COURSE STRUCTURE
AND
DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

For
B.TECH FIRST YEAR DEGREE PROGRAMME
(Applicable for the batches admitted from 2022-2023)

VAAGDEVI COLLEGE OF ENGINEERING
(Autonomous)
Bollikunta, Warangal-506 005
Telangana State, India.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

COURSE STRUCTURE
(R22 Regulations applicable for the batches admitted from Academic Year 2022-2023)

I YEAR - I SEMESTER

S. No.	Course Code	Course	L	T	P	Credits
1.	B22MA01	Matrices and Calculus	3	1	0	4
2.	B22PH01	Applied Physics	3	1	0	4
3.	B22CS01	Programming for Problem Solving	3	0	0	3
4.	B22ME01	Engineering Workshop	0	1	3	2.5
5.	B22EN01	English for Skill Enhancement	2	0	0	2
6.	B22CS02	Elements of Computer Science & Engineering	0	0	2	1
7.	B22PH02	Applied Physics Laboratory	0	0	3	1.5
8.	B22CS03	Programming for Problem Solving Laboratory	0	0	2	1
9.	B22EN02	English Language and Communication Skills Laboratory	0	0	2	1
10.	B22MC01	Environmental Science	3	0	0	0
		Induction Program				
		Total	**14**	**3**	**12**	**20**

I YEAR - II SEMESTER

S. No.	Course Code	Course	L	T	P	Credits
1.	B22MA02	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	B22CH01	Engineering Chemistry	3	1	0	4
3.	B22ME03	Computer Aided Engineering Graphics	1	0	4	3
4.	B22EE03	Basic Electrical Engineering	2	0	0	2
5.	B22EC02	Electronic Devices and Circuits	2	0	0	2
6.	B22CS04	Python Programming Laboratory	0	1	2	2
7.	B22CH02	Engineering Chemistry Laboratory	0	0	2	1
8.	B22EE04	Basic Electrical Engineering Laboratory	0	0	2	1
9.	B22CS05	IT Workshop	0	0	2	1
		Total	**11**	**3**	**12**	**20**

II YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22MA06	Mathematical and Statistical Foundations	3	0	0	3
2	B22CS11	Data Structures	3	0	0	3
3	B22CS12	Computer Organization and Architecture	3	0	0	3
4	B22CS19	Software Engineering	3	0	0	3
5	B22CS17	Operating Systems	3	0	0	3
6	B22CS24	Introduction to Data Structures Lab	0	0	3	1.5
7	B22CS20	Operating Systems Lab	0	0	3	1.5
8	B22CS25	Software Engineering Lab	0	0	2	1
9	B22MB10	Constitution of India	3	0	0	0
10	B22CS23	Node JS/React JS/Django	0	0	2	1
		Total	**18**	**0**	**10**	**20**

II YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22CS16	Discrete Mathematics	3	0	0	3
2	B22AI01	Automata Theory and Compiler Design	3	0	0	3
3	B22CS18	Database Management Systems	3	0	0	3
4	B22AI02	Introduction to Artificial Intelligence	3	0	0	3
5	B22CS13	Object Oriented Programming through Java	3	0	0	3
6	B22CS21	Database Management Systems Lab	0	0	2	1
7	B22CS26	Java Programming Lab	0	0	2	1
8	B22AI03	Real-time Research Project/Field-Based Research Project	0	0	4	2
9	B22MC07	Gender Sensitization Lab	0	0	2	0
10	B22AI04	Prolog/Lisp/Pyswip	0	0	2	1
		Total	**15**	**0**	**12**	**20**

II YEAR-I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	B22CS27	Design and Analysis of Algorithms	3	1	0	4
2	B22AI05	Machine Learning	3	0	0	3
3	B22CS28	Computer Networks	3	0	0	3
4	B22MB01	Business Economics & Financial Analysis	3	0	0	3
5	**Professional Elective-I**		3	0	0	3
	B22CS56	Graph Theory				
	B22AI06	Introduction to Data Science				
	B22AI07	Web Programming				
	B22CS31	Image Processing				
	B22CS33	Computer Graphics				
6	B22AI08	Machine Learning Lab	0	0	2	1
7	B22CS37	Computer Networks Lab	0	0	2	1
8	B22EN03	Advanced English Communication Skills Lab	0	0	2	1
9	B22AI09	UI design-Flutter	0	0	2	1
10	B22MB06	Intellectual Property Rights	3	0	0	0
		Total	**18**	**01**	**08**	**20**

III YEAR-II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	B22AI10	Knowledge Representation and Reasoning	3	0	0	3
2	B22AI11	Data Analytics	3	0	0	3
3	B22AI12	Natural Language Processing	3	0	0	3
4	**Professional Elective–II**		3	0	0	3
	B22CS46	Software Testing Methodologies				
	B22CS35	Information Retrieval Systems				
	B22AI13	Pattern Recognition				
	B22AI14	Computer Vision and Robotics				
	B22DS04	Data Warehousing and Business Intelligence				
5	**Open Elective-I**		3	0	0	3
6	B22AI17	Natural Language Processing Lab	0	0	3	1.5
7	B22AI18	Principles of Data Analytics Lab	0	0	3	1.5
8	B22AI19	Industrial Oriented Mini Project/Internship/Skill Development Course (DevOps)	0	0	4	2
9	B22CH03	Environmental Science	3	0	0	0
		Total	**18**	**0**	**10**	**20**

Environmental Science in IIIYr IISem Should be Registered by Lateral Entry Students Only.

IV YEAR-I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	B22AI20	Deep Learning	3	0	0	3
2	B22AI21	Nature Inspired Computing	2	0	0	2
3	**Professional Elective-III**		3	0	0	3
	B22CS43	Internet of Things				
	B22AI22	Data Mining				
	B22CS44	Scripting Languages				
	B22CS45	Mobile Application Development				
	B22AI23	Cloud Computing				
4	**Professional Elective-IV**		3	0	0	3
	B22AI24	Quantum Computing				
	B22AI25	Expert Systems				
	B22AI26	Semantic Web				
	B22AI27	Game Theory				
	B22AI28	Mobile Computing				
5	**Open Elective-II**		3	0	0	3
6	B22AI31	Professional Practice, Law& Ethics	0	0	4	2
7	**Professional Elective-III Lab**		0	0	2	1
	B22CS49	Internet of Things Lab				
	B22AI32	Data Mining Lab				
	B22CS50	Scripting Languages Lab				
	B22CS51	Mobile Application Development Lab				
	B22AI33	Cloud Computing Lab				
8	B22AI34	Project Stage-I	0	0	6	3
		Total Credits	**14**	**0**	**12**	**20**

IV YEAR-II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	**Professional Elective-V**		3	0	0	3
	B22AI35	Social Network Analysis				
	B22AI36	Federated Machine Learning				
	B22AI37	Augmented Reality &Virtual Reality				
	B22AI38	Web Security				
	B22CS59	Ad-hoc & Sensor Networks				
2	**Professional Elective–VI**		3	0	0	3
	B22AI39	Speech and Video Processing				
	B22CS62	Robotic Process Automation				
	B22AI40	Randomized Algorithms				
	B22AI41	Cognitive Computing				
	B22AI42	Conversational AI				
3	**Open Elective–III**		3	0	0	3

4	B22AI45	Project Stage–II including Seminar	0	0	22	11
		Total Credits	**9**	**0**	**22**	**20**

***MC-Satisfactory/Unsatisfactory**

Open Elective I:

1	B22AI15	Fundamentals of AI
2	B22AI16	Machine Learning Basics

Open Elective II:

1	B22AI29	Introduction to Natural Language Processing
2	B22AI30	AI applications

Open Elective III:

1	B22AI43	Chat bots
2	B22AI44	Evolutionary Computing

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

MATRICES AND CALCULUS

B. Tech. I Year I Sem. **L T P C**
3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level.

Course Objectives: To learn
- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

UNIT - I: Matrices **10 L**
Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT - II: Eigen values and Eigen vectors **10 L**
Linear Transformation and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Eigen values and Vectors with reference to Symmetric, Skew-symmetric, Hermitian, Skew- Hermitian, orthogonal and Unitary Matrices. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem,
Quadratic Forms: Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms.

UNIT - III: Calculus **10 L**
Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates),
Beta and Gamma Functions: Introduction to Improper Integrals, Definition of Beta and Gamma functions, properties and other forms. Relation between Beta and Gamma functions. Evaluation of Improper integrals using Beta and Gamma functions

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications) 10 L
Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) **8 L**
Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Course outcomes: After learning the contents of this paper the student must be able to

CO-1: Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations

CO-2: Find the Eigen values and Eigen vectors. Reduce the quadratic form to canonical form using orthogonal transformations.

CO-3: Solve the applications on the mean value theorems.

CO-4: Evaluate the improper integrals using Beta and Gamma functions

CO-5: Find the extreme values of functions of two variables with/ without constraints. Evaluate the multiple integrals and apply the concept to find areas, volumes.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. RajnishVerma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

VAAGDEVI COLLEGE OF ENGINEERING
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APPLIED PHYSICS

B. Tech. I Year I Sem. **L T P C**
3 1 0 4

Pre-requisites: 10 + 2 Physics.

Course Objectives: The objectives of this course for the student are to:

- Understand the basic principles of quantum physics and band theory of solids.
- Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
- Study the fundamental concepts related to the dielectric, magnetic and energy materials.
- Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
- Study the characteristics of lasers and optical fibres.

UNIT - I: QUANTUM PHYSICS AND SOLIDS

QUANTUM MECHANICS: Introduction To Quantum Physics - Blackbody Radiation – Stefan-Boltzmann's Law, Wein's And Rayleigh-Jean's Law, Planck's Radiation Law (qualitative) - Photoelectric Effect- waves and particles – de Broglie hypothesis – properties of matter waves- Davisson And Germer Experiment –Heisenberg Uncertainty Principle - Born Interpretation Of The Wave Function – Time Independent Schrodinger Wave Equation - Particle in One Dimensional Potential Box – **SOLIDS:** Free Electron Theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac Distribution - Bloch's Theorem -Kronig-Penney Model (qualitative) - E-K Diagram- Effective Mass Of electron- Origin Of Energy Bands- Classification Of Solids.

UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic And Extrinsic Semiconductors – Hall Effect - Direct And Indirect Band Gap Semiconductors - Construction, Principle , Operation And Characteristics Of P-N Junction Diode, Zener Diode And Bipolar Junction Transistor (BJT)–LED, PIN Diode, Avalanche Photo Diode (APD) And Solar Cells, Their Structure, Materials, Working Principle And Characteristics.

UNIT - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

DIELECTRIC MATERIALS: Basic Definitions- Types of Polarizations (Qualitative) - Ferroelectric, Piezoelectric, and Pyroelectric Materials – Applications – Liquid Crystal Displays (LCD) And Crystal Oscillators. **MAGNETIC MATERIALS:** Hysteresis - Soft And Hard Magnetic Materials - Magnetostriction, Magnetoresistance - Applications - Bubble Memory Devices, Magnetic Field Sensors And Multi-Ferroics. **ENERGY MATERIALS**: Conductivity of Liquid and Solid Electrolytes- Superionic Conductors - Materials Andelectrolytes for Super Capacitors - Rechargeable Ion Batteries, Solid Fuel Cells.

UNIT - IV: NANOTECHNOLOGY

Nanoscale, Quantum Confinement, Surface to Volume Ratio, Bottom-Up Fabrication: Sol-Gel, Precipitation, Combustion Methods – Top-Down Fabrication: Ball Milling - Physical Vapor Deposition (PVD) - Chemical Vapor Deposition (CVD) - Characterization Techniques - XRD, SEM &TEM - Applications of Nano materials.

UNIT - V: LASER AND FIBER OPTICS

LASERS: Laser Beam Characteristics-Three Quantum Processes-Einstein Coefficients And Their Relations- Lasing Action - Pumping Methods- Ruby Laser, He-Ne Laser, Nd: YAG Laser- Semiconductor Laser-Applications Of Laser. **FIBER OPTICS**: Introduction To Optical Fiber- Advantages Of Optical Fibers - Total Internal Reflection construction of Optical Fiber - Acceptance Angle - Numerical Aperture-

Classification Of Optical Fibers losses in Optical Fiber - Optical Fiber For Communication System - Applications.

Course Outcomes:

On successful completion of this course, students are able to:

- **CO-1:** Understand physical world from fundamental point of view by the concepts of Quantum Mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
- **CO-2:** Identify the role of semiconductor devices in science and engineering Applications.
- **CO-3:** Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
- **CO-4:** Appreciate the features and applications of Nano materials.
- **CO-5:** Understand various aspects of Lasers and Optical fibre and their applications in diverse fields.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"-S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill,4thEdition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons, 11th Edition,2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, PragathiPrakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition

VAAGDEVI COLLEGE OF ENGINEERING
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PROGRAMMING FOR PROBLEM SOLVING

B. Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

UNIT - I: Introduction to Programming Compilers, compiling and executing program. Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode with examples, Program design and structured programming
Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops
I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:
Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings
Structures: Defining structures, initializing structures, unions, Array of structures
Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

UNIT - III: Preprocessor and File handling in C:
Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:
Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

COURSE OUTCOMES:

On successful completion of this course, students are able to:

CO-1: To write algorithms and to draw flowcharts for solving problems. To convert the algorithms/flowcharts to C programs.

CO-2: To use arrays, pointers, strings and structures to write C programs.

CO-3: Ability to design and implement different types of file structures using standard methodology.

CO-4: To decompose a problem into functions and to develop modular reusable code.

CO-5: Searching and sorting problems.

