execute straightforward programs using a high level language;
- 3) An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
- 4) Be able to make use of members of classes found in the Java API.
- 5) Demonstrate the ability to employ various types of constructs and a hierarchy of Java classes to provide solution to a given set of requirements.

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OPEN ELECTIVE - II

(R20A1253) SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES:

The Main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience - based creation & improvement of models (process management). The Objectives of the course can be characterized as follows:

- 1) To understand the specific roles within a software organization as related to project and process management
- 2) To understand the basic infrastructure competences (e.g., process modeling and measurement)
- 3) To understand the basic steps of project planning, project management, quality assurance, and process management and their relationships
- 4) To understand the Flow Process and Check points of the process.
- 5) To understand Project Organizations and Responsibilities

UNIT-I

Conventional Software Management: The waterfall Model, Conventional Software Management Performance, evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT-II

Conventional And Modern Software Management: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process, Life Cycle Phases: Engineering and Production Stages Inception, Elaboration, Construction, Transition phases .

UNIT-III

Artifacts of the Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based Software Architectures: A Management Perspective and Technical Perspective.

UNIT-IV

Flows of the Process: Software Process Workflows, Iteration workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cocomo Cost Estimation model.

UNIT-V

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation Building Blocks, the Project Environment. Project Control and Process Instrumentation: Seven Core Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software Metrics Automation.

TEXT BOOKS:

1. Walker Royce, -Software Project Management||, 1998,PEA.
2. Henry, -Software Project Management||, Pearson.

REFERENCE BOOKS:

1. Richard H.Thayer.|| Software Engineering Project Management||, 1997, IEEE Computer Society.
2. Shere K.D.: -Software Engineering and Management||, 1998,PHI.
3. S.A. Kelkar, -Software Project Management: A Concise Study||,PHI.
4. Hughes Cotterell, -Software Project Management||, 2e, TMH. 88 5. Kaeron Conway, Software Project Management from Concept toD

COURSE OUTCOMES:

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

- 1) Understanding the specific roles within a software organization as related to project and process management
- 2) Understanding the basic infrastructure competences (e.g., process modeling and measurement)
- 3) Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships
- 4) Understanding the Flow Process and Check points of the process.
- 5) Understanding the Project Organizations and Responsibilities

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OPEN ELECTIVE - II

(R20A0452) INTERNET OF THINGS AND ITS APPLICATIONS

COURSE OBJECTIVES:

- 1) To study IoT Networking Core
- 2) To study IoT related network fundamentals
- 3) To study IoT Architecture.
- 4) To study IoT Application Development procedure
- 5) To study various case studies and IoT applications.

UNIT I

The IoT Networking Core:

Technologies involved in IoT Development: Internet/Web and Networking Basics OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing IoT Platform overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT II

Network Fundamentals: Overview and working principle of Wired Networking equipment's – Router, Switches, Overview and working principle of Wireless Networking equipment's–Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions.

UNIT III

IoT Architecture: History of IoT, M2M–Machine to Machine, Web of Things, IoT protocols Applications: Remote Monitoring & Sensing, Remote Controlling, and Performance Analysis. The Architecture Layering concepts, IoT Communication Pattern, IoT protocol Architecture, The 6LoW PAN Security aspects in IoT

UNIT IV

IoT Application Development: Application Protocols MQTT, REST/HTTP, CoAP, MySQL. Back-end Application Designing Apache for handling HTTP Requests, PHP & My SQL for data processing, Mongo DB Object type Database, HTML, CSS & jQuery for UI

Designing, JS ON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android/IOS App Development tools

UNIT V

Case Study & IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment's. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi/ Intel Galileo/ARM Cortex/ Arduino)

TEXT BOOKS:

1. WPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Eco systems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

REFERENCES:

1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning
2. Internet of Things (A Hands-on-Approach), Vijay Madisetti, Arshdeep Bahga
3. Designing the Internet of Things, Adrian McEwen (Author), Hakim Cassimally
4. Asoke K Talukder and Roopa R Yavagal, "Mobile Computing," Tata Mc Graw Hill, 2010.
5. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014
6. Computer Networks; By: Tanenbaum, Andrew S; Pearson Education Pte.Ltd., Delhi, 4th Edition
7. Data and Computer Communications; By: Stallings, William; Pearson Education Pte.Ltd., Delhi, 6th Edition

COURSE OUTCOMES:

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

- 1) Understand IoT Networking Core
- 2) Understand IoT related network fundamentals
- 3) Understand IoT Architecture.
- 4) Understand IoT Application Development procedure
- 5) Understand various case studies and IoT applications.

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OPEN ELECTIVE – II

(R20A0553) OPERATING SYSTEM CONCEPTS

COURSE OBJECTIVES:

- 1) To understand the basic concepts and functions of operating systems.
- 2) To understand Processes and Threads
- 3) To understand the concept of Deadlocks.
- 4) To analyze various memory management schemes.
- 5) To understand I/O management and File system

UNIT-I

Introduction: Concept of Operating Systems, OS Services, Structure of an Operating Systems
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of Multithreads.

UNIT-II

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion. Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem, The Producer/Consumer Problem, Semaphores, Monitors.

UNIT-III

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation; Paging: Principle of operation – Page allocation – Hardware support for paging, protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory, Page fault , Demand paging; Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV

File Management: Concept of File, Access methods, File types, File operation, File System structure, Allocation methods (contiguous, linked, indexed), Directory structure, directory implementation (linear list, hash table), efficiency and performance.

UNIT-V

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

TEXT BOOKS:

1. Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison- Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice- Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

COURSE OUTCOMES:

At the end of the course the students are able to:

- 1) Create processes and threads.
- 2) Implement algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
- 3) Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
- 4) Design and implement file management system.
- 5) Analyze various disk scheduling schemes.

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OPEN ELECTIVE - II

(R20A0066) PUBLIC POLICY AND GOVERNANCE (PP&G)

Course objectives:

- To make the students understand in-depth analysis of public policy and to solve its ills prevailing in the society.
- To provide an opportunity for the students to learn the basic areas of public policy analysis, implementation and evaluation.
- To make understand the process and various approaches in public policy making
- To understand the theories and issues of social coordination and the nature of all patterns of rule.
- To make the students understand the techniques of governance and emerging trends in public and private governance its policy-making and implementation.

Unit-I

Introduction of Public Policy: Definition, Nature, Scope and Importance of Public Policy, Evolution of Public Policy and Policy Sciences, Public Policy and Public Administration.