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson. Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

VAAGDEVI COLLEGE OF ENGINEERING
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ENGINEERING WORKSHOP

B. Tech. I Year I Sem. **L T P C**

0 1 3 2.5

Pre-requisites: Practical skill.

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

COURSE OUTCOMES:

On successful completion of this course, students are able to:

CO-1: Study and practice on machine tools and their operations.
CO-2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
CO-3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
CO-4: Apply basic electrical engineering knowledge for house wiring practice.

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah / K.L. Narayana / Scitech.
2. Workshop Manual / Venkat Reddy/ BSP.

VAAGDEVI COLLEGE OF ENGINEERING
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ENGLISH FOR SKILL ENHANCEMENT

B. Tech. I Year I Sem.

L	T	P	C
2	0	0	2

Course Objectives: This course will enable the students to:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Develop study skills and communication skills in various professional situations.
- Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

UNIT - I

Chapter entitled '**Toasted English' by R.K.Narayan** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT - II

Chapter entitled **'Appro JRD' by Sudha Murthy** from **"English: Language, Context and Culture" published** by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice Nature and

Writing: Style of Writing- Defining /Describing People, Objects,Places and Events – Classifying-Providing Examples or Evidence.

UNIT - III

Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT - V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (Covering all the other aspects of grammar whichwere not covered in the previous units)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: **Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculumare covered in the syllabus of ELCS Lab Course.**

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note**: **2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

COURSE OUTCOMES:

On successful completion of this course, students are able to:

CO-1: Understand the importance of vocabulary and sentence structures.

CO-2: Choose appropriate vocabulary and sentence structures for their oral and written communication.

CO-3: Demonstrate their understanding of the rules of functional grammar.

CO-4: Develop comprehension skills from the known and unknown passages.

CO-5: Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts and acquire basic proficiency in reading and writing modules of English.

TEXT BOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press 3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

B. Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Course Objective: To provide an overview of the subjects of computer science and engineering.

UNIT – I

Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

UNIT – II

Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, data structures – definition, types of data structures

UNIT – III

Operating systems: Functions of operating systems, types of operating systems, Device & Resource management

Database Management Systems: Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

UNIT – IV

Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communication.

World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, Social media, Online social networks.

Security – information security, cyber security, cyber laws

UNIT – V

Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development, natural language processing, image and video processing.

Cloud Basics

COURSE OUTCOMES:

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

CO-1: Know the working principles of functional units of a basic Computer

CO-2: Understand program development, the use of data structures and algorithms inproblem solving.

CO-3: Know the need and types of operating system, database systems.

CO-4: Understand the significance of networks, internet, WWW and cyber security.

CO-5: Understand Autonomous systems, the application of Artificial intelligence.

TEXT BOOK:

1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCE BOOKS:

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

APPLIED PHYSICS LABORATORY (B22PH02)

B. Tech. I Year I Sem. **L T P C**
0 0 3 1.5

Course Objectives: The objectives of this course for the student to

- Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
- Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
- Able to measure the characteristics of dielectric constant of a given material.
- Study the behavior of B-H curve of ferromagnetic materials.
- Understanding the method of least squares fitting.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor. 3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material
11. a) Determination of the beam divergence of the given LASER beam
    b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
12. Understanding the method of least squares – torsional pendulum as an example.

Note: *Any 8 experiments are to be performed.*

COURSE OUTCOMES:

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

CO-1: Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
CO-2: Appreciate quantum physics in semiconductor devices and optoelectronics.
CO-3: Gain the knowledge of applications of dielectric constant.
CO-4: Understand the variation of magnetic field and behavior of hysteresis curve.
CO-5: Carried out data analysis.

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

PROGRAMMING FOR PROBLEM SOLVING LAB

B. Tech. I Year I Sem. **L T P C**
0 0 2 1

[Note:The programs may be executed using any available Open Source/ Freely available IDESome of theTools available are:
CodeLite: https://codelite.org/ Code:Blocks:
http://www.codeblocks.org/DevCpp :
http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems:

a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that declares Class awarded for a given percentage of marks, where marks <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15

e. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value.
   1-x/2 +x^2/4-x^3/6.
i. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+…….+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
c. Write a program to count the occurrence of an element in an array.
d. Write a C program that uses functions to perform the following:
e. Addition of Two Matrices
f. Multiplication of Two Matrices
g. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
h. Write C programs that use both recursive and non-recursive functions
i. To find the factorial of a given integer.
j. To find the GCD (greatest common divisor) of two given integers.
k. To find x^n
l. Write C program to demonstrate call by value and call by reference.
m. Write a program to pass a single dimensional array as a parameter to a function.
n. Write a program for reading elements using a pointer into an array and display the values using the array.
o. Write a program for display values reverse order from an array using a pointer.
p. Write a program through a pointer variable to sum of n elements from an array.

Files:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
d. Write a C program that does the following:
   It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)
   Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)
   The program should then read all 10 values and print them back.
e. Write a C program to merge two files into a third file (i.e., the contents of the first filefollowed by those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string into a given main string from a given position.
e. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
h. Write a C program to count the lines, words and characters in a given text.
i. Write a program to read ‘n’ strings and search the given substring.
j. Write a program to sort the strings in logical order.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * *
                                             *
                                4 4 4 4    * *
                                           *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

d. Write a C program that sorts the given array of integers using selection sort in descending order.
e. Write a C program that sorts the given array of integers using insertion sort in ascending order.
f. Write a C program that sorts a given array of names.

COURSE OUTCOMES:

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

CO-1: Understand basic structure of the C Programming, data types, declaration and usage of variables,control structures and all related concepts.
CO-2: Ability to understand any algorithm and Write the C programming code in executable form.
CO-3: Implement Programs using functions, pointers and arrays, and use the pre-processors to solve realtime problems.
CO-4: Ability to use file structures and implement programs on files and implement programs on sortingand searching techniques.

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition,Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

B. Tech. I Year I Sem.

L	T	P	C
0	0	2	1

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize the impact of dialects.
- To train students to use language appropriately for public speaking, group discussions and interviews

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives:

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content.
- Listening to fill information.
- Intensive listening.
- Listening for specific information.

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts.
2. To enable students express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise-I

CALL Lab*:*

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. *Practice*: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*

ICS Lab*:*

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise II

CALL Lab*:*

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*

ICS Lab*:*

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -*Testing Exercises*

ICS Lab*:*

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise IV

CALL Lab*:*

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - *Testing Exercises*

ICS Lab:

Understand: Public Speaking–Exposure to Structured Talks -Non-verbal Communication - Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise –V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:

Understand: Group Discussion

Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable
ii) Configuration High Fidelity
Headphones

2. ***Interactive Communication Skills (ICS) Lab :***

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1,2,3.* CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor- made to suit the contents of the syllabus.

COURSE OUTCOMES:

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

CO-1:	Understand the nuances of English language through audio-visual experience and group activities.
CO-2:	Speak with clarity and confidence which in turn enhances their employability skills.
CO-3:	Develop their listening skills so that they may appreciate its role in developing LSRW skills language and improve their pronunciation.
CO-4:	Involve the students in speaking activities in various contexts.
CO-5:	Speak with clarity and confidence which in turn enhance their employability skills.

Suggested Software:

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley.
3. Punctuation Made Easy by Darling Kindersley.
4. Oxford Advanced Learner's Compass, 10^{th} Edition.
5. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
7. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
8. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
9. Digital All
10. Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd.

2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press.

3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford University Press.

4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd.

5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* Cambridge University Press.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENVIRONMENTAL SCIENCE

B. Tech. I Year I Sem. **L T P C**

3 0 0 0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations.

UNIT - I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In- Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

COURSE OUTCOMES:

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

CO-1: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B. Tech. I Year II Sem. **L T P C**
3 1 0 4

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

UNIT-I: First Order ODE **8 L**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order **10 L**

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type , sin, cos , polynomials in method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

UNIT-III: Laplace transforms **10L**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation **10L**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration **10L**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

COURSE OUTCOMES:

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

- **CO-1:** Identify whether the given differential equation of first order is exact or not
- **CO-2:** Solve higher differential equation and apply the concept of differential equation to real world problems.
- **CO-3:** Extend the basic concepts of differential calculus to vector functions in a simple and natural fashion.
- **CO-4:** Extend the basic concepts of differential calculus to vector functions in a simple and natural fashion.
- **CO-5:** Evaluate the line, surface and volume integrals and converting them from one to another

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENGINEERING CHEMISTRY

B. Tech. I Year II Sem.

L	T	P	C
3	1	0	4

Course Objectives:

- To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
- To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
- To imbibe the basic concepts of petroleum and its products.
- To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

UNIT - I: Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation - Determination of F^- ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water -Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods -Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry & Corrosion [8]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials: [8]

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: **Engineering Materials: [8]**

Cement: Portland cement, its composition, setting and hardening. **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

COURSE OUTCOMES:

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

CO-1: Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.

CO-2: The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.

CO-3: They can learn the fundamentals and general properties of polymers and other engineering materials.

CO-4: They can predict potential applications of chemistry. Practical utility in order to become good engineers and entrepreneurs.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011).

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

COMPUTER AIDED ENGINEERING GRAPHICS

B. Tech. I Year II Sem. **L T P C**
1 0 4 3

Course Objectives:

- To develop the ability of visualization of different objects through technical drawings
- To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

UNIT – I

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

UNIT – V

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

COURSE OUTCOMES:

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

CO-1: Apply computer aided drafting tools to create 2D and 3D objects.Sketch conics and different types of solid.

CO-2: Appreciate the need of Sectional views of solids and Development of surfaces of solids

CO-3: Read and interpret engineering drawings.

CO-4: Conversion of orthographic projection into isometric view and vice versa manually and by usingcomputer aided drafting.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar.
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill.
2. Engineering Graphics and Design, WILEY, Edition 2020.
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford.
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers.

Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

BASIC ELECTRICAL ENGINEERING

B. Tech. I Year II Sem.

L	T	P	C
2	0	0	2

Prerequisites: Mathematics.

Course Objectives:

- To understand DC and Single & Three phase AC circuits
- To study and understand the different types of DC, AC machines and Transformers.
- To import the knowledge of various electrical installations and the concept of power, power factor and its improvement.

UNIT-I:

D.C. Circuits: Electrical circuit elements(R, LandC),voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Super position, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits .

UNIT-II:

Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, realpower, reactive power, apparent power, power factor, Analysis of single- phase ac circuits consisting of R, L, C, RL, RC, RLC combinations(series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relationsin star and delta connections.

UNIT-III:

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections .

UNIT-IV:

Electrical Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT-V:

Electrical Installations: Components of LT Switch gear: Switch Fuse Unit(SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

COURSE OUTCOMES:

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

CO-1: Analyze circuit theorems, mesh and nodal analysis, series and parallel networks, electrical power.

CO-2: Gain knowledge on AC circuits, reactance, Impedance, Susceptance and Admittance and Power Factor

CO-3: Learn the working principle of DC motors, Transformers

CO-4: Understand the construction and performance characteristics of Electrical Machines

CO-5: Introduce components of Low Voltage Electrical Installations.

TEXTBOOKS:

1. D.P.KothariandI.J.Nagrath,"BasicElectricalEngineering",TataMcGrawHill,4th Edition,2019.
2. MSNaiduandSKamakshaiah,"BasicElectricalEngineering",TataMcGrawHill,2nd Edition, 2008.

REFERENCEBOOKS:

1. P.Ramana,M.Suryakalavathi,G.T.Chandrasheker,"BasicElectricalEngineering",S.Chand, 2nd Edition,2019.
2. D.C.Kulshreshtha,"BasicElectricalEngineering",McGrawHill,2009
3. M.S.Sukhija,T.K.Nagsarkar,"BasicElectricalandElectronicsEngineering",Oxford,1st Edition,2012.
4. AbhijitChakrabarthi,SudiptaDebnath,ChandanKumarChanda,"BasicElectricalEngineering",2nd Edition,McGrawHill,2021.
5. L.S.Bobrow,"FundamentalsofElectricalEngineering",OxfordUniversityPress,2011.
6. E.Hughes,"ElectricalandElectronicsTechnology",Pearson,2010.
7. V. D.Toro, "ElectricalEngineeringFundamentals",PrenticeHallIndia,1989.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ELECTRONIC DEVICES AND CIRCUITS

B. Tech. I Year II Sem. **L T P C**
2 0 0 2

Course Objectives:

- To familiarize the student with the principle of operation of Junction diode, BJT and FET.
- To know the applications of devices.
- To know the switching characteristics of devices.
- To understand the characteristics and operation of various special purpose devices.

UNIT - I

Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

UNIT - IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

COURSE OUTCOMES:

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

CO-1: Acquire the knowledge of PN diode and its characteristics.
CO-2: Design the rectifiers with and without filters for specified DC voltage.
CO-3: Illustrate the voltage- current characteristics of Junction Transistor and different configurations of transistor.
CO-4: Acquire knowledge about the construction, theory and characteristics of FET and MOSFET.
CO-5: Acquire the knowledge about the role of special purpose devices and their applications.

TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

PYTHON PROGRAMMING LABORATORY

B. Tech. I Year II Sem.

L	T	P	C
0	1	2	2

Course Objectives:

- To install and run the Python interpreter.
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Lecture- 1: Introduction to Python, Write and Execute a simple python Program, Basic Commands, Variables, Statements , Input /Output, Keywords, Standard Data Types, Strings, Operands and Operators .

Lecture-2: Understanding the Decision Control Structures: The if Statement, A Word on Indentation, The if … else Statement, The if … elif … else Statement.

Lecture- 3: Loop Control Statements: The while Loop, The for Loop, Infinite Loops, Nested Loops. The break Statement, The continue Statement.

Lecture- 4: Function Definition and Execution, Scoping, Arguments, Argument Calling by Keywords, Default Arguments, Function Rules, Return Values.

Lecture- 5: Lists: List, Creating List, Updating the Elements of a List, Sorting the List Elements. Storing Different Types of Data in a List, Nested Lists, Nested Lists as Matrices.

Lecture-6: Tuples: Creating and Accessing the Tuple Elements, Basic Operations on Tuples, Functions to Nested Tuples, Inserting, Modifying and Deleting Elements from a Tuple.

Lecture- 7: Exceptions : What is an Exception?, Exception Handling: try..except..else.., try..finally.., Exceptions Nest, Raising Exceptions, Built-In Exceptions.

Lecture- 8: Files: Working with Files and Directories, File Processing, reading from files, writing to files, merging file contents, Controlling File I/O.

Lecture- 9: Python Classes and Objects. Inheritance in Python.Types of inheritance Python.

Lecture- 10: numpy, Plotpy and Scipy libraries of python and their functionalities. Basic GUI programming using these libraries: text labels and buttons.

Week -1: (Lecture- 1)

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help () to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. i) Write a program to calculate compound interest when principal, rate and number of periods is given.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print

Week - 2: (Lecture- 2 & 3)

1. Print the below triangle using for loop. 5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3: (Lecture- 5)

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4: (Lecture- 4)

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
   i). Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
   ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
   iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
   ii) Remove the given word in all the places in a string?
   iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

Week - 5: (Lecture- 5)

1. i) Write a python program that defines a matrix and prints
   ii) Write a python program to perform addition of two square matrices
   iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.

Week-6: (Lecture- 10)

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
   b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
   c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
   d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7: (Lecture- 7)

1. Use the structure of exception handling for all general purpose exceptions.

Week - 8: (Lecture- 8)

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

Week - 9: (Lecture- 9)

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR.
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder.
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

COURSE OUTCOMES:

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

CO-1: Develop the application specific codes using python.
CO-2: Understand Strings, Lists, Tuples and Dictionaries in Python.
CO-3: Understand the structure of exception handling for all general purpose exceptions.
CO-4: Verify programs using modular approach, file I/O, Python standard library. Implement Digital Systems using Python.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1st Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson.
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition.
5. Think Python, Allen Downey, Green Tea Press.
6. Core Python Programming, W. Chun, Pearson.
7. Introduction to Python, Kenneth A. Lambert, Cengage

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ENGINEERING CHEMISTRY LABORATORY

B. Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.

II. Conductometry: Estimation of the concentration of an acid by Conductometry.

III. Potentiometry: Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. Determination of pH: Determination of pH unknown acid solution by using Quinhydrone electrode.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon –6,6.

VI. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. Determination of surface tension of a given liquid using Stalagmometer.

VIII. Virtual lab experiments:

1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications.
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

COURSE OUTCOMES:

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

CO-1: **Able to d**etermine the hardness of water.

CO-2: Able to perform methods such as conductometry, potentiometry and pH metry in Order to find out the concentrations or equivalence points of acids and pH of unknown solutions.

CO-3: Students are able to prepare polymers like bakelite and nylon-6,6.

CO-4: Estimations saponification value, and viscosity of lubricant oils.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

BASIC ELECTRICAL ENGINEERING LABORATORY

B. Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Prerequisites: Basic Electrical Engineering.

Course Objectives:

- To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
- To study the transient response of various R, L and C circuits using different excitations.
- To determine the performance of different types of DC, AC machines and Transformers.

List of experiments/ demonstrations:

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.
9. Verification of Super position theorem.
10. Load Test on Single Phase Transformer(Calculate Efficiency and Regulation)

COURSE OUTCOMES:

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

CO-1: Verify the basic electrical circuits through different laws and theorems

CO-2: Analyse the transient responses of R, L and C circuits for DC excitation

CO-3: Create resonance condition in series R-L-C circuit

CO-4: Analyze the performance of DC shunt motor, single phase transformer and Three-phase Induction Motor.

TEXTBOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCEBOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand,2nd Edition,2019.
2. D.C.Kulshreshtha,"BasicElectricalEngineering",McGrawHill,2009
3. M. S.Sukhija, T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1stEdition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2ndEdition, McGraw Hill,2021.
5. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E.Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

IT WORKSHOP

B. Tech. I Year II Sem. **L T P C**
0 0 2 1

Course Objectives:

- The IT Workshop for engineers is a training lab course spread over 60 hours.
- The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power point

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides

COURSE OUTCOMES:

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

CO-1: Perform Hardware troubleshooting. Understand Hardware components and inter dendencies.

CO-2: Safeguard computer systems from viruses/worms.

CO-3: Perform calculations using spreadsheets.

CO-4: Document/ Presentation preparation.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*

2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*

3. Introduction to Information Technology, ITL Education Solutions limited, *PearsonEducation.* 4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)

4. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.

5. IT Essentials PC Hardware and Software Companion Guide Third Edition by DavidAnfinson and Ken Quamme. – *CISCO Press, Pearson Education*.

6. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition byPatrick Regan – CISCO Press, *Pearson Education.*

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

MATHEMATICAL AND STATISTICAL FOUNDATIONS

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Mathematics courses of first year of study.

Course Objectives:

- The Number Theory basic concepts useful for cryptography etc
- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making inferences.
- Stochastic process and Markov chains.

UNIT - I

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers **Congruences:** Introduction to congruences, Linear congruences, The Chinese remainder theorem,Systems of linear congruences

UNIT - II

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple LinearRegression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study**Random Variables and Probability Distributions:** Concept of a Random Variable, DiscreteProbability Distributions, Continuous Probability Distributions, Statistical Independence.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT - III

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial

Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t–Distribution, F- Distribution.

UNIT - IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

UNIT - V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process.Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, nstep transition probabilities, Markov chain, Steady state condition, Markov

analysis.

Course Outcomes: After learning the contents of this course, the student must be able to

CO-1: Apply the number theory concepts to cryptography domain
CO-2: Apply the concepts of probability and distributions to some case studies
CO-3: Correlate the material of one unit to the material in other units
CO-4: Resolve the potential misconceptions and hazards in each topic of study.

TEXT BOOKS:

1. Kenneth H. Rosen, Elementary number theory & its applications, sixth edition, Addison-Wesley, ISBN 978 0-321-50031-1.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statisticsfor Engineers & Scientists, 9th Ed. Pearson Publishers.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

REFERENCE BOOK:

1. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications
2. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & SonsLtd, 2004.
3. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

DATA STRUCTURES

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Programming for Problem Solving.

Course Objectives

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms.

UNIT - I

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations.

UNIT - II

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing- linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, theKnuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

Course Outcomes:

CO-1: Ability to select the data structures that efficiently model the information in a problem.

CO-2: Ability to assess efficiency trade-offs among different data structure implementations orcombinations.

CO-3: Implement and know the application of algorithms for sorting and pattern matching.

CO-4: Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.

2. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan,Cengage Learning.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

COMPUTER ORGANIZATION AND ARCHITECTURE

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Pre-requisite: A Course on "Digital Electronics".

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basicarchitectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer andintroduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, microprogrammed control unit,pipelining and vector processing, memory organization and I/O systems, and multiprocessors

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output andInterrupt.

UNIT - II

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, DataTransfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating
– point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer,Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, CacheMemory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, InstructionPipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter-processor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Course Outcomes:

- CO-1: Understand the basics of instruction sets and their impact on processor design.
- CO-2: Demonstrate an understanding of the design of the functional units of a digital computer system.
- CO-3: Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
- CO-4: Design a pipeline for consistent execution of instructions with minimum hazards.
- CO-5: Recognize and manipulate representations of numbers stored in digital computers

TEXT BOOK:

1. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, V th Edition, McGrawHill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4 th Edition, PHI/Pearson.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

SOFTWARE ENGINEERING

B. Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams.

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 models**: The waterfall model, Spiral model and Agile methodology

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.

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, conceptual model of UML, basic structural modeling, class diagrams, sequencediagrams, collaboration diagrams, use case diagrams, component diagrams.

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.

Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT - V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, softwarereliability, the ISO 9000 quality standards.

Course Outcomes:

CO-1: 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).

CO-2: Identify and apply appropriate software architectures and patterns to carry out high level designof a system and be able to critically compare alternative choices.

CO-3: Will have experience and/or awareness of testing problems and will be able to develop a simpletesting report.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw HillInternational Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCE BOOKS:

1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson,Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-HillCompanies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

OPERATING SYSTEMS

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization and Architecture".

Course Objectives:

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization,deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocesscommunication and I/O in Unix

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II

CPU Scheduling-Scheduling Criteria, Scheduling Algorithms,Multiple-Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

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

UNIT - III

Process Management and Synchronization - The Critical Section Problem, SynchronizationHardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors **Interprocess Communication Mechanisms:** IPC between processes on a single computer system,IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV

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, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

Course Outcomes:

CO-1: Will be able to control access to a computer and the files that may be shared
CO-2: Demonstrate the knowledge of the components of computers and their respective roles incomputing.
CO-3: Ability to recognize and resolve user problems with standard operating environments.
CO-4: Gain practical knowledge of how programming languages, operating systems, andarchitectures interact and how to use each effectively.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition,John Wiley.
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems- Internals and Design Principles, William 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.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

INTRODUCTION TO DATA STRUCTURES LAB

B. Tech. II Year I Sem.

L	T	P	C
0	0	3	1.5

Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

List of Experiments:

1. Write a program that uses functions to perform the following operations on singly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linkedlist.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integersin ascending order
   i) Quick sort ii) Heap sort iii) Merge sort
7. Write a program to implement the tree traversal methods(Recursive and Non Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVLtrees v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

Course Outcomes:

CO-1: Ability to develop C programs for computing and real-life applications using basic elements likecontrol statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.

CO-2: Ability to Implement searching and sorting algorithms

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan,Cengage Learning.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

OPERATING SYSTEMS LAB

B.Tech. II Year I Sem.

L	T	P	C
0	0	3	1.5

Prerequisites: A course on "Programming for Problem Solving", A course on "Computer Organizationand Architecture".

Co-requisite: A course on "Operating Systems".

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts throughsimulation
- Introduce basic Unix commands, system call interface for process management, interprocesscommunication and I/O in Unix.

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) RoundRobin d) priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close,fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores usingUNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms

   a) Pipes

   b) FIFOs

   c) Message Queues

   d) Shared Memory

6. Write C programs to simulate the following memory management techniques

   a) Paging b)Segmentation

7. Write C programs to simulate Page replacement policies

   a) FCFS

   b) LRU

   c) Optimal

Course Outcomes:

CO-1: Simulate and implement operating system concepts such as scheduling, deadlockmanagement, file management and memory management.

CO-2: Able to implement C programs using Unix system calls.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition,John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William 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

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

SOFTWARE ENGINEERING LAB

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites:

- A course on "Programming for Problem Solving".

Co-requisite:

- A Course on "Software Engineering".

Course Objectives:

- To have hands on experience in developing a software project by using various softwareengineering principles and methods in each of the phases of software development.

List of Experiments:

Do the following seven exercises for any two projects given in the list of sample projects or any otherProjects:

1. Development of problem statements.
2. Preparation of Software Requirement Specification Document, Design Documents and TestingPhase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Course Outcomes:

CO-1: Ability to translate end-user requirements into system and software requirements

CO-2: Ability to generate a high-level design of the system from the software requirements

CO-3: Will have experience and/or awareness of testing problems and will be able to develop asimple testing report

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson,Pearson Education.

REFERENCE BOOKS:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, JohnWiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

CONSTITUTION OF INDIA

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	0

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rightsperspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutionalrole and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin 1917 and its impact on the initial drafting of the Indian Constitution.

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.

Unit - 2 Philosophy of the Indian Constitution- Preamble Salient Features

Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes: Students will be able to:

CO-1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before thearrival of Gandhi in Indian politics.

CO-2: Discuss the intellectual origins of the framework of argument that informed theconceptualization of social reforms leading to revolution in India.

CO-3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Constitution.

CO-4: Discuss the passage of the Hindu Code Bill of 1956.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

NODE JS/ REACT JS/ DJANGO

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming.
- To experiment with single page application development using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 andexperiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed inexperiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various sessiontracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS,path, event.
10. Develop an express web application that can interact with REST API to perform CRUDoperations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation usingchart.js
14. Create a TODO application in react with necessary components and deploy it into github.

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

- CO-1: Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
- CO-2: Demonstrate Advanced features of JavaScript and learn about JDBC
- CO-3: Develop Server – side implementation using Java technologies like
- CO-4: Develop the server – side implementation using Node JS.
- CO-5: Design a Single Page Application using React.

REFERENCE BOOKS:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2ndEdition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node, 2nd Edition, A Press.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

DISCRETE MATHEMATICS

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- Introduces elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

UNIT - I

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT - III

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as PartiallyOrdered Sets, Boolean Algebra.

UNIT - IV

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT - V

Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits,Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Course Outcomes:

C0-1. Understand and construct precise mathematical proofs
C0-2. Apply logic and set theory to formulate precise statements
C0-3. Analyze and solve counting problems on finite and discrete structures
C0-4. Describe and manipulate sequences
C0-5. Apply graph theory in solving computing problems

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel,Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS:

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearsoneducation, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

AUTOMATA THEORY AND COMPILER DESIGN

B. Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Nil

Course Objectives:

- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To understand deterministic and non-deterministic machines and the differences betweendecidability and undecidability.
- Introduce the major concepts of language translation and compiler design and impart theknowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use ofsymbol tables, intermediate code generation

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the CentralConcepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automatawith Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA,Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammarsand Languages.