Approaches to Public Policy Analysis: The Process Approach, The Logical Positivist Approach, The Phenomenological Approach, The Participatory Approach and Normative Approach

Unit-II

Theories and Process of Public Policy Making: Theories and Models of Policy Making, Perspectives of Policy Making Process, Institutions of Policy Making.

Unit-III

Policy Implementation and Evaluation: Concept of Policy Implementation, Techniques of Policy Implementation, Concept of Policy Evaluation, Constraints of Public Policy Evaluation

Unit-IV

Introduction of Governance: Definitions, Issues and Controversies, Reinventing Government, Reforming Institutions: The State, Market and Public domain. **State and Governance:** Origin and types of State, Democratic State and Democratic Administration, Neo-Liberalism and Rolling Back State and Governance as Government.

Unit-V

Citizen and Techniques of Governance: Rule of Law and Human Rights, Accountability, Participation, Representation. **Techniques of Governance:** Openness and Transparency, Citizen Charter, Social Audit. **Emerging Trends in Public and Private Governance:** An Overview, Market, Civil Society, Information and Communication Technology.

Text and Reference books

1. Introduction to Public Policy- Charles Wheelan, Naked Economics 2010.
2. Birkland Thomas A., (2005), An Introduction to The Policy Process: Theories, Concepts, And Models of Public Policy Making, Armonk; M.E. Sharpe.
3. Anderson J.E., (2006) Public Policy-Making: An Introduction, Boston, Houghton
4. Bardach, Eugene (1977), The Implementation Game: What Happens After a Bill Becomes a Law, Cambridge, MA: MIT.
5. Bell, S., and Hind moor, A. (2009) Rethinking Governance: The Centrality of the State in Modern Society, Cambridge: Cambridge University Bell, Stephen and Andrew Hind moor.
6. Joyee M. Mitchell & William C. Mitchell, Political Analysis & Public Policy: An Introduction to Political Science, Thomson Press Limited, New Delhi, 1972.
7. R.K. Sapru, Public Policy, Art and Craft of policy Analysis, PHI learning private limited, New Delhi, 2011.
8. Brian W. Hogwood & Lewis A. Gunn, Policy Analysis for the Real world, Oxford University, Press, 1986.

Course outcomes

After completion of the course, student will be able to

1. Understand public policy analysis and they will be able to understand policy evaluation and implementation.
2. Understand the public policy and governance on the largest gamut of its canvas.
3. Students will understand the what are emerging trends in public and private governance and various theories in public policy making
4. Understands various concepts, and techniques of governance and its policy-making decisions

(R20A6781) STATISTICAL FOUNDATIONS LAB

COURSE OBJECTIVES:

1. The students are exposed to various experimental skills in data analytics which is very essential for Data Science.
2. Students are exposed to the Probability distribution using R & Python Programming.
3. Students are able to use R and Python Programming and perform all types of operators and functions to generate the effective reports.
4. To inculcate in students professional and ethical attitude, multidisciplinary approach and an ability to relate statistical analysis in data science by using various statistical methods or principles.
5. Students should aware of Hypothetical Tests, Regression Analysis and Monte Carlo Integration.
6. To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful bright and professional career.

Required Software Tools: R and Python (numpy, scipy, matplotlib)

Also required: Pandas, Statsmodels and Seaborn.

WEEK 1: Study R Languages, Commands, etc

Consider 50 observations (dataset), generating random data using functions provided, like rbinom, performing basic statistical computations using built-in functions of R. Discussion of R graphics. Histograms. Stem and leaf plots. Boxplots. Scatterplots. Bar graphs plotting the data using line graph, histograms, multiple graphs, etc. Generate 3D graphs or plots.

WEEK 2: Measures of Central Tendency: Given a sample of 50 Observations (from any dataset), use possible functions R or Python and calculate mean, sd, var, min, max, median, range, and quantile. Discuss the properties of this distribution. generate bell curve of a random normal distribution.

WEEK 3: Pragmatic matters. Tabulating data. Transforming a variable. Subsetting vectors and data frames.

WEEK 4: (i) Consider 100 observations, find out Correlation “cor()” and Covariance “cov()” and programs on Frequencies and Crosstabs.

(ii) Finding and analyze the missing data.

WEEK 5: Sorting, transposing and merging data. Reshaping a data frame. Basics of text processing. Reading unusual data files. Basics of variable coercion.

WEEK 6: Hypothesis testing and t-test for any given dataset. Find out null hypothesis, alternate hypothesis, draw the picture (graph) to visualize problem. Test the value of population mean.

WEEK 7: State alpha level and rejection region, estimate the maximum likely hood and inference.

WEEK 8: Binomial simulation: Making the computer flip coins for you. Make use of rbinom function of R to generate samples, and other functions: counts, avgs, mean, sd, sqrt, hist (histogram).

WEEK 9: Bayesian Hypothesis testing on any given dataset or dataframe.

WEEK 10: Use seaborn and combines simple statistical fits with plotting on pandas dataframes.

WEEK 11: Working on Linear Algebra and Linear Systems

WEEK 12: Working on Monte Carlo Integration (Quasi-random numbers and find out the variance on any dataframe)

COURSE OUTCOMES:

1. The student learns the concept of R and Python Programming and Statistical analysis and try formulate new solutions or programs.
2. Demonstrate an ability to design and develop R and Python programs with this, analysis the data and generate the related report or results.
3. Demonstrate an ability to design programming on probability distribution and computed all possible outcomes or required reports.
4. Able to do hypothetical analysis and transformation of data into useful manner using Python Programming
5. Able to generate the linear algebra, Monte Carlo Integrations etc by using Python programming.

(R20A0588) ARTIFICIAL INTELLIGENCE LAB

COURSE OBJECTIVES:

1. Familiarity with the Prolog and Python Programming environment.
2. Systematic introduction to Prolog programming constructs
3. Understanding list data structure in Prolog.
4. To provide student with an academic environment aware of various AI Algorithms.
5. To train Students with python programming as to comprehend, analyze, design and create AI platforms and solutions for the real life problems.

WRITE THE FOLLOWING PROGRAMS USING PYTHON/PROLOG

Week 1

- a) Write a program to print the multiplication table for the given number.
- b) Write a program to find factorial of a number.
- c) Write a program to check whether the given number is prime or not.

Week 2

- a) Write a program to implement Simple Calculator program.
- b) Write a program to generate Calendar for the given month and year.
- c) Write a program to Illustrate Different Set Operations.

Week 3

Write a program to implement simple Chat bot.

Week 4

- a) Write a program to remove punctuations from the given string.
- b) Write a program to sort the sentence in alphabetical order.

Week 5

Write a program to Implement of Towers of Hanoi Problem.