UNIT - III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalenceof PDA and CFG's, Acceptance by final state

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, Thelanguage of a Turing machine

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An UndecidableProblem That is RE, Undecidable Problems about Turing Machines

UNIT - IV

Introduction: The structure of a compiler,

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of

Tokens, TheLexical- Analyzer Generator Lex,

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing,Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers.

UNIT - V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management.

Course Outcomes:

CO-1: Able to employ finite state machines for modeling and solving computing problems.
CO-2: Able to design context free grammars for formal languages.
CO-3: Able to distinguish between decidability and undecidability.
CO-4: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
CO-5: Acquire skills in using lex tool and design LR parsers

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft,Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan,Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Compiler Construction, Kenneth C. Louden, Thomson. Course Technology

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

DATABASE MANAGEMENT SYSTEMS

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites: A course on "Data Structures".

Course Objectives:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transactioncontrol, concurrency control, storage structures and access techniques.

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/alteringtables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and

EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL,triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, 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, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM),

B+ Trees: A Dynamic Index Structure.

Course Outcomes:

CO-1: Gain knowledge of fundamentals of DBMS, database design and normal forms
CO-2: Master the basics of SQL for retrieval and management of data.
CO-3: Be acquainted with the basics of transaction processing and concurrency control.
CO-4: Familiarity with database storage structures and access techniques

TEXT BOOKS:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition.
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

B.Tech. II Year II Sem. **L T P C**

3 0 0 3

Prerequisite: Knowledge on Data Structures.

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning.
- To understand the concepts of state space representation, exhaustive search, heuristic
- search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machinelearning.

UNIT - I

Introduction to AI - Intelligent Agents, Problem-Solving Agents,
Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT-II

Games - Optimal Decisions in Games, Alpha–Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, **Logic-** Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT-III

First-Order Logic - Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference,Unification, Forward Chaining, Backward Chaining, Resolution.
Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

UNIT-IV

Planning - Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning.

UNIT-V

Probabilistic Reasoning:
Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relationaland First- Order Probability.

Course Outcomes:

CO-1: Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.

CO-2: Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.

CO-3: Learn different knowledge representation techniques.

CO-4: Understand the concepts of state space representation, exhaustive search, heuristic searchtogether with the time and space complexities.

CO-5: Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.

CO-6: Analyze Supervised Learning Vs. Learning Decision Trees

TEXT BOOK:

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig,Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B.Tech. II Year II Sem.

L	T	P	C
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Course Objectives:

- To Understand the basic object-oriented programming concepts and apply them in problemsolving.
- To Illustrate inheritance concepts for reusing the program.
- To Demonstrate multitasking by using multiple threads and event handling
- To Develop data-centric applications using JDBC.
- To Understand the basics of java console and GUI based programming

UNIT - I

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT - II

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT - III

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

UNIT - IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox

groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border,grid, flow, card and grid bag.

UNIT - V

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes,Tabbed Panes, Scroll Panes, Trees, and Tables.

Course Outcomes:

CO-1: Demonstrate the behavior of programs involving the basic programming constructs like controlstructures, constructors, string handling and garbage collection.

CO-2: Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by usingextend and implement keywords

CO-3: Use multithreading concepts to develop inter process communication.

CO-4: Understand the process of graphical user interface design and implementation using AWT orswings.

CO-5: Develop applets that interact abundantly with the client environment and deploy on the server.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley& sons.
2. An Introduction to OOP, third edition, T. Budd, Pearson education.
3. Introduction to Java programming, Y. Daniel Liang, Pearson education.
4. An introduction to Java programming and object-oriented application development, R.A.Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition,Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition,Pearson Education
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8. Java and Object Orientation, an introduction, John Hunt, second edition, Springer. 9. Maurach'sBeginning Java2 JDK 5, SPD.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

DATABASE MANAGEMENT SYSTEMS LAB

B.Tech. II Year II Sem.

L	T	P	C
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Co-requisites: "Database Management Systems"

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
   B. Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

Course Outcomes:

CO-1: Design database schema for a given application and apply normalization
CO-2: Acquire skills in using SQL commands for data definition and data manipulation.
CO-3: Develop solutions for database applications using procedures, cursors and triggers

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill,3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

JAVA PROGRAMMING LAB

B.Tech. II Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives:

- To understand OOP principles.
- To understand the Exception Handling mechanism.
- To understand Java collection framework.
- To understand multithreaded programming.
- To understand swing controls in Java.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else conditionand a for loop.

2. Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction]

3. Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.

4. Write a Java program on Random Access File class to perform different read and write operations.

5. Write a Java program to demonstrate the working of different collection classes. [Use packagestructure to store multiple classes].

6. Write a program to synchronize the threads acting on the same object. [Consider the exampleof any reservations like railway, bus, movie ticket booking, etc.]

7. Write a program to perform CRUD operations on the student table in a database using JDBC.

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

9. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. [Use Adapter classes].

Course Outcomes:

CO-1: Able to write the programs for solving real world problems using Java OOP principles.
CO-2: Able to write programs using Exceptional Handling approach.
CO-3: Able to write multithreaded applications.
CO-4: Able to write GUI programs using swing controls in Java.

REFERENCE BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

GENDER SENSITIZATION LAB

B.Tech. II Year II Sem. **L T P C**
0 0 2 0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questionsabout the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions aboutsex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex andgender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudestowards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary.

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work.

-Gender Development Issues-Gender, Governance and Sustainable Development-

Gender andHuman Rights-Gender and Main streaming.

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping withEveryday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives.Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life….".

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender andPopular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Course Outcomes:

CO-1: Students will have developed a better understanding of important issues related to gender in contemporary India.

CO-2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

CO-3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

CO-4: Students will acquire insight into the gendered division of labor and its relation to politics and economics.

CO-5: Men and women students and professionals will be better equipped to work and live together as equals.

CO-6: Students will develop a sense of appreciation of women in all walks of life.

CO-7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

- ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".***

 ESSENTIAL READING: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

PROLOG/ LISP/ PYSWIP

B. Tech. II Year II Sem.

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List of Programs:

1. Write simple fact for following:
   A. Ram likes mango.
   B. Seema is a girl.
   C. Bill likes Cindy.
   D. Rose is red.
   E. John owns gold

2. Write predicates one converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.

3. Write a program to solve the Monkey Banana problem

4. WAP in turbo prolog for medical diagnosis and show the advantages and disadvantages of green and red cuts.

5. Write a program to solve the 4-Queen problem.

6. Write a program to solve traveling salesman problems.

7. Write a program to solve water jug problems using Prolog.

8. Write simple Prolog functions such as the following. Take into account lists which are too short. -- remove the Nth item from the list. -- insert as the Nth item.

9. Assume the prolog predicate gt(A, B) is true when A is greater than B. Use this predicate to define the predicate addLeaf(Tree, X, NewTree) which is true if NewTree is the Tree produced by adding the item X in a leaf node. Tree and NewTree are binary search trees. The empty treeis represented by the atom nil.

10. Write a Prolog predicate, countLists(Alist, Ne, Nl), using accumulators, that is true when Nl is the number of items that are listed at the top level of Alist and Ne is the number of empty lists.Suggestion: First try to count the lists, or empty lists, then modify by adding the other counter.

11. Define a predicate memCount(AList,Blist,Count) that is true if Alist occurs Count times within Blist. Define without using an accumulator. Use "not" as defined in utilities.pro, to make similarcases are unique, or else you may get more than one count as an answer.

    Examples:
    memCount(a,[b,a],N).
    N= 1 ;
    no
    memCount(a,[b,[a,a,[a],c],a],N).
    N= 4 ;
    nomemCount([a],[b,[a,a,[a],c],a],N)

N = 1 ;
No

REFERENCE BOOK:

1. PROLOG: Programming for Artificial Intelligence, 3e, by BRATKO, WILEY

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22CS27: DESIGN AND ANALYSIS OF ALGORITHMS

B.Tech. III Year I Sem. **L T P C**

3 1 0 4

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Advanced Data Structures".

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms and the data structure ofdisjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate
- Describes how to evaluate and compare different algorithms using worst-, average-, and bestcase analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:

1. Analyze the performance of algorithms
2. Choose appropriate data structures and algorithm design methods for a specified application
3. Understand the choice of data structures and the algorithm design methods

UNIT - I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, AsymptoticNotations- 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 Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort **Backtracking:** General method, applications, n-queen's problem, sum of subsets problem, graphColoring, hamitonian cycles.

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search tree, 0/1 knapsackproblem, All pairs shortest path problem, Traveling salesperson problem, Reliability design.

UNIT - IV

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

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs,Connected components, Biconnected components.

UNIT - V

Branch and Bound: General method, applications - Traveling salesperson problem, 0/1 knapsackproblem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP-Hard andNP-Complete classes, Cook's theorem.

TEXT BOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan,University press, 1998.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI05: MACHINE LEARNING

B.Tech. III Year I Sem. **L T P C**

3 **0 0 3**

Course Objectives:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability-based learning techniques

Course Outcomes:

1. Distinguish between, supervised, unsupervised and semi-supervised learning
2. Understand algorithms for building classifiers applied on datasets of non-linearly separableclasses
3. Understand the principles of evolutionary computing algorithms
4. Design an ensembler to increase the classification accuracy

UNIT - I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT - II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions — Support Vector Machines

UNIT - III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT - IV

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization

Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators –

Using Genetic Algorithms

UNIT - V

Reinforcement Learning – Overview – Getting Lost Example

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo

– Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TEXT BOOKS:

1. Stephen Marsland, ―Machine Learning — An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

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B22CS28: COMPUTER NETWORKS

B.Tech. III Year I Sem **L T P C**

3 0 0 3

Prerequisites

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

Course Objectives

- The objective of the course is to equip the students with a general overview of the conceptsand fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communicationbetween machines in a network and the protocols of the various layers.

Course Outcomes

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation.

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, WirelessTransmission.

Data link layer: Design issues, framing, Error detection and correction.

UNIT - II

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-freechannel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocolusing Selective Repeat, Example data link protocols.

Medium Access sublayer: The channel allocation problem, Multiple access protocols: ALOHA, Carriersense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streamingaudio and video.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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B22MB01: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year I Sem **L T P C**

3 0 0 3

Prerequisites: None

Course Objective: To learn the basic Business types, impact of the Economy on Business and Firmsspecifically. To analyze the Business from the Financial Perspective.

Course Outcome: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with onevariable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly,Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGrawHill Education Pvt. Ltd. 2012.

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013

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COMPUTER SCIENCE AND ENGINEERING

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B22CS56: GRAPH THEORY (Professional Elective – I)

B.Tech. III Year I Sem **L T P C**

3 0 0 3

Course Objectives:

- Understanding graphs, trees, connected paths, applications of trees and graphs.

Course Outcomes:

1. Know some important classes of graph theoretic problems;
2. Prove central theorems about trees, matching, connectivity, coloring and planar graphs;
3. Describe and apply some basic algorithms for graphs;
4. Use graph theory as a modeling tool.

UNIT - I

Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representationsof graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

UNIT - II

Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra‟s shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT - III

Trees- Definitions and characterizations, Number of trees, Cayley‟s formula, Kircho↵-matrix-tree theorem, Minimum spanning trees, Kruskal‟s algorithm, Prim‟s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury‟s algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

UNIT - IV

Independent sets coverings and matchings– Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall‟s Theorem, K¨onig‟s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

UNIT - V

Vertex Colorings- Basic definitions**,** Cliques and chromatic number, Mycielski"s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

TEXT BOOKS:

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS:

1. Lecture Videos: http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.

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B22AI06: INTRODUCTION TO DATA SCIENCE (Professional Elective – I)

B.Tech. III Year I Sem

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Course Objectives:

- Learn concepts, techniques and tools they need to deal with various facets of data sciencepractice, including data collection and integration
- Understand the basic types of data and basic statistics
- Identify the importance of data reduction and data visualization techniques

Course Outcomes:

1. Understand basic terms of statistical modeling and data science
2. Implementation of R programming concepts
3. utilize R elements for data visualization and prediction

UNIT- I

Introduction

Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication

- Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting.

Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types.

UNIT- II

Data Types & Statistical Description

Types of Data: Attributes and Measurement, Attribute, The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes.

Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT- III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting,

Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class.

Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of

Data Frames, Extending Data Frames, Sorting Data Frames.

Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating ListElements, Merging Lists, Converting Lists to Vectors

UNIT- IV

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, LogicalOperators, Logical Operators and Vectors, Conditional Statements.

Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List.

Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion,Loading an R Package, Mathematical Functions in R.

UNIT- V

Charts and Graphs: Introduction, Pie Chart: Chart Legend, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot.

Regression: Linear Regression Analysis, Multiple Linear regression

TEXT BOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly,2014.
2. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed.The Morgan Kaufmann Series in Data Management Systems.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, PearsonEducation.
3. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
4. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
5. Paul Teetor, "R Cookbook", O'Reilly, 2011.

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B22AI07: WEB PROGRAMMING (Professional Elective – I)

B.Tech. III Year I Sem **L T P C**

3 0 0 3

Course Objectives:

- Understand the technologies used in Web Programming.
- Know the importance of object-oriented aspects of Scripting.
- Understand creating database connectivity using JDBC.
- Learn the concepts of web-based application using sockets.

Course Outcomes:

- Design web pages.
- Use technologies of Web Programming.
- Apply object-oriented aspects to Scripting.
- Create databases with connectivity using JDBC.
- Build web-based application using sockets.

UNIT – I Client side Programming

HTML- Basic Tags- List, Tables, Images, Forms, Frames, CSS

JAVA Script -

Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java ScriptObject, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML5- CSS3- HTML 5 canvas - Web site creation using tools.

UNIT – II JAVA

Introduction to object-oriented programming-Features of Java – Data types, variables and arrays –Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/Output – Files – Utility Classes – StringHandling.

UNIT – III JDBC

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets – UDPsockets, Java Beans –RMI.

UNIT – IV APPLETS

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphicsand Text. Using AWT Controls, Layout Managers and Menus. Servlet — life cycle of a servlet. TheServlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction toJSP.

UNIT – V XML AND WEB SERVICES

Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI-WSDL-Javaweb services — Web resources.

TEXT BOOKS:

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

REFERENCE BOOKS:

1. John Pollock, Javascript - A Beginners Guide, 3rd Edition –- Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

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B22CS31: IMAGE PROCESSING (Professional Elective – I)

B.Tech. III Year I Sem **L T P C**

3 0 0 3

Prerequisites:

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge ofdigital signal processing is desirable.
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Course Objectives

- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes

1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition,sampling, and quantization.
2. Demonstrate the knowledge of filtering techniques.
3. Demonstrate the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.

UNIT - I

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

UNIT - II

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT - III

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, LeastMean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT - V

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image CompressionModels, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:

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

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L.Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wiley, 3rd Edition, 2004.

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COMPUTER SCIENCE AND ENGINEERING

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B22CS33: COMPUTER GRAPHICS (Professional Elective – I)

B.Tech. III Year I Sem. **L T P C**

3 0 0 3

Prerequisites

1. Programming for problem solving and Data Structures

Course Objectives

- Provide the basics of graphics systems including Points and lines, line drawing algorithms, 2D,3D objective transformations

Course Outcomes

1. Explore applications of computer graphics
2. Understand 2D, 3D geometric transformations and clipping algorithms
3. Understand 3D object representations, curves, surfaces, polygon rendering methods, colormodels
4. Analyze animation sequence and visible surface detection methods

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 (DDA and Bresenham's Algorithm) circle-generating algorithms and ellipse - generating algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT - II

2-D geometric 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, clipping operations, point clipping, Line clipping-Cohen Sutherland algorithms, Polygon clipping-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, Polygon rendering methods, color models and color applications.

UNIT - IV

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms and clipping.

UNIT - V

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

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

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education

REFERENCE BOOKS:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
4. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner andHughes, Pearson Education.
5. Computer Graphics, Steven Harrington, TMH

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B22AI08: MACHINE LEARNING LAB

B.Tech. III Year I Sem.

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Course Objective:

- The objective of this lab is to get an overview of the various machine learning techniques andcan demonstrate them using python.

Course Outcomes:

1. Understand modern notions in predictive data analysis
2. Select data, model selection, model complexity and identify the trends
3. Understand a range of machine learning algorithms along with their strengths andweaknesses
4. Build predictive models from data and analyze their performance

List of Experiments

1. Write a python program to compute Central Tendency Measures: Mean, Median,Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

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B22CS37: COMPUTER NETWORKS LAB

B.Tech. III Year I Sem. **L T P C**

0 0 2 1

Course Objectives

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology andobserve its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding windowprotocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. **Wireshark**
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis an

    Statistic&Filters.
11. How to run Nmap scan Operating System Detection using Nmap Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
iv. Simulate to Find the Number of Packets Dropped due to Congestion
v. Simulate to Compare Data Rate & Throughput.
vi. Simulate to Plot Congestion for Different Source/Destination
vii. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOK:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

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COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22EN03: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem.

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Prerequisite: English Language and Communication Skills Lab

Introduction:
The introduction of the Advanced English Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen, speak, read, and write in English both for their professional and interpersonal communication in the globalised context.

The proposed lab should be a laboratory course to enable students to use 'good' English and perform the following:

- Gather ideas and information to organize ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice-versa.
- Take part in social and professional communication.

Course Objectives

This Lab focuses on using multi-media instruction for language development to meet the following targets. By the end of the course the students will be able

- To prepare the students for their placements by improving communication skills.
- To familiarize and train students with the types and elements of Résumé/ Curriculum Vitae.
- To expose students to the concepts of report writing familiarize and train students to write technical reports.
- To practice interview skills as an observer, an interviewer and/or an interviewee.

Course Outcomes
After completing this course, students will be able to:

1. Participate in group discussion to present their viewpoints briefly and effectively.
2. Inculcate flair for writing and felicity in written expression in Résumé / Curriculum Vitae / Reports.

3. Participate confidently with appropriate body language in interviews.
4. Enhance their team building skills and capabilities for effective decision making.

Syllabus

Module 1: Fundamentals of Interpersonal Communication

- Listen to process information- give information, as part of a simple explanation – conversation starters: small talk-exposure to functional aspects of intonation- accent- tone-pauses for practice – compare information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.
- Lexical chunks for accuracy and fluency- factors influencing the fluency, Role play-deliver a five-minute formal / informal talk – greetings – respond to greetings – invite and offer – accept – decline – take leave- making a request-apology etc.
- Listening for gist- listening for details-Being an active listener: giving verbal and non-verbal feedback – Summarizing academic readings and lectures - conversational speech listening to and participating in conversation – persuasion.

Module 2: Effective Writing Skills

- Résumé Writing-Concept of Résumé Writing-Professional career objective-Resume-Curriculum vitae, Biodata: Difference-Format of Résumé and Types of Résumés -Tips to build a winning Résumé-Tips to write effective cover letter-Statement of Purpose-Letters of Recommendation.
- Report Writing-Elements of Report Writing- Significance, format, layout, and mechanism-types of Reports-Newspaper Reports-Technical reports -Special Reports-Report in manuscript format.

Module 3: Presentation Skills

Oral presentations - individual and group through JAMsessions/seminars/PPTs and Written presentations through posters/projects/reports.

Module 4: Group Discussion

Concept and process of Group Discussion-Importance of Group Discussion-Do's and Don'ts of Group Discussion-Group Discussion for placements-Practice on topics–Current affairs, Abstract topics, General awareness, Business and economy, Education and Social issues.

Module 5: Interview Skills

Interview Skills: Meaning and Purpose of an Interview-Types of interviews-telephonic interview, video conference-(n)etiquette; Interview preparation techniques-Dress code at an interview-Types of interview questions-FAQs in HR Interview.

Minimum Requirement of infrastructural facilities for Advanced English Communication Skills Lab:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo
- Headphones of High quality
- Forty movable chairs and Eight round tables to accommodate 5 students per each table

Prescribed Lab Manual: A book titled ***A Coursebook of Advanced Communication Skills Lab*** published by Universities Press, Hyderabad.

Suggested Software: The software of the topics prescribed above are procured and used.

- **Globarena**
- **Open source software**
- **Oxford Advanced Learner's Compass**, 8thEdition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**

- **Time Management**
- **Skill mate**
- **Presentation skills, Cambridge** (with VCD)

Books Prescribed:

1. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam& Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. **Advanced Communication Skills Laboratory Manual** by Sudha Rani, D, Pearson Education 2011.
4. **Technical Communication** by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. **Business and Professional Communication:** Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

- The practical examinations for the Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
- For the English Language lab sessions, there shall be continuous evaluation during the year for 30 sessional marks and 70 End Examination marks. Of the 30 marks, 20 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

- **Seminar/ Professional Presentation**
- **A Report on the same has to be prepared and presented.**
- ***Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***
- ***Not more than two students to work on each mini project.***
- ***Students may be assessed by their performance both in oral presentation and written report.***

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VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI09: UI DESIGN-FLUTTER

B.Tech. III Year I Sem

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Course Objectives:

- To learn installation of SDK of Flutter, Xcode and Android Emulator
- Understanding Stateless and Stateful Widgets and Widget Tree
- Learning of Dart basics
- Application of Animation to app.

Course Outcomes:

1. Knowledge on installation of various softwares.
2. Understanding of various Widgets
3. Application of Animation to Apps

UNIT - I Introducing Flutter and Getting Started

Introducing Flutter, Defining Widgets and Elements, Understanding Widget Lifecycle Events, The Stateless Widget Lifecycle, The Stateful Widget Lifecycle, Understanding the Widget Tree and the Element Tree, Stateless Widget and Element Trees, Stateful Widget and Element Trees, Installing theFlutter SDK, Installing on mac OS, System Requirements, Get the Flutter SDK, Check for Dependencies, iOS Setup: Install Xcode, Android Setup: Install Android Studio, Set Up the Android Emulator, Installing on Windows, System Requirements, Get the Flutter SDK, Check for Dependencies, Install Android Studio, Set Up the Android Emulator, Installing on Linux, System Requirements, Get the Flutter SDK, Check for Dependencies, Install Android Studio, Set Up the Android Emulator, Configuring the Android Studio Editor.

UNIT - II Creating a Hello World App

Setting Up the Project, Using Hot Reload, Using Themes to Style Your App, Using a Global App Theme, Using a Theme for Part of an App, Understanding Stateless and Stateful Widgets, Using External Packages, Searching for Packages, Using Packages

UNIT - III Learning Dart Basics

Use of Dart, Commenting Code, Running the main() Entry Point, Referencing Variables, Declaring Variables, Numbers, Strings, Booleans, Lists, Maps, Runes, Using Operators, Using Flow Statements, if and else, ternary operator, for Loops, while and do-while, while and break, continue, switch and case, Using Functions, Import Packages, Using Classes, Class Inheritance, Class Mixins, Implementing Asynchronous Programming.

UNIT- IV Creating a Starter Project Template

Creating and Organizing Folders and Files, Structuring Widgets.

Understanding the Widget Tree

Introduction to Widgets, Building the Full Widget Tree, Building a Shallow Widget Tree, Refactoring witha Constant, Refactoring with a Method, Refactoring with a Widget Class.

UNIT- V Using Common Widgets

Using Basic Widgets, Safe Area, Container, Text, Rich Text, Column, Row, Column and Row Nesting, Buttons, Floating Action Button, Flat Button, Raised Button, Icon Button, Popup Menu Button, Button Bar, Using Images and Icons, Asset Bundle, Image, Icon, Using Decorators, Using the Form Widget toValidate Text Fields, Checking Orientation.

Adding Animation to an App

Using Animated Container, Using Animated Cross Fade, Using Animated Opacity, Using Animation Controlle, Using Staggered Animations.

TEXT BOOK:

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development, 1st edition, Wroxpublisher.

REFERENCE BOOKS:

1. Flutter for Beginners: An introductory guide to building cross-platform mobile applications withFlutter and Dart 2, Packt Publishing Limited.
2. Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps, 1st edition, Apress.
3. Frank Zammetti, Practical Flutter: Improve your Mobile Development with Google's LatestOpen-Source SDK, 1st edition, Apress.

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B22MB06: INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Sem. **L T P C**

3 0 0 0

Course Objectives:

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

Course Outcomes:

1. Distinguish and Explain various forms of IPRs.
2. Identify criteria to fit one's own intellectual work in particular form of IPRs.
3. Apply statutory provisions to protect particular form of IPRs.
4. Appraise new developments in IPR laws at national and international level

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter,selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations oftrade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international — trade mark law,

copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, TataMcGraw Hill Publishing company ltd.

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B22AI10: KNOWLEDGE REPRESENTATION AND REASONING

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- To investigate the key concepts of Knowledge Representation (KR) techniques and differentnotations.
- To integrate the KR view as a knowledge engineering approach to model organizationalknowledge.
- To introduce the study of ontologies as a KR paradigm and applications of ontologies.
- To understand various KR techniques and process, knowledge acquisition and sharing ofontology.

Course Outcomes:

1. Analyze and design knowledge-based systems intended for computer implementation.
2. Acquire theoretical knowledge about principles for logic-based representation and reasoning.
3. Ability to understand knowledge-engineering process
4. Ability to implement production systems, frames, inheritance systems and approaches tohandle uncertain or incomplete knowledge.

UNIT - I

The Key Concepts: Knowledge, Representation, Reasoning, Why knowledge representation and reasoning, Role of logic

Logic: Historical background, Representing knowledge in logic, Varieties of logic, Name, Type, Measures, Unity Amidst diversity

UNIT - II

Ontology: Ontological categories, Philosophical background, Top-level categories, Describing physical entities, Defining abstractions, Sets, Collections, Types and Categories, Space and Time

UNIT - III

Knowledge Representations: Knowledge Engineering, Representing structure in frames, Rules and data, Object-oriented systems, Natural language Semantics, Levels of representation

UNIT - IV

Processes: Times, Events and Situations, Classification of processes, Procedures, Processes and Histories, Concurrent processes, Computation, Constraint satisfaction, Change Contexts: Syntax of contexts, Semantics of contexts, First-order reasoning in contexts, Modal reasoning in contexts, Encapsulating objects in contexts.

UNIT - V

Knowledge Soup: Vagueness, Uncertainty, Randomness and Ignorance, Limitations of logic, Fuzzy logic, Nonmonotonic Logic, Theories, Models and the world, Semiotics Knowledge Acquisition and Sharing: Sharing Ontologies, Conceptual schema, Accommodating multiple paradigms, Relating different knowledge representations, Language patterns, Tools for knowledge acquisition

TEXT BOOKS:

1. Knowledge Representation logical, Philosophical, and Computational Foundations by John F.Sowa, Thomson Learning.
2. Knowledge Representation and Reasoning by Ronald J. Brachman, Hector J. Levesque,Elsevier.

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B22AI11: DATA ANALYTICS

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Prerequisites

1. A course on "Database Management Systems".
2. Knowledge of probability and statistics.

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate theaccuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Outcomes: After completion of this course students will be able to

1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. To carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, MissingImputations etc. Need for Business Modeling.