Week 6

Write a program to Implement Breadth First Search.

Week 7

Write a program to Implement Depth First Search.

Week 8

Write a program to implement Hill Climbing Algorithm.

Week 9

Write a program to implement A* Algorithm.

Week 10

Write a program to implement Tic-Tac-Toe game.

Week 11

Write a program to implement Water Jug Problem.

LAB OUTCOMES:

Upon completion of the course, students will be able to

1. Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction)
2. Understand the fundamentals of knowledge representation, inference.
3. Understand the fundamentals of theorem proving using AI tools.
4. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information

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(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’ placement needs 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 of the instructor whose constant evaluation helps in the professional development of students. This course fulfills 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 equip students, 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 of professional 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.

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
SYLLABUS (R20)**

(Batches admitted from the academic year 2020 - 2021)

B.Tech

III Year – II - Semester

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(R20A6704) DATA SCIENCE TOOLS AND TECHNIQUES

COURSE OBJECTIVES:

1. Study basic tools available for data science and analytics
2. Study usage of Tableau desktop
3. Student will study usage of various data sources with Tableau
4. Student will learn data extraction from various data sources
5. Student will study working with various Charts
6. Student will learn various calculations and best practises to develop a dashboard

UNIT I

Introduction to data science, various data science tools available.

Introduction to Tableau, Tableau desktop, Tableau server, Tableau online, Tableau Reader, Tableau Features, VizQL.

UNIT-II

Introducing the Tableau Desktop Workspace, Using the Workspace Controls Effectively

The Start Page and Data Connection Page, What You Need to Know about the Menu

Leveraging Toolbar Icons, The Data Window, Data Types, and Aggregation

Building Visualizations with the Row and Column Shelves, Number of Records, Measure Values, and Measure Names, Understanding Colour in Icons and Pills, Using the View Cards to Identify Trends and Outliers, How the Status Bar Helps You Understand Visualizations,

Saving Time by Using the Show Me Button.

UNIT-III

Connecting to Data source: How to Connect to Data source: Connecting to Desktop Sources, Connecting to Database Sources, and Connecting to Public Data sources.

Generated Values: Measure Names and Measure Values, Tableau Geocoding, Number of Records,

Direct Connection or a Data Extract: The Flexibility of Direct Connections, The Advantages of a Data Extract ,Using Tableau’s File Types Effectively ,Tableau Workbook Files ,Tableau Packaged Workbooks ,Tableau Data source Files, Tableau Bookmark Files.

Joining Database Tables with Tableau: The Default Inner Join, The Left and Right Join Types, Customizing Tableau’s Join Script.

Blending Different Data sources in a Single Worksheet : When to Use Blending vs Joins. How to Create a Data Blend,Factors that Affect the Speed of Your Data Connections The Database.

UNIT -IV

Fast and Easy Analysis via Show Me: Chart Types Provided by the Show Me Button, Text Tables (crosstabs), Maps (Symbol and Filled), Heat Maps, Highlight Tables, Tree maps Bar Chart, Stacked Bar, Side-by-Side Bars, Line Charts For Time Series Analysis, Area Fill Charts and Pie Charts, Scatter Plot, Circle View, and Side-by-Side Circle Plots, Bullet Graph, Packed Bubble, Histogram, and Gantt Charts, Trend Lines and Reference Lines, Sorting Data in Tableau, Enhancing Views with Filters, Sets, Groups, and Hierarchies , Advanced Chart Types: Bar in Bar Chart, Box Plots, Pareto Charts, Sparklines, Bullet Graphs

UNIT -V

Enhancing Data using calculations:-

Aggregation: Count Distinct Versus, Count Median, Dimension versus Attribute

Calculation Dialog Box to Create: Calculated Values, Field Selection, Function Selection, Parameter Selection, Building Formulas Using Table Calculations, Using Table Calculation Functions.

Maps to Improve Insight: Creating a Standard Map View, Plotting Your Own Locations on a Map.

Best Practices for Dashboard Building.

Tableau Server: The Reasons to Deploy Tableau Server, Data Governance, Efficiency, Flexibility, Licensing Options for Tableau Server and Tableau Online.

Text Books:

1. Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software® Daniel G. Murray and the InterWorks BI Team, Wiley publication.
2. Tableau 10 Complete Reference Joshua N. Milligan, Tristan Guillevin Published December 2018
3. Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics, 3rd Edition Paperback – March 27, 2019 by Joshua N. Milligan (Author)
4. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master 1st Edition by Ryan Sleeper (Author)
5. Visual Analytics with Tableau 1st Edition by Alexander Loth (Author)
6. Tableau Desktop and Web Authoring Help (<https://help.tableau.com/>)

COURSE OUTCOMES:

1. Student will gain ability to use Tableau desktop
2. Student will be able to use various panes ,menus available in Tableau desktop
3. Student will be able to use various data sources with Tableau
4. Student will be able to use data extraction from various data sources
5. Student will be able to us draw various Charts
6. Student will be able to use various calculations and best practises to develop a dashboard

(R20A0525) 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 understand, learn and design simple artificial neural networks for the selected problem
4. To gain skills of how to combine multiple machine learning algorithms to solve the selected problem
5. To understand deep belief networks and applications

UNIT – I:

INTRODUCTION

Machine-Learning Paradigms: Introduction. Machine Learning Systems, Forms of Learning: Supervised and Unsupervised Learning, reinforcement – theory of learning – feasibility of learning – Data Preparation– training versus testing and split.

Supervised Learning:

Regression: Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods.

UNIT – II:

Classification: – support vector machines – soft margin SVM – going beyond linearity – generalization and over fitting – regularization – validation-Naïve Bayes classification, Ensemble Learning: BOOSTING - AdaBoost – Stumping- Gradient Boosting Machines and XGBoost -BAGGING
-Subagging -Different Ways to Combine Classifiers-Random forest Classifier

UNIT – III:

Unsupervised learning

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees – locality sensitive hashing – non-parametric regression. Clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning

UNIT - IV:

Dimensionality Reduction - Linear Discriminant Analysis – Principal Component Analysis – Covariance’s - limitations of PCA-Computing PCA .

Reinforcement learning

Reinforcement learning- Example: Getting Lost -State and Action Spaces - Carrots and Sticks: The Reward Function -Discounting -Action Selection - Policy –MARKOV DECISION PROCESSES - The Markov Property - Probabilities in Markov Decision Processes

UNIT – V:

Neural Networks - The Perceptron -The Perceptron Learning Algorithm - LINEAR SEPARABILITY:The Perceptron Convergence Theorem - The Exclusive or (XOR) Function

BACK-PROPAGATION OF ERROR : The Multi-layer Perceptron Algorithm -Different Output Activation Functions -Sequential and Batch Training - Local Minima - Picking Up Momentum- Minibatches and Stochastic Gradient Descent- A Regression Problem - Classification with the MLP.

TEXT BOOKS:

1. MACHINE LEARNING An Algorithmic Perspective 2nd Edition,Stephen Marsland,2015, byTaylor & Francis Group, LLC
2. Introduction to Machine Learning ,The Wikipedia Guide

REFERENCE BOOKS:

1. Introduction to Machine Learning, Second Edition, Ethem Alpaydın, the MIT Press, Cambridge, Massachusetts, London, England.
2. Machine Learning , Tom M. Mitchell, McGraw-Hill Science, ISBN: 0070428077
3. Understanding Machine Learning:From Theory to Algorithms, c 2014 by ShaiShalev-Shwartz and Shai Ben-David, Published 2014 by Cambridge University Press.

COURSE OUTCOMES:

The students will be able:

1. Apply machine learning techniques in the design of computer systems
2. To differentiate between various categories of ML algorithms
3. Design and make modifications to existing machine learning algorithms to suit an individual application to improve classification accuracy
4. Able to design deep neural networks
5. Design systems that use appropriate graph models of machine learning

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<p style="text-align: center;">PROFESSIONAL ELECTIVE – III (R20A6609) NATURAL LANGUAGE PROCESSING</p>

PRE-REQUISITES: Data structures, finite automata and probability theory

COURSE OBJECTIVES:

- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.
- To understand linguistic phenomena and learn to model them with formal grammars.
- To Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
- To learn how to manipulate probabilities, construct statistical models over strings and trees
- To estimate parameters using supervised and unsupervised training methods.
- To design, implement, and analyze NLP algorithms. Able to design different language modeling Techniques.

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, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

REFERENCE BOOKS:

1. 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 formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical 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.

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PROFESSIONAL ELECTIVE-III

(R20A6705) WEB ANALYTICS AND DEVELOPMENT

COURSE OUTCOMES:

1. To provide overview and the need for web analytics.
2. To give the measuring strategy and effects of web analytics
3. To understand segmentation and conversions
4. Identify the various types of testing and reporting methods.
5. To provide exposure to usage of web analytic tools.

UNIT-I:

Introduction – Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization

UNIT-II:

Web Analytics tools: Click Stream Analysis, A/B testing, Online Surveys

UNIT-III:

Web Search and Retrieval: Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models

UNIT-IV:

Making Connection: Link Analysis, Random Graphs and Network evolution, Social Connects: Affiliation and identity

UNIT-V:

Connection: Connection Search, Collapse, Robustness Social involvements and diffusion of innovation

Textbook(s):

1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL: Insights from a Connected World. Morgan Kaufmann, 2010.

References:

1. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Wiley Publishers, 2009.
2. Easley, D., Kleinberg, J., Networks, Crowds, and Markets: Reasoning About a Highly Connected World. New York: Cambridge University Press, 2010.
<http://www.cs.cornell.edu/home/kleinber/networks-book/>

COURSE OUTCOMES :

1. Explore Knowledge in web data.
2. Demonstrate different methodologies to perform analysis and improve the performance of web pages
3. Trace the concept of measuring strategy in web analytics
4. Describe the knowledge of various types of testing
5. Develop real time applications using various tools.

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PROFESSIONAL ELECTIVE – III

(R20A1207) MOBILE APPLICATION DEVELOPMENT

UNIT-I

Introduction to Android Operating System: Android OS and Features – Android development framework;

Installing and running applications on Android Studio, Creating AVDs, Types of Android application; Creating Activities, Activity Life Cycle, Activity states, monitoring state changes;

UNIT - II

Android application components – Android Manifest file, Externalizing resources like Simple Values, Drawables, Layouts, Menus, etc,

Building User Interfaces: Fundamental Android UI design, Layouts – Linear, Relative, Grid and Table Layouts. User Interface (UI) Components

UNIT-III

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities,

UNIT-IV

Intents and Broadcasts: Using intents to launch Activities, Types of Intents, Passing data to Intents, Getting results from Activities, Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters;

UNIT-V

Database: Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data;

TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCES:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
2. Android Application Development (with Kitkat Support), Black Book, Pradeep Kothari, 2014, Dreamtech Press publisher, Kogent Learning Inc.,2014
3. Android Programming: Pushing the Limits, Erik Hellman, 1st Edition,Wiley Publications, 2014

Course Outcomes

1. Analyze architecture of android and current trends in mobile operating systems.
2. Apply suitable software tools and APIs for the development User Interface of a particular mobile application.
3. Apply intents and broadcast receivers in android application.
4. Develop and design apps for mobile devices using SQLiteDatabase.

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PROFESSIONAL ELECTIVE - IV
(R20A6202) CYBER SECURITY

COURSE OBJECTIVES:

This course will enable the students:

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, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCE BOOKS:

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

COURSE OUTCOMES:

Student will be able to

1. Understand basic concepts of Cyber Crimes.
2. Ability to identify the attacks in Cyber Crimes
3. Able to specify the suitable methods used in Cyber Crime
4. Ability to face cyber security challenges
5. Understand Cyber laws.

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Professional Elective –IV

(R20A0522) SOFTWARE TESTING METHODOLOGIES

COURSE OBJECTIVES

1. To learn and understand the tools and techniques of software testing and its practice in the industry.
2. To be aware of the differences between the various testing strategies.
3. To know the taxonomy and purpose of software testing tools.
4. Ability to learn path testing, domain testing
5. To know the data flow testing

UNIT I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

UNIT II

Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

Transaction Flow Testing: Transaction flows, transaction flow testing techniques

UNIT III

Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. **Domain Testing:**-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT IV

Paths, Path products and Regular expressions : Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing : Overview, decision tables, path expressions, kv charts, specifications.

UNIT V

State, State Graphs and Transition testing : State graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application : Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.

TEXT BOOKS:

1. Software Testing techniques - Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

COURSE OUTCOMES:

Students will be able to:

1. Ability to test a process for continuous quality improvement
2. Generation of test cases from requirements
3. Analysis of Modeling techniques: UML: FSM and State charts, Combinatorial design etc.
4. Test generation from models.
5. Test adequacy assessment

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<p style="text-align: center;">PROFESSIONAL ELECTIVE - IV (R20A6606) HUMAN COMPUTER INTERACTION</p>

Course Objectives:

1. Gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing
2. Familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans
3. Apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation
4. Be familiar with a variety of both conventional and non-traditional user interface paradigms
5. Work in small groups on a product design from start to finish will provide you with invaluable team-work experience.