UNIT - III

Regression — Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications tovarious Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. **Time Series Methods:** Arima, Measures of Forecast

Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, VisualizingComplex Data and Relations.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan KaufmannPublishers.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway LabsJeffrey D Ullman Stanford Univ.

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B22AI12: NATURAL LANGUAGE PROCESSING

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Prerequisites:

1. Data structures and compiler design

Course Objectives:

- Introduction to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

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 evaluatingempirical NLP systems
3. Manipulate probabilities, construct statistical models over strings and trees, and estimateparameters using supervised and unsupervised training methods.
4. Design, implement, and analyze NLP algorithms; and design different language modelingTechniques.

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, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation,

Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, 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.

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, PearsonPublications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

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B22CS46: SOFTWARE TESTING METHODOLOGIES (Professional Elective – II)

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Prerequisites

1. Software Engineering

Course Objectives

- To provide knowledge of the concepts in software testing such as testing process, criteria,strategies, and methodologies.
- To develop skills in software test automation and management using the latest tools.

Course Outcomes

1. Understand purpose of testing and path testing
2. Understand strategies in data flow testing and domain testing
3. Develop logic-based test strategies
4. Understand graph matrices and its applications
5. Implement test cases using any testing automation tool

UNIT - I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing: transaction flows, transaction flow testing techniques.

Data Flow testing: Basics of data flow testing, strategies in data flow testing, application of data flowtesting.

Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfacestesting, domain and interface testing, domains and testability.

UNIT - III

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 - IV

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing,Testability tips.

UNIT - V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like Jmeter/selenium/soapUI/Catalon).

TEXT BOOKS:

1. Software Testing techniques - Baris 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.

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B22CS35: INFORMATION RETRIEVAL SYSTEMS (Professional Elective – II)

B.Tech. III Year I Sem. **L T P C**

3 0 0 3

Prerequisites:

1. Data Structures

Course Objectives:

- To learn the concepts and algorithms in Information Retrieval Systems
- To understand the data/file structures that are necessary to design, and implement informationretrieval (IR) systems.

Course Outcomes:

1. Ability to apply IR principles to locate relevant information large collections of data
2. Ability to design different document clustering algorithms
3. Implement retrieval systems for web search tasks.
4. Design an Information Retrieval System for web search tasks.

UNIT - I

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

UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT - III

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

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

UNIT - IV

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

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

UNIT - V

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

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval by Yates and Neto Pearson Education.

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B22AI13: PATTERN RECOGNITION (Professional Elective – II)

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Prerequisites:

- Programming for problem solving
- Computer Oriented Statistical Methods

Course Objectives:

- Introducing fundamental concepts, theories, and algorithms for pattern recognition andmachine learning.

Course Outcomes:

1. Understand the importance of pattern recognition and its representation
2. Analyza the variants of NN algorithm
3. Understand the necessity of Hidden markov models, decision tree and SVM for classification
4. Understand different types of clustering algorithms

UNIT - I

Introduction: Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT - II

Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm, use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT - III

Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT - IV

Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT - V

Clustering: Importance of clustering, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

TEXT BOOK:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub, 1st Ed.

REFERENCE BOOKS:

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing-Hwang Juang. PrenticeHall Pub.

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B22AI14: COMPUTER VISION AND ROBOTICS (Professional Elective – II)

B.Tech. III Year II Sem.

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Pre-Requisites: Linear Algebra and Probability.

Course Objectives:

- To understand the Fundamental Concepts Related To sources, shadows and shading
- To understand the The Geometry of Multiple Views

Course Outcomes:

1. Implement fundamental image processing techniques required for computer vision
2. Implement boundary tracking techniques
3. Apply chain codes and other region descriptors, Hough Transform for line, circle, and ellipsedetections.
4. Apply 3D vision techniques and Implement motion related techniques.
5. Develop applications using computer vision techniques.

UNIT - I

CAMERAS: Pinhole Cameras

Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases

Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local ShadingModels, Application: Photometric Stereo, Interreflections: Global Shading Models

Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color,Surface Color from Image Color.

UNIT - II

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency andFourier Transforms, Sampling and Aliasing, Filters as Templates

Edge Detection: Noise, Estimating Derivatives, Detecting Edges

Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application:Synthesis by Sampling Local Models, Shape from Texture.

UNIT - III

The Geometry of Multiple Views: Two Views

Stereopsis: Reconstruction, Human Stereposis, Binocular Fusion, Using More Cameras

Segmentation by Clustering: Segmentation, Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels,Segmentation by Graph-Theoretic Clustering,

UNIT - IV

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations

Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization

UNIT - V

Introduction to Robotics: Social Implications of Robotics, Brief history of Robotics, Attributes of hierarchical paradigm, Closed world assumption and frame problem, Representative Architectures, Attributes of Reactive Paradigm, Subsumption Architecture, Potential fields and Perception.

Common sensing techniques for Reactive Robots: Logical sensors, Behavioural Sensor Fusion, Pro- prioceptive sensors, Proximity Sensors, Topological Planning and Metric Path Planning

TEXT BOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision — A Modern Approach, PHI Learning (Indian Edition), 2009.
2. Robin Murphy, Introduction to AI Robotics, MIT Press

REFERENCE BOOKS:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.
2. The Robotics premier, Maja J Matari, MIT Press
3. Richard Szeliski “Computer Vision: Algorithms and Applications” Springer-Verlag London Limited 2011.

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B22DS04: DATA WAREHOUSING AND BUSINESS INTELLIGENCE

(Professional Elective – II)

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- This course is concerned with extracting data from the information systems that deal with the day-to-day operations and transforming it into data that can be used by businesses to drive high-level decision making
- Students will learn how to design and create a data warehouse, and how to utilize the processof extracting, transforming, and loading (ETL) data into data warehouses.

Course Outcomes:

- Understand architecture of data warehouse and OLAP operations.
- Understand Fundamental concepts of BI
- Application of BI Key Performance indicators
- Understand Utilization of Advanced BI Tools and their Implementation.
- Implementation of BI Techniques and BI Ethics.
-

UNIT - I

Data Warehouse, Data Warehouse Modelling, OLAP operations, Data Qube Computation methods

UNIT - II

Business Intelligence Introduction – Definition, Leveraging Data and Knowledge for BI, BI Components, BI Dimensions, Information Hierarchy, Business Intelligence and Business Analytics. BI Life Cycle. Data for BI - Data Issues and Data Quality for BI.

UNIT - III

BI Implementation - Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI-vent-Driven alerts-A cyclic process of Intelligence Creation. The value of Business Intelligence-Value driven and Informationuse.

UNIT - IV

Advanced BI – Big Data and BI, Social Networks, Mobile BI, emerging trends, Description of different BI-Tools (Pentaho, KNIME)

UNIT - V

Business Intelligence and integration implementation-connecting in BI systems- Issues of legality- Privacy and ethics- Social networking and BI.

TEXT BOOKS:

1. Data Mining — Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER, Elsevier, 4th Edition.
2. Rajiv Sabherwal "Business Intelligence" Wiley Publications, 2012.

REFERENCE BOOKS:

1. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009.
2. David Loshin, Business Intelligence - The Savy Manager's Guide Getting Onboard with Emerging IT, Morgan Kaufmann Publishers, 2009.
3. Philo Janus, Stacia Misner, Building Integrated Business Intelligence. Solutions with SQL Server, 2008 R2 & Office 2010, TMH, 2011.
4. Business Intelligence Data Mining and Optimization for decision making [Author: Carlo-Verellis] [Publication: (Wiley)]
5. Data Warehousing, Data Mining & OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007
6. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.
7. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

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B22AI15: FUNDAMENTALS OF AI (Open Elective – I)

B.Tech. III Year II Sem. **L T P C**

3 0 0 3

Course Objective:

- To learn the difference between optimal reasoning Vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic searchalong with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI namely, Game Playing, Theorem Proving, ExpertSystems, Machine Learning and Natural Language Processing

Course Outcomes:

1. Gain the knowledge of what is AI, risks and benefits of AI, limits of AI and the ethics involvedin building an AI application.
2. Understand the nature of environments and the structure of agents.
3. Possess the ability to select a search algorithm for a problem and characterize its time andspace complexities.
4. Possess the skill for representing knowledge using the appropriate technique
5. Gain an understanding of the applications of AI

UNIT – I

Foundations of AI: Introduction to AI, History of AI, Strong and Weak AI, The State of the Art, Risksand Benefits of AI

Philosophy, Ethics and Safety of AI: The Limits of AI, Machine thinking capability, The Ethics of AI **Intelligent Agents:** Agents and Environments, Good Behavior: The Concept of Rationality, The Natureof Environments, The Structure of Agents.

UNIT – II

Solving Problems by Searching: Problem – Solving Agents

Uninformed Search Strategies: Best-First Search, Breadth-First Search, Uniform-Cost Search,Depth-First Search, Iterative Deepening Search and Bidirectional Search

Informed Search Strategies: Greedy Best-First Search, A* Search

UNIT – III

Logical Agents: Knowledge-based agents, Propositional Logic, Propositional Theorem Proving

First-Order Logic: Syntax and Semantics of First-Order Logic

Inference in First-Order Logic: Propositional Vs. First-Order Inference, Unification and First-Order Inference, Forward Chaining, Backward Chaining

Knowledge Representation: Ontological Engineering, Categories and Objects, Events

UNIT – IV

Quantifying Uncertainty: Basic Probability Notation, Inference Using Full-Joint Distributions, Independence, Bayes' Rule and its Use, Naive Bayes Models

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The semantics of Bayesian Networks, Exact Inference in Bayesian Networks

UNIT – V

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Model Selection, Linear Regression and Classification, Ensemble Learning

Natural Language Processing: Language Models, Grammar, Parsing, Complications of Real Natural Language, Natural Language Tasks.

Robotics: Robots, Robot Hardware, Kind of Problems solved, Application Domains

Computer Vision: Simple Image Features, Using Computer Vision

TEXT BOOKS:

1. "Artificial Intelligence a Modern Approach", Fourth Edition, Stuart J. Russell & Peter Norvig –Pearson.

REFERENCE BOOKS:

1. "Artificial Intelligence", Elaine Rich, Kevin Knight & Shivashankar B Nair — McGraw Hill Education.
2. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
3. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
4. Artificial Intelligence, Shivani Goel, Pearson Education.
5. Artificial Intelligence and Expert systems – Patterson, Pearson Education

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(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI16: MACHINE LEARNING BASICS (Open Elective – I)

B.Tech. III Year II Sem.

L	T	P	C
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Course Objectives:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability-based learning techniques

Course Outcomes:

1. Distinguish between, supervised, unsupervised and semi-supervised learning
2. Understand algorithms for building classifiers applied on datasets of non-linearly separableclasses
3. Understand the principles of evolutionary computing algorithms
4. Design an ensembler to increase the classification accuracy

UNIT - I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT - II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation

UNIT - III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT - IV

Support Vector Machines

Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT - V

Reinforcement Learning – Overview – Getting Lost Example

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo

– Hidden Markov Models.

TEXT BOOKS:

1. Stephen Marsland, ―Machine Learning — An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

VAAGDEVI COLLEGE OF ENGINEERING

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COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI17: NATURAL LANGUAGE PROCESSING LAB

B.Tech. III Year II Sem. **L T P C**

0 0 3 1.5

Prerequisites:

1. Data structures, finite automata and probability theory.

Course Objectives:

- To Develop and explore the problems and solutions of NLP

Course Outcomes:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Knowledge on NLTK Library implementaion
3. Work on strings and trees, and estimate parameters using supervised and unsupervisedtraining methods.

List of Experiments

1. Write a Python Program to perform following tasks on text
   a) Tokenization b) Stop word Removal
2. Write a Python program to implement Porter stemmer algorithm for stemming
3. Write Python Program for a) Word Analysis b) Word Generation
4. Create a Sample list for at least 5 words with ambiguous sense and Write a Python programto implement WSD
5. Install NLTK tool kit and perform stemming
6. Create Sample list of at least 10 words POS tagging and find the POS for any given word
7. Write a Python program to
   a) Perform Morphological Analysis using NLTK library
   b) Generate n-grams using NLTK N-Grams library
   c) Implement N-Grams Smoothing
8. Using NLTK package to convert audio file to text and text file to audio files.

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication.
2. Oreilly Practical natural Language Processing, A Comprehensive Guide to Building Real WorldNLP Systems.
3. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

REFERENCE BOOKS:

1. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python, FirstEdition, O‘Reilly Media, 2009.

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B22AI18: DATA ANALYTICS LAB

B.Tech. III Year II Sem. **L T P C**

0 0 3 1.5

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate theaccuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Outcomes:

1. Understand linear regression and logistic regression
2. Understand the functionality of different classifiers
3. Implement visualization techniques using different graphs
4. Apply descriptive and predictive analytics for different types of data

List of Experiments:

1. Data Preprocessing
   a. Handling missing values
   b. Noise detection removal
   c. Identifying data redundancy and elimination
2. Implement any one imputation model
3. Implement Linear Regression
4. Implement Logistic Regression
5. Implement Decision Tree Induction for classification
6. Implement Random Forest Classifier
7. Implement ARIMA on Time Series data
8. Object segmentation using hierarchical based methods
9. Perform Visualization techniques (types of maps - Bar, Colum, Line, Scatter, 3D Cubes etc)
10. Perform Descriptive analytics on healthcare data
11. Perform Predictive analytics on Product Sales data
12. Apply Predictive analytics for Weather forecasting.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan KaufmannPublishers.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway LabsJeffrey D Ullman Stanford Univ.