UNIT - I

Introduction : Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II

Design process – Human interaction with computers, importance of human characteristics, human consideration, Human interaction speeds, understanding business junctions.

UNIT – III

Screen Designing : Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT - IV

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT - V

Software tools – Specification methods, interface – Building Tools.

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

REFERENCES :

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.
2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech, User Interface Design, Soren Lauesen , Pearson Education.

Course outcomes:

1. Explain the capabilities of both humans and computers from the view point of human information processing.
2. Describe typical HCI models, styles and various historic HCI paradigms
3. Apply an interactive design process and universal design principles to designing HCI systems
4. Describe and use HCI design principles, standards and guidelines
5. Analyze and identify user modules, user support, socio organizational issues and stakeholder requirements of HCI systems.

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OPEN ELECTIVE - III

(R20A0453) ROBOTICS AND AUTOMATION

COURSE OBJECTIVES:

1. To study overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
2. To study in detail about Robotics and sensors.
3. To study about AVR RISC Microcontroller architecture in detail.
4. To study about ARM Processor in detail.
5. To study about Artificial Intelligence in Robotics.

UNIT - I

Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller

UNIT - II

Robotics: Classification of Robots, Degree of freedom, Kinematics; Multidisciplinary approach: Motors-DC motors, Stepper Motors, Servo Motors; Power Transmission-Type of Gears, Gear Assembly, CAM follower, Sensors, Open loop and Closed-loop Controls, Artificial Intelligence.

UNIT- III

The AVR RISC microcontroller architecture: Introduction , AVR family architecture, register file, the ALU, memory access and instruction execution, I/O memory ,EEPROM ,I/O ports, timers, UART, Interrupt structure.

UNIT-IV

ARM Processor: Fundamentals, Registers, current program status register, pipeline concept, Interrupt and the vector table.

UNIT V

AI IN ROBOTICS: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TEXT BOOKS:

1. Subrata Ghoshal, "Embedded Systems & Robots", Cengage Learning
2. Stuart Russell, Peter Norvig, "Artificial Intelligence: A modern approach", Pearson Education, India2003.

3. ARM System Developer's Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

1. M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "8051 Microcontroller and Embedded Systems", Pearson.
2. Dr. K.V.K. Prasad, "Embedded/Real-Time Systems: Concepts Design & Programming", Dreamtech
3. Microcontrollers and applications, Ajay V Deshmukh , TMGH,2005

COURSE OUTCOMES:

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

1. Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
2. Understand in detail about Robotics and sensors.
3. Understand AVR RISC Microcontroller architecture in detail.
4. Understand about ARM Processor in detail.
5. Understand about Artificial Intelligence in Robotics.

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OPEN ELECTIVE - III

(R20A1254) BIG DATA ARCHITECTURE

COURSE OBJECTIVES

1. To introduce the terminology, technology and its applications
2. To introduce the concept of Analytics and Visualization
3. To demonstrate the Big Data Architecture and its components, tools
4. To provide knowledge about Apache Spark.
5. To provide wild understanding about the databases and Hadoop systems.

UNIT I

Big Data Introduction: 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, Importance of Big Data.

UNIT II:

Big Data Architecture Introduction: Big Data Architecture- Definition, Why Big Data Architecture. Evolution of Big Data Architecture. Market Trends. Big Data Architecture and Its Sources. Big Data Architecture Use Cases.

UNIT-III

Big Data architecture components: Data ingestion, Data storage, Data Computing, Data Analysis, Data Visualization. Understanding the Lambda architecture, HBase, Spark Libraries, Spark Streaming.

UNIT IV

Introducing Apache Spark : Introduction to Spark, Spark Architecture and its components, Features of Spark, Spark vs Hadoop, Challenges of Spark.

UNIT V

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

TEXT BOOKS:

- 1) Tom White – Hadoop: The Definitive Guide|| Third Edit on, O'reily Media, 2012.
- 2) Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS:

- 1) Michael Berthold, David J. Hand, "Intelligent Data Analysis||, Springer, 2007.
- 2) Jay Liebowitz, –Big Data and Business Analytics|| Auerbach Publications, CRC press (2013)
- 3) Tom Plunkett, Mark Hornick, –Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop||, McGraw-Hill/Osborne Media (2013), Oracle press.
- 4) Glen J. Myat, –Making Sense of Data||, John Wiley & Sons, 2007
- 5) Pete Warden, –Big Data Glossary||, O'Reily, 2011.
- 6) Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
- 7) ArvindSathi, –BigDataAnalytics: Disruptive Technologies for Changing the Game||, MC Press, 2012
- 8) Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform " , Tata McGraw Hill Publications

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Identify Big Data and its Business Implications.
2. Categorize and summarize Big Data and its importance.
3. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce in big data analytics
4. Compare various file systems and use an appropriate file system for storing different types of data.
5. Connect to web data sources for data gathering, Integrate data sources with Hadoop components to process streaming data.

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OPEN ELECTIVE - III

(R20A6251) INFORMATION SECURITY

COURSE OBJECTIVES:

1. To understand the basic categories of threats to computers and networks.
2. To understand various cryptographic algorithms.
3. To apply authentication functions for providing effective security.
4. To analyze the application protocols to provide web security.
5. To understand the importance and implementation of Web security and Firewalls

UNIT — I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT — II

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES), Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman), Key Distribution.

UNIT — III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, Digital signatures, Authentication Applications: Kerberos, X.509

Authentication Service, Public — Key Infrastructure, Biometric Authentication

UNIT — IV

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management

UNIT — V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

TEXT BOOKS:

1. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

COURSE OUTCOMES:

1. Students will be able to evaluate various security attacks and will gain understanding on services and mechanisms.
2. Students will understand the applications and working of various symmetric and asymmetric algorithms
3. Students will be able to identify information system requirements for both of them such as client and server.
4. Students will be able to understand the importance of IP security and key management.
5. Students will understand other types of threats and also the importance of web security

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OPEN ELECTIVE – III

(R20A0555) CLOUD COMPUTING FUNDAMENTALS

COURSE 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: System Models for Distributed and Cloud Computing- Cloud Computing in a Nutshell, Layers and Types of Clouds , Desired Features of a Cloud , Infrastructure as a Service Providers ,Platform as a Service Providers , Challenges and Risks

UNIT- II

Virtualization: Virtual machines, Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms-Virtualization of CPU, Memory, and I/O Devices

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 , 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 and Identity.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.
2. Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.TanuraiSelvi, TMH, 2012.
3. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

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 into cloud
4. To effectively use the cloud services in terms of infrastructure and operating platforms.
5. To apply the services in the cloud for real world scenarios

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<p style="text-align: center;">OPEN ELECTIVE - III (R20A0352) DESIGN THINKING</p>
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COURSE OBJECTIVES:

1. To understand the engineering design process and identification of customer need.
2. To understand innovative problem solving concepts.
3. To understand the principles of Design for Manufacturing and FMEA.
4. To know about the design for assembly principles.
5. To know about the concepts of design for environment and design for recycling.