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B22AI19: DEVOPS

B.Tech. III Year II Sem. **L T P C**

0 0 4 2

Course Objectives:

- Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aimsto shorten the software development lifecycle to provide continuous delivery with high-quality.

Course Outcomes:

1. Understand the need of DevOps tools
2. Understand the environment for a software application development
3. Apply different project management, integration and development tools
4. Use Selenium tool for automated testing of application

List of Experiments:

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application for exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

TEXT BOOKS:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wileypublications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. AddisonWesley.

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COMPUTER SCIENCE AND ENGINEERING

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B22CH03: ENVIRONMENTAL SCIENCE

B.Tech. III Year II Sem.	**L**	**T**	**P**	**C**
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Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations.

Course Outcomes: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps insustainable development

UNIT - I

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situconservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of

pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS

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B22AI20: DEEP LEARNING

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To understand deep Learning algorithms and their applications in real-world data

Course Outcomes:

1. Understand machine learning basics and neural networks
2. Understand optimal usage of data for training deep models
3. Apply CNN and RNN models for real-world data
4. Evaluate deep models
5. Develop deep models for real-world problems

UNIT - I

Machine Learning Basics

Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning

Deep Feedforward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - II

Regularization for Deep Learning

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under- Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi- Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

UNIT - III

Convolutional Networks

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features

UNIT - IV

Recurrent and Recursive Nets

Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long- Term Dependencies, Explicit Memory

UNIT - V

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data**,** Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural LanguageProcessing, Other Applications.

TEXT BOOK:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

REFERENCE BOOKS:

1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop. C.M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G.,H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

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COMPUTER SCIENCE AND ENGINEERING

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B22AI21: NATURE INSPIRED COMPUTING

B.Tech. IV Year I Sem.

L	T	P	C
2	0	0	2

Course Objectives:

- Knowledge on significance of evolutionary computing, neuro computing and swarmintelligence

Course Outcomes:

- Familiar with Evolutionary Computing algorithms
- Understand scope of neurocomputing
- Compare different Ant Colony Optimization algorithmic models.
- Understand the scope of artificial immune systems
- Tackle different real world problems

UNIT - I

Evolutionary Computing

Problem Solving as a Search Task, Hill Climbing and Simulated Annealing, Evolutionary Biology,Evolutionary Computing, The Other Main Evolutionary Algorithms, From Evolutionary Biology to Computing, Scope of Evolutionary Computing

UNIT - II

Neurocomputing

The Nervous System, Artificial Neural Networks, Typical ANNS and Learning Algorithms, FromNatural to Artificial Neural Networks, Scope of Neurocomputing

UNIT - III

Swarm Intelligence

Ant Colonies, Swarm Robotics, Social Adaptation of Knowledge

UNIT - IV

Immuno computing

The Immune System, Artificial Immune Systems, Bone Marrow Models, Negative Selection Algorithms, Clonal Selection and Affinity Maturation, Artificial Immune Networks, From Natural toArtificial Immune Systems, Scope of Artificial Immune Systems

UNIT - V

Case Studies- Bioinformatics, Information Display

TEXT BOOKS:

1. Leandro Nunes de Castro - " Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007
2. Albert Y.Zomaya - "Handbook of Nature-Inspired and Innovative Computing", Springer, 2006

REFERENCE BOOKS:

1. Floreano, D. and C. Mattiussi -"Bio-Inspired Artificial Intelligence: The oriesethods, andTechnologies" IT Press, 2008
2. Marco Dorrigo, Thomas Stutzle -" Ant Colony Optimization", Prentice Hall of India, New Delhi,2005
3. Vinod Chandra S S, Anand H S - "Machine Learning: A Practitioner's Approach", Prentice Hallof India, New Delhi, 2020

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COMPUTER SCIENCE AND ENGINEERING

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B22CS43: INTERNET OF THINGS (Professional Elective – III)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Pre-Requisites: Computer organization, Computer Networks

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

Course Outcomes:

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Identify the applications of IoT in Industry.

UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates

Domain Specific IoTs – Home automation, Environment, Agriculture, Health and Lifestyle

UNIT - II

IoT and M2M – M2M, Difference between IoT and M2M, SDN and NFV for IoT,

IoT System Management with NETCOZF, YANG- Need for IoT system Management, Simple Network management protocol, Network operator requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG

UNIT - III

IoT Systems – Logical design using Python-Introduction to Python — Python Data types & Data structures, Control flow, Functions, Modules, Packaging, File handling, Data/Time operations, Classes, Exception, Python packages of Interest for IoT

UNIT - IV

IoT Physical Devices and Endpoints - Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces,Programming Raspberry PI with Python, Other IoT devices.

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Python web application framework
–Django, Designing a RESTful web API

UNIT V

Case studies- Home Automation, Environment-weather monitoring-weather reporting- air pollution monitoring, Agriculture.

TEXT BOOK:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, UniversitiesPress, 2015, ISBN: 9788173719547.

RERENCE BOOK:

1. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759.

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COMPUTER SCIENCE AND ENGINEERING

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B22AI22: DATA MINING (Professional Elective – III)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Pre-Requisites:

1. Database Management System
2. Probability and Statistics

Course Objectives:

- Students will become acquainted with both the strengths and limitations of various data miningtechniques like Association, Classification, Cluster and Outlier analysis.

Course Outcomes:

1. Understand the need of data mining and pre-processing techniques.
2. Perform market basket analysis using association rule mining.
3. Utilize classification techniques for analysis and interpretation of data.
4. Identify appropriate clustering and outlier detection techniques to handle complex data.
5. Understand the mining of data from web, text and time series data.

UNIT - I

Introduction to Data Mining:

What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptionsof Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing**:** Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformationand Data Discretization.

UNIT - II

Association Analysis: Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

UNIT - III

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer Feed- Forward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.

UNIT - IV

Cluster Analysis: Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density- Based Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier Detection, and Overview of Outlier Detection Methods

\UNIT - V

Advanced Concepts: Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann/Elsevier, 2012.
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition, Pearson Education, India, 2006.

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson Education India, 2021.
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

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COMPUTER SCIENCE AND ENGINEERING

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B22CS44: SCRIPTING LANGUAGES (Professional Elective – III)

B.Tech. IV Year I Sem.	**L**	**T**	**P**	**C**
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Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Object Oriented Programming Concepts".

Course Objectives:

- This course introduces the script programming paradigm
- Introduces scripting languages such as Perl, Ruby and TCL.
- Learning TCL

Course Outcomes:

1. Comprehend the differences between typical scripting languages and typical system andapplication programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select anappropriate language for solving a given problem.
3. Acquire programming skills in scripting language

UNIT - I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services

RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System,Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT - III

Introduction to PERL and Scripting

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern andregular expressions, subroutines.

UNIT - IV

Advanced perl

Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT-V

TCL

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Leeand B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

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B22CS45: MOBILE APPLICATION DEVELOPMENT (Professional Elective – III)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Prerequisites

1. Acquaintance with JAVA programming
2. A Course on DBMS

Course Objectives

- To demonstrate their understanding of the fundamentals of Android operating systems
- To improves their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobileplatform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Course Outcomes

1. Understand the working of Android OS Practically.
2. Develop Android user interfaces
3. Develop, deploy and maintain the Android Applications.

UNIT - I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes

Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state change.

UNIT - II

Android User Interface: Measurements – Device and pixel density independent measuring unit - sLayouts – Linear, Relative, Grid and Table Layouts

User Interface (UI) Components –Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components

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, Multi-screen Activities

UNIT - III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding andusing Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT - IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving andretrieving data using Shared Preference

UNIT - V

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOK:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.

REFERENCE BOOKS:

1. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013.
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

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COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI23: CLOUD COMPUTING (Professional Elective – III)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Pre-requisites:

1. A course on "Computer Networks".
2. A course on "Operating System".

Course Objectives:

- This course provides an insight into cloud computing.
- Topics covered include- Cloud Computing Architecture, Deployment Models, Service Models,Technological Drivers for Cloud Computing, Networking for Cloud Computing and Security in Cloud Computing.

Course Outcomes:

1. Understand different computing paradigms and potential of the paradigms and specificallycloud computing
2. Understand cloud service types, cloud deployment models and technologies supporting anddriving the cloud
3. Acquire the knowledge of programming models for cloud and development of softwareapplication that runs the cloud and various services available from major cloud providers
4. Understand the security concerns and issues in cloud computing
5. Acquire the knowledge of advances in cloud computing.

UNIT - I

Computing Paradigms, Cloud Computing Fundamentals, Cloud Computing Architecture and Management

UNIT - II

Cloud Deployment Models, Cloud Service Models, Technological Drivers for Cloud Computing: SOA and Cloud, Multicore Technology, Web 2.0 and Web 3.0, Pervasive Computing, Operating System, Application Environment

UNIT - III

Virtualization, Programming Models for Cloud Computing: MapReduce, Cloud Haskell, SoftwareDevelopment in Cloud

UNIT - IV

Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, Cloud Service Providers

UNIT - V

Security in Cloud Computing, and Advanced Concepts in Cloud Computing

TEXT BOOK:

1. Chandrasekaran, K. *Essentials of cloud computing*. CRC Press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg,Andrzej M. Goscinski, Wiley, 2011
2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff,Cambridge University Press, 2010
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

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COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI24: QUANTUM COMPUTING (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives

- To introduce the fundamentals of quantum computing
- The problem-solving approach using finite dimensional mathematics

Course Outcomes

1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand The Impact of Quantum Computing on Cryptography

UNIT - I

History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II

Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III

Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorizationalgorithm, Grover's search algorithm.

UNIT - V

Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

TEXT BOOK:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge.

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.I: Basic Concepts, Vol II.
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to QuantumComputing Algorithms.

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B22AI25: EXPERT SYSTEMS (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives:

- Understand the basic techniques of artificial intelligence.
- Understand the Non-monotonic reasoning and statistical reasoning.

Course Outcomes:

1. Apply the basic techniques of artificial intelligence.
2. Discuss the architecture of an expert system and its tools.
3. Understand the importance of building an expert systems.
4. Understand various problems with an expert systems.

UNIT- I

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game trees, Min- max algorithms, game playing – Alpha-beta pruning.

UNIT- II

Knowledge representation issues predicate logic – logic programming Semantic nets-frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

UNIT- III

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

UNIT- IV

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.

UNIT- V

Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process.

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.

TEXT BOOKS:

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, New Delhi.
2. Waterman D.A., "A Guide to Expert Systems", Addison Wesley Longman.

REFERENCE BOOKS:

1. Stuart Russel and other Peter Norvig, "Artificial Intelligence – A Modern Approach", Prentice-Hall,
2. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley,
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley,
5. Weiss S.M. and Kulikowski C.A., "A Practical Guide to Designing Expert Systems", Rowman&Allanheld, New Jersey.

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B22AI26: SEMANTIC WEB (Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives:

- Introduce Semantic Web Vision and learn Web intelligence
- Understanding about XML, RDF, RDFS, OWL
- Querying Ontology and Ontology Reasoning
- To learn Semantic Web Applications, Services and Technology
- To learn Knowledge Representation for the Semantic Web

Course Outcomes:

1. Understand the characteristics of the semantic web technology
2. Understand the concepts of Web Science, semantics of knowledge resource and ontology
3. Describe logic semantics and inference with OWL.
4. Use ontology engineering approaches in semantic applications
5. Learn about web graph processing for various applications such as search engine, communitydetection

UNIT - I

Introduction: Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

UNIT - II

Web Services: Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

UNIT - III

Resource Description Framework: Features, Capturing Knowledge with RDF.

XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

UNIT - IV

Taxonomies and Ontologies: Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

UNIT - V

Semantic Web Application: Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base.

Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle

TEXT BOOKS:

1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Managementby Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.
2. Peter Mika, Social Networks and the Semantic Web, Springer

REFERENCE BOOKS:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley Interscience
2. The Semantic Web: A Guide to the Future of XML, Web Services, and KnowledgeManagement by Michael C. Daconta, Leo J. Obrst , Kevin T. Smith, Wiley Publishing, Inc.
3. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R. Studer, P. Warren, John Wiley & Sons.
4. Semantic Web and Semantic Web Services - Liyang Lu Chapman and Hall/CRCPublishers, (Taylor & Francis Group)
5. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
6. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.

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B22AI27: GAME THEORY (Professional Elective – IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives

The course will explain in depth the standard equilibrium concepts (such as Nash equilibrium, Subgame-Perfect Nash Equilibrium, and others) in Game Theory.

Course Outcomes

1. Understand the basic concepts of game theory and solutions
2. Understand different types of equilibrium interpretations
3. Understand and analyze knowledge and solution concepts
4. Analyze extensive games with perfect information

UNIT - I

Introduction- Game Theory, Games andSolutions, Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation

Nash Equilibrium- Strategic Games, Nash Equilibrium, Examples, Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information

UNIT - II

Mixed, Correlated, and Evolutionary Equilibrium -Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium

Rationalizability and Iterated Elimination of Dominated Actions- Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions

UNIT - III

Knowledge and Equilibrium -A Model of Knowledge Common Knowledge, Can People Agree to Disagree? Knowledge and Solution Concepts, The Electronic Mail Game

UNIT - IV

Extensive Games with Perfect Information -Extensive Games with Perfect Information, Subgame Perfect Equilibrium, Two Extensions of the Definition of a Game, The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated Strategies

Bargaining Games -Bargaining and Game Theory, A Bargaining Game of Alternating Offers, SubgamePerfect Equilibrium, Variations and Extensions

UNIT - V

Repeated Games - The Basic Idea Infinitely Repeated Games vs. Finitely Repeated Games, Infinitely Repeated Games: Definitions, Strategies as Machines, Trigger Strategies: Nash Folk Theorems, Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion, Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion, The Structure of Subgame Perfect Equilibria Under the Discounting Criterion, Finitely Repeated Game

TEXT BOOKS:

1. A course in Game Theory, M. J. Osborne and A. Rubinstein, MIT Press.

REFERENCE BOOKS:

1. Game Theory, Roger Myerson, Harvard University Press.
2. Game Theory, D. Fudenberg and J. Tirole, MIT Press.
3. Theory of Games and Economic Behavior, J. von Neumann and O. Morgenstern, New York:John Wiley and Sons.
4. Games and Decisions, R.D. Luce and H. Raiffa, New York: John Wiley and Sons.
5. Game Theory, G. Owen, 2nd Edition, New York: Academic Press.