UNIT-I

Introduction: Innovations in Design, Engineering Design Process, Prescriptive and integrative models of design, Design Review and societal considerations.

Identification of Customer Need: Evaluating Customer requirements and survey on customer needs, Conversion of customer needs into technical Specifications, Information sources.

UNIT-II

Theory of Inventive Problem solving (TRIZ), Creativity and Problem solving, Functional Decomposition of the problem for innovative concept development, Introduction to Axiomatic Design, Concept evaluation and decision making.

UNIT-III

Design for Manufacturing: Technical estimating, design of experiments, design for manufacturability, statistical process control, Introduction to FMEA (failure modes and effects analysis), and Case study of design for manufacturing: Manufacturing System Design Based on Axiomatic Design: Case of Assembly Line

UNIT-IV

Design for Assembly: Assembly Principles, Process, Worksheet, Assumptions. Case study of design for Assembly: Manufacturing System Design Based on Axiomatic Design: Case of Assembly Line

UNIT-V

Design for Environment: Design for recycling; Design for disassembly, Design for energy Efficiency, Design for remanufacture, Design for disposability, Hazardous material minimization. Case study of design for Environment.

TEXT BOOKS:

1. Nigel Cross, Engineering Design Methods, John Wiley, 2009.
2. George E. Dieter, Engineering Design, McGraw-Hill, 2009.
3. GenrichAltshuller, The Innovation Algorithm, Technical Innovation Centre, 2011.

REFERENCE BOOKS

1. The Art of Innovation, by Tom Kelley.
2. Design Thinking, by Nigel Cross.
3. The Design of Business: by Roger Martin.

COURSE OUTCOMES:

1. The importance of design in innovation.
2. Design tools and processes can generate innovative new ideas.
3. Design and design thinking to innovative in areas such as engineering, software development and business operations.
4. Strengthen students' individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment.
5. To describe the various case studies for design for environment.

OPEN ELECTIVE – III
(R20A0065) BUSINESS ANALYTICS

Course Aim/s:

- To help students in understanding how the managers use business analytics for managerial decision making.

Learning Outcome/s:

- The students will be familiar with the practices of analyzing and reporting the business data useful for the insights of business growth and development.

Unit-I: Understanding Business Analytics

Introduction: Meaning of Analytics - Evolution of Analytics - Need of Analytics - Business Analysis vs. Business Analytics - Categorization of Analytical Models - Data Scientist vs. Data Engineer vs. Business Analyst - Business Analytics in Practice - Types of Data - Role of Business Analyst.

Unit-II: Dealing with Data and Data Science

Data: Data Collection - Data Management - Big Data Management - Organization/Sources of Data - Importance of Data Quality - Dealing with Missing or Incomplete Data - Data Visualization - Data Classification.

Data Science Project Life Cycle: Business Requirement - Data Acquisition - Data Preparation

- Hypothesis and Modeling - Evaluation and Interpretation - Deployment - Operations - Optimization - Applications for Data Science

Unit-III: Data Mining and Machine Learning

Data Mining: The Origins of Data Mining - Data Mining Tasks - OLAP and Multidimensional Data Analysis - Basic Concept of Association Analysis and Cluster Analysis.

Machine Learning: History and Evolution - AI Evolution - Statistics vs. Data Mining vs. Data Analytics vs. Data Science - Supervised Learning - Unsupervised Learning - Reinforcement Learning - Frameworks for Building Machine Learning Systems.

Unit-IV: Applications of Business Analytics

Overview of Business Analytics Applications: Financial Analytics - Marketing Analytics - HR Analytics - Supply Chain Analytics - Retail Industry - Sales Analytics - Web & Social Media Analytics - Healthcare Analytics - Energy Analytics - Transportation Analytics - Lending Analytics - Sports Analytics - Future of Business Analytics.

Unit-V: Ethical, Legal and Organizational Issues

Issues & Challenges: Business Analytics Implementation Challenges - Privacy and Anonymization - Hacking and Insider Threats - Making Customer Comfortable.

REFERENCES:

- James R Evans, Business Analytics, Global Edition, Pearson Education
- U Dinesh Kumar, Business Analytics, Wiley India Pvt. Ltd., New Delhi
- Ger Koole, An Introduction to Business Analytics, Lulu.com, 2019
- J.D. Camm, J.J. Cochran, M. J. Fry, J.W. Ohlmann, D.R. Anderson, D.J. Sweeney, T. A. Williams - *Essentials of Business Analytics*, 2e; Cengage Learning.
- Vipin Kumar, Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Pearson Education India
- Bhimasankaram Pochiraju, Sridhar Seshadri, Essentials of Business Analytics: An Introduction to the Methodology and its Application, Springer

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(R20A6782) DATA SCIENCE TOOLS AND TECHNIQUES LAB

COURSE OBJECTIVES:

1. To learn Installation of Tableau desktop
2. To learn usage of Tableau desktop for various data sources
3. To Perform various operations on tables of data source
4. To Create various visualizations
5. To learn various charts and plotting techniques

Week 1: Installation of Tableau desktop, Exploring Various panes.

Week 2: Connecting to Various data sources (Different data bases), Working with superstore

Week 3: Perform various joins on tables from data base

Week 4: Working with filters and calculated fields.

Week 5: How to create data blend. Creating Visualization, cross tabs

Week 6: Creating following Visualizations maps, Heat Maps, Highlight Tables, Treemaps.

Week 7: Creating following Visualizations Bar Chart, Stacked Bar, Side-by-Side Bars

Week 8: Creating following Visualizations Line Charts For Time Series Analysis

Week 9: Creating following Visualizations Area Fill Charts and Pie Charts

Week 10: Creating following Visualizations Scatter Plot, Circle View, and Side-by-Side Circle Plots

Week 11: Creating following Visualizations Bullet Graph, Packed Bubble, Histogram, and Gantt Charts

Week 12: Enhance Visualization by Aggregation, Calculated Values, Field Selection, Function Selection, Parameter Selection, Building Formulas Using Table Calculations, Using Table Calculation Functions.

Week 13: CASE Study: Aggregating Disparate Datasources at a Large University

Text Books:

1. Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software® Daniel G. Murray and the InterWorks BI Team, Wiley publication.
2. Tableau 10 Complete Reference Joshua N. Milligan, Tristan Guillevin Published December 2018
3. Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics, 3rd Edition Paperback – March 27, 2019 by Joshua N. Milligan (Author)
4. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master 1st Edition by Ryan Sleeper (Author)
5. Visual Analytics with Tableau 1st Edition by Alexander Loth (Author)
6. Tableau Desktop and Web Authoring Help (<https://help.tableau.com/>)

OUTCOMES:

After successfully studying this course, students will:

1. Learn Installation of Tableau desktop
2. Learn usage of Tableau desktop for various data sources
3. Perform various operations on tables of data source
4. Create various visualizations
5. Various charts and plotting techniques

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(R20A0590) MACHINE LEARNING LAB

COURSE OBJECTIVES:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods.
3. To implement classification methods.
4. To implement clustering methods.
5. To become familiar with Dimensionality reduction Techniques.

LIST OF EXPERIMENTS

WEEK 1

- a) Implementation of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
- b) Implementation of Python Libraries for ML application such as Pandas and Matplotlib.

WEEK 2

- a) Creation and Loading different datasets in Python
- b) Write a python program to compute Mean, Median, Mode, Variance, Standard Deviation using Datasets

WEEK 3

- a) Write a python program to compute reshaping the data, Filtering the data , merging the data and handling the missing values in datasets

WEEK 4

- a) Write a Python program to implement Simple Linear Regression and plot the graph.
- b) Implementation of Multiple Linear Regression for House Price Prediction using sklearn

WEEK 5

- a) Implementation of Logistic Regression for iris using sklearn

WEEK 6

- a) Implementation of random forest algorithm

WEEK 7

- a) Implementation of naive bayes classifier algorithm and plot the graph.

WEEK 8

- a) Implementation of SVM classification and plot the graph.

WEEK 9

- a) Implementation of PCA
- b) Implementation of LDA.

WEEK 10

- a) Implementation of k-means clustering.
- b) Implementation of hierarchical clustering.

WEEK 11

- a) Implementation Q-learning

Week 12

- a) Performance analysis on a specific dataset (Mini Project)

COURSE OUTCOMES:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods.
3. To implement classification methods.
4. To implement clustering methods.
5. To become familiar with Dimensionality reduction Techniques.

(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

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

UNIT –V

Scheme of fundamental Right to Equality

Scheme of fundamental Right to certain Freedom under Article 19

Scope 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

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
SYLLABUS (R20)**

(Batches admitted from the academic year 2020 - 2021)

B.Tech

IV Year – I - Semester

(R20A0519) BIG DATA ANALYTICS

COURSE OBJECTIVES:

Students will try to learn:

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

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 CASSANDRA

MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language Cassandra: Features - CQL Data Types – CQLSH – Keyspaces - CRUD Operations – Collections - Using a Counter - Time to Live - Alter Commands - Import and Export - Querying System Tables

UNIT IV

INTRODUCTION TO MAPREDUCE PROGRAMMING AND HIVE

MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression 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 - Hive Analytic Functions

UNIT-V:

INTRODUCTION TO PIG & JASPERREPORTS

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 - JasperReport using Jaspersoft.

TEXT BOOK:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition, 2015

REFERENCE BOOKS:

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:

Students will be able to:

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

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(R20A0521) BLOCKCHAIN TECHNOLOGY

PREREQUISITES

1. Knowledge in security and applied cryptography;
2. Knowledge in distributed databases

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 own projects.
5. Understand how Cryptocurrency Regulation works

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 Public blockchain.

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 Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
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 smart contracts

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.

(R20A6610) DEEP LEARNING

COURSE 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

DIMENSIONALITY REDUCTION LINEAR (PCA, LDA) manifolds, metric learning-Auto encoders 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 Elementary Point of View,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

COURSE OUTCOMES:

1. Ability 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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<p>PROFESSIONAL ELECTIVE - V (R20A6210) DIGITAL FORENSICS</p>

COURSE OBJECTIVES:

1. This course will cover the fundamentals of digital forensics.
2. Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
3. Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
4. Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics.
5. It Provides preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics.

UNIT - I

Digital Forensics Science: Forensics science, computer forensics, and digital forensics. Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics.

UNIT - II

Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

UNIT - III

Evidence Management & Presentation: Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, define and apply probable cause.

UNIT - IV

Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, and complete a case, Critique a case. Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data.

UNIT - V

Mobile Forensics: mobile forensics techniques, mobile forensics tools. Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008. Recent trends in mobile forensic technique and methods to search and seizure electronic evidence.

TEXT BOOKS:

1. Nelson, A. Phillips, and C. Steuart, Guide to Computer Forensics and Investigations, 4th Edition, Course Technology, 2010

REFERENCE BOOKS:

1. John Sammons, The Basics of Digital Forensics, 2nd Edition, Elsevier, 2014
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Laxmi Publications, 2005.

COURSE OUTCOMES:

1. Understand relevant legislation and codes of ethics.
2. Investigate computer forensics and digital detective and various processes, policies and procedures data acquisition and validation, e-discovery tools.
3. Analyze E-discovery, guidelines and standards, E-evidence, tools and environment.
4. Apply the underlying principles of Email, web and network forensics to handle real life problems Use IT Acts and apply mobile forensics techniques.
5. Use IT Acts and apply mobile forensics techniques.

PROFESSIONAL ELECTIVE - V
(R20A7305) COMPUTER VISION

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, Pearson Education Limited 2015.
2. Szeliski, Richard, "Computer vision: algorithms and applications", Springer Science & Business Media, 2010.

REFERENCE BOOKS:

1. Hau, Chen Chi, "Handbook of pattern recognition and computer vision", World Scientific, Fifth Edition, 2015.
2. Muhammad Sarfraz, "Computer Vision and Image Processing in Intelligent Systems and Multimedia Technologies", IGI Global, 2014.
3. Theo Gevers, Arjan Gijsenij, 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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PROFESSIONAL ELECTIVE – V

(R20A0517) DISTRIBUTED SYSTEMS

COURSE OBJECTIVES:

- 1.To learn the principles, architectures, algorithms and programming models used in distributed systems.
- 2.To analyze the algorithms of mutual exclusion, election & multicast communication.
- 3.To evaluate the different mechanisms for Inter process communication and remote invocations.
- 4.To design and implement sample distributed systems.
- 5.To apply transactions and concurrency control mechanisms in different distributed environments.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of Distributed systems, Resource sharing and web, challenges. System models: Introduction, Architectural and Fundamental models.

UNIT II

Time and Global States: Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, globalStates. Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT III

Inter process Communication: Introduction ,The API for the Internet Protocols, External Data Representation and Marshalling, Client –Server Communication, Group Communication, Case Study: IPC inUNIX. Distributed Objects and Remote Invocation: Introduction, Communication between distributed objects, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT IV

Distributed File Systems: Introduction, File Service Architecture, Case Study: Sun Network File System Name Services: Name Services: Introduction, Name Services and the Domain Name System, Case study of the Global Name Service Distributed Shared Memory: Introduction, Design and Implementation issues, Sequential consistency, Release consistency , Other consistency models.

UNIT V

Transactions and Concurrency control: Introduction, Transactions, Nested Transactions, Locks, optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit

protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education. 2009.

REFERENCES:

1. Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van Steen, Second Edition,PHI. 2. Distributed Systems, An Algorithm Approach, Sikumar Ghosh, Chapman & Hall/CRC, Taylor &Fransis Group,2007.

COURSE OUTCOMES:

1. Able to compare different types of distributed systems and different models.
2. Able to analyze the algorithms of mutual exclusion, election & multicast communication.
3. Able to evaluate the different mechanisms for Interprocess communication and remote invocations.
4. Able to design and develop new distributed applications.
5. Able to apply transactions and concurrency control mechanisms in different distributed environments.

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PROFESSIONAL ELECTIVE - VI
(R20A0520) CLOUD COMPUTING

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

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 data centers

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 and Identity.

Text books:

- 1.Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.
- 2.Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.TanuraiSelvi, TMH, 2012.

References:

- 1.Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

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 into cloud
4. To effectively use the cloud services in terms of infrastructure and operating platforms.
5. To apply the services in the cloud for real world scenarios

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<p>PROFESSIONAL ELECTIVE - VI (R20A7201) TEXT ANALYTICS</p>

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 ChengXiang Zhai, eds. mining text data. Springer Science & BusinessMedia, 2012.

REFERENCE BOOKS:

1. Miner, Gary, et al. Practical text mining and statistical analysis for non-structured text dataapplications. Academic Press, 2012.
2. Srivastava, Ashok N., and Mehran Sahami. Text mining: Classification, clustering, andapplications. 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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<p align="center">PROFESSIONAL ELECTIVE - VI (R20A6213) ETHICAL HACKING</p>
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Course Objectives:

1. To understand and analyses Information security threats & countermeasures.
2. To perform security auditing & testing.
3. To understand issues relating to ethical hacking.
4. To study & employ network defense measures.
5. To understand penetration and security testing issues in wireless networks.

UNIT - I

ETHICAL HACKING OVERVIEW & VULNERABILITIES

Understanding the importance of security, Concept of ethical hacking and essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit, Phases involved in hacking

UNIT - II

FOOTPRINTING & PORT SCANNING

Footprinting - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning - Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction, Enumerating windows OS & Linux OS

UNIT - III

SYSTEM HACKING

Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.

UNIT - IV

HACKING WEB SERVICES & SESSION HIJACKING

Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools

UNIT - V

HACKING WIRELESS NETWORKS

Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.

REFERENCES:

1. Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010
2. Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
3. Rajat Khare, "Network Security and Ethical Hacking", Luniver Press, 2006
4. Ramachandran V, BackTrack 5 Wireless Penetration Testing Beginner's Guide (3rd ed.). Packt Publishing, 2011
5. Thomas Mathew, "Ethical Hacking", OSB publishers, 2003

Course Outcomes:

1. Students will be able to understand and analyse Information security threats & countermeasures.
2. Students will be able to perform security auditing & testing.
3. Students will be able to understand issues relating to ethical hacking.
4. Students will be able to study & employ network defense measures.
5. Students will be able to understand penetration and security testing issues in wireless networks

(R20A0591) BLOCKCHAIN TECHNOLOGY LAB

COURSE OBJECTIVES

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

1. Understand how blockchain systems (mainly Bitcoin and Ethereum) work, to securely interact with them,
2. Design, build, and deploy smart contracts and distributed applications.
3. Design how to create wallet and send cryptocurrency
4. Design how to create smart contract
5. Design mining puzzles.

LIST OF EXPERIMENTS

Week 1. Creating wallets and sending cryptocurrency

Week 2. Create your own cryptocurrency

Week 3. Create Toy application using Blockchain

Week 4. Create Mining puzzles

Week 5. Create Smart Contract Construction

COURSE OUTCOMES:

Students will be able to:

1. Student should be able to create wallets and cryptocurrency
2. Student able to create smart contract and applications
3. Student should be able to create mining puzzles
4. Students should able create smart contract
5. Students should able create blockchain applications

(R20A0592) BIG DATA ANALYTICS LAB

COURSE OBJECTIVES:

The course should enable the students to

- Understand the installation and configuration procedure for Hadoop and HDFS
- Students should be able to understand tools and techniques MapReduce tools
- Students should be able to understand and run the Hive tools.
- Students will gain and understand the Hive buckets partitioning
- To understand the tools and techniques in Pig and Hive tables

LIST OF EXPERIMENTS :

WEEK 1: Install, configure and run Hadoop and HDFS

WEEK 2: Implement word count / frequency programs using MapReduce
WEEK 3: Implement an MR program that processes a weather dataset

WEEK 4: Develop and run a word count program using Apache spark
WEEK 5: Design and Implement the following Mapreduce programs

a) Writing mapper programs b) Writing reducer programs

WEEK 6: Execute WordCount Program in Hive [Hands On]

WEEK 7: Develop and execute the Partitions and Buckets partitioning program in Hive.
WEEK 8: Develop and execute the Hive Tables (Managed Tables and External Tables)
WEEK 9: Design and Implement the following Hive Tables (Static and Dynamic Tables)

a) Importing Data. b) Querying Data.

WEEK 10: Pig Queries [Hands-on]

COURSE OUTCOMES:

The student should be able to

1. Improve the Knowledge of Hadoop and HDFS file system tools.
2. Identify problems, and explain, analyze, and evaluate various MapReduce Programs.
3. Choose the appropriate Hive technologies, algorithms, and approaches for the related issues.
4. Understand the important of Hive internal and external tables and Implementation.
5. Display new ideas and innovations in Hive and Pig.

BACHELOR OF TECHNOLOGY (B.Tech)

DATA SCIENCE

**COURSE STRUCTURE &
SYLLABUS (R20)**

(Batches admitted from the academic year 2020 - 2021)

B.Tech

IV Year – II - Semester

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(R20A0337) INNOVATION, STARTUPS AND ENTREPRENEURSHIP

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.