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COMPUTER SCIENCE AND ENGINEERING

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B22AI28: MOBILE COMPUTING (Professional Elective – IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites:

- Computer Networks
- Distributed Systems / Distributed Operating Systems

Course Objectives:

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations, typical mobile networking infrastructure through a popular GSM protocol, the issues of various layers of mobile networks and their solutions.

Course Outcomes:

1. Understand the concept of mobile computing paradigm, its novel applications and limitations.
2. Analyze and develop new mobile applications
3. Understand the issues of various layers of mobile networks and their solutions.
4. Classify data delivery mechanisms

UNIT - I

Introduction

Mobile Communications, Mobile Computing — Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT - II

(Wireless) Medium Access Control (MAC)

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Mobile Network Layer

IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management,Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT - III

Mobile Transport Layer

Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues

Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT - IV

Data Dissemination and Synchronization

Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

UNIT - V

Mobile Ad hoc Networks (MANETs)

Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

REFERENCE BOOK:

1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal Mobile Computing: Technology, Applications and Service Creation, McGraw Hill Education.

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B22AI29: INTRODUCTION TO NATURAL LANGUAGE PROCESSING

(Open Elective – II)

B.Tech. IV Year I Sem. **L T P C**
3 0 0 3

Prerequisites:

- Data structures and compiler design

Course Objectives:

- Introduction to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

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 evaluatingempirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, andestimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms; and design different languagemodeling 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, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, 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

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, PearsonPublications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

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B22AI30: AI APPLICATIONS (Open Elective – II)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: Fundamentals of AI

Course Objectives:

- To give deep knowledge of AI and how AI can be applied in various fields to make life easy.

Course Outcomes:

1. Correlate AI and solutions to modern problems.
2. Use of AI in business applications
3. Application of AI in manufacturing automation
4. Use of AI in streaming of data and Network applications

UNIT - I

Alibaba: Using Artificial Intelligence To Power The Retail And Business-To-Business Services Of TheFuture

Amazon: Using Deep Learning To Drive Business Performance

UNIT - II

McDonald's: Using Robots And Artificial Intelligence To Automate Processes Walmart: Using Artificial Intelligence To Keep Shelves Stacked And Customers Happy

UNIT - III

LinkedIn: Using Artificial Intelligence To Solve The Skills Crisis

Netflix: Using Artificial Intelligence To Give Us A Better TV Experience

UNIT - IV

Salesforce: How Artificial Intelligence Helps Businesses Understand Their CustomersUber: Using Artificial Intelligence To Do Everything

UNIT - V

Siemens: Using Artificial Intelligence And Analytics To Build The Internet Of TrainsTesla: Using Artificial Intelligence To Build Intelligent Cars

TEXT BOOK:

1. Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Bernard Marr, Matt Ward, Wiley.

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B22AI31: PROFESSIONAL PRACTICE, LAW & ETHICS

B.Tech. IV Year I Sem. **L T P C**

2 0 0 2

Course Objectives:

- Understand the types of roles they are expected to play in the society as practitioners of theengineering profession.
- To develop some ideas of the legal and practical aspects of their profession.

Course Outcome:

1. Practice ethics and rule of the land in their profession
2. Follow the principles and elements of legal contracts
3. Able to resolve disputes pertaining to arbitration, reconciliation
4. Aware of intellectual property loss

UNIT - I

Professional Practice and Ethics: Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures. Introduction to GST- Various Roles of Various Stake holders

UNIT - II

Law of Contract: Nature of Contract and Essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object. Unlawful and illegal agreements, Contingent Contracts, Performance and discharge of Contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: GeneralPrinciples, Conditions & Warranties, Performance of Contract of Sale.

UNIT - III

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration;

UNIT - IV

Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal — appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT - V

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ravinder Kaur, Legal Aspects of Business, 4e, Cengage Learning, 2016.

REFERENCE BOOKS:

1. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
2. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House.
3. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers.

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(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22CS49: INTERNET OF THINGS LAB

(Professional Elective – III)

B.Tech. IV Year I Sem.	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Course Objectives

- To introduce the raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of distance sensor on IoT devices

Course Outcomes

1. Ability to introduce the concept of M2M (machine to machine) with necessary protocols andget awareness in implementation of distance sensor
2. Get the skill to program using python scripting language which is used in many IoT devices

List of Experiments

1. Using Raspberry pi
   a. Calculate the distance using a distance sensor.
   b. Interface an LED and switch with Raspberry pi.
   c. Interface an LDR with Raspberrry Pi.

2. Using Arduino
   a. Calculate the distance using a distance sensor.
   b. Interface an LED and switch with Aurdino.
   c. Interface an LDR with Aurdino
   d. Calculate temperature using a temperature sensor.

3. Using Node MCU
   a. Calculate the distance using a distance sensor.
   b. Interface an LED and switch with Raspberry pi.
   c. Interface an LDR with Node MCU
   d. Calculate temperature using a temperature sensor.

4. Installing OS on Raspberry Pi
   a) Installation using PiImager
   b) Installation using image file
      - Downloading an Image
      - Writing the image to an SD card
        - using Linux
        - using Windows

- Booting up Follow the instructions given in the URL https://www.raspberrypi.com/documentation/computers/getting-started.html

5. Accessing GPIO pins using Python
   a) Installing GPIO Zero
      library. update your
      repositories list:
      install the package for Python 3:
   b) Blinking an LED connected to one of the GPIO pin
   c) Adjusting the brightness of an LED Adjust the brightness of an LED (0 to 100, where 100means maximum brightness) using the in-built PWM wavelength.

6. Create a DJANGO project and an app.
7. Create a DJANGO view for weather station REST API
8. Create DJANGO template
9. Configure MYSQL with DJANGO framework

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, UniversitiesPress, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759.

REFERENCE BOOKS:

1. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

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B22AI32: DATA MINING LAB (Professional Elective – III)

B.Tech. IV Year I Sem.	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Prerequisites

- A course on "Database Management System

Course Objectives:

- The course is intended to obtain hands-on experience using data mining software.
- Intended to provide practical exposure of the concepts in data mining algorithms

Course Outcomes:

1. Apply preprocessing statistical methods for any given raw data.
2. Gain practical experience of constructing a data warehouse.
3. Implement various algorithms for data mining in order to discover interesting patternsfrom large amounts of data.
4. Apply OLAP operations on data cube construction

LIST OF EXPERIMENTS: Experiments using Weka/ Pentaho/Python

1. Data Processing Techniques:
   (i) Data cleaning (ii) Data transformation – Normalization (iii) Data integration
2. Partitioning - Horizontal, Vertical, Round Robin, Hash based
3. Data Warehouse schemas – star, snowflake, fact constellation
4. Data cube construction – OLAP operations
5. Data Extraction, Transformations & Loading operations
6. Implementation of Attribute oriented induction algorithm
7. Implementation of apriori algorithm
8. Implementation of FP – Growth algorithm
9. Implementation of Decision Tree Induction
10. Calculating Information gain measures
11. Classification of data using Bayesian approach
12. Classification of data using K – nearest neighbour approach
13. Implementation of K – means algorithm
14. Implementation of BIRCH algorithm
15. Implementation of PAM algorithm
16. Implementation of DBSCAN algorithm

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN &MICHELINE KAMBER, Elsevier.

2. Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-HillEdition, Tenth reprint 2007

REFERENCE BOOK:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Anuj Karpatne, Introduction to Data Mining,Pearson Education

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B22CS50: SCRIPTING LANGUAGES LAB

(Professional Elective – III)

B.Tech. IV Year I Sem.	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Prerequisites: Any High level programming language (C, C++)

Course Objectives

- To Understand the concepts of scripting languages for developing web based projects
- To understand the applications the of Ruby, TCL, Perl scripting languages

Course Outcomes

1. Ability to understand the differences between Scripting languages and programming languages
2. Gain some fluency programming in Ruby, Perl, TCL

LIST OF EXPERIMENTS

1. Write a Ruby script to create a new string which is n copies of a given string where n is a non-negativeinteger
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter andarea.
3. Write a Ruby script which accept the users first and last name and print them in reverse order with aspace between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return theirsum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other isgreater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student storedin a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for sorting a list using a comparison function
14. Write a TCL script to (i) create a list (ii) append elements to the list (iii) Traverse the list (iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.

    c) Write a Perl script to print the multiplication tables from 1-10 using subroutines.

18. Write a Perl program to implement the following list of manipulating functions
    a) Shift
    b) Unshift
    c) Push
19. a) Write a Perl script to substitute a word, with another word in a string.
    b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

TEXT BOOKS:

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Leeand B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

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B22CS51: MOBILE APPLICATION DEVELOPMENT LAB

(Professional Elective – III)

B.Tech. IV Year I Sem.	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Course Objectives:

- To learn how to develop Applications in an android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.

Course Outcomes:

1. Understand the working of Android OS Practically.
2. Develop user interfaces.
3. Develop, deploy and maintain the Android Applications.

LIST OF EXPERIMENTS:

1. (a)Create an Android application that shows Hello + name of the user and run it on an emulator.
   (b) Create an application that takes the name from a text box and shows hello message along with thename entered in the text box, when the user clicks the OK button.
2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Datepicker), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on the right fragment instead of the second screen with the back button. Use Fragment transactions and Rotation event listeners.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store usernames and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog

with a Login Failed message.

7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.
11. Create an application that saves user information like name, age, gender etc. in shared preferenceand retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

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, 2013.

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

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COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI33: CLOUD COMPUTING LAB

(Professional Elective – III)

B.Tech. IV Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives:

1. This course provides an insight into cloud computing
2. Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

1. Understand various service types, delivery models and technologies of a cloud computingenvironment.
2. Understand the ways in which the cloud can be programmed and deployed.
3. Understand cloud service providers like Cloudsim, Globus Toolkit etc.
4. Examine various programming paradigms suitable to solve real world and scientific problemsusing cloud services.

List of Experiments:

1. Install Virtualbox/VMware Workstation with different flavors of Linux or windows OS on top ofwindows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute SimplePrograms
3. Create an Amazon EC2 instance and set up a web-server on the instance and associate an IPaddress with the instance.
4. Install Google App Engine. Create a hello world app and other simple web applications usingpython/java.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not presentin CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count.
9. Create a database instance in the cloud using Amazon RDS.
10. Create a database instance in the cloud using Google Cloud SQL

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej
   M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J.
   Dongarra, Elsevier, 2012.
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

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B22AI34: PROJECT STAGE-I

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B22AI35: SOCIAL NETWORK ANALYSIS (Professional Elective – V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites

- Web Technologies
- Computer Networks
- Data Warehousing and Data Mining

Course Objectives

- Understand the concepts of social media
- Learn the mechanisms for social network analysis
- Analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

Course Outcomes

1. Ability to construct social network maps easily
2. Gain skills in tracking the content flow through the social media
3. Understand NodeXL use to perform social network analysis

UNIT - I

Introduction: Social Media and Social Networks

Social Media: New Technologies of Collaboration

Social Network Analysis: Measuring, Mapping, and Modelling collections of Connections.

UNIT - II

NodeXL, Layout, Visual Design, and Labelling, Calculating and Visualising Network Metrics, PreparingData and Filtering, Clustering and Grouping.

UNIT - III

CASE STUDIES:

Email: The lifeblood of Modern Communication**.**

Thread Networks: Mapping Message Boards and Email Lists

Twitter: Conversation, Entertainment and Information

UNIT - IV

CASE STUDIES:

Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks

UNIT - V

CASE STUDIES:

You Tube: Contrasting Patterns of Content Interaction, and Prominence**. Wiki Networks:** Connections of Creativity andCollaboration

TEXT BOOK:

1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL:Insights from a Connected World, Morgan Kaufmann, 2011.

REFERENCE BOOKS:

1. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.
2. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and UsingMetrics, 1st Edition, MGH, 2011.

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B22AI36: FEDERATED MACHINE LEARNING (Professional Elective – V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites

- The prerequisite knowledge for this course includes machine learning, basic computersystems and basic programming skills.

Course Objectives

- Understand the key concepts and issues behind Federated Learning
- Get familiar with key theoretical results of Federated Learning

Course Outcomes

1. Understand the basics on privacy-preserving ML
2. Analyze the key concepts of Distributed ML and FL
3. Understand the key concepts and applications of Horizontal FL and Vertical FL
4. Motivates the intensive mechanism design for FL
5. Analyze the concepts of federated reinforcement learning

UNIT - I

Introduction: Motivation, Federated Learning as a Solution, The Definition of Federated Learning,Categories of Federated Learning, Current Development in Federated Learning, Research Issues inFederated Learning, Open-Source Projects, Standardization Efforts, The Federated AI Ecosystem Background: Privacy-Preserving Machine Learning, PPML and Secure ML, Threat and SecurityModels, Privacy Threat Models, Adversary and Security Models, Privacy Preservation Techniques,Secure Multi-Party Computation, Homomorphic Encryption, Differential Privacy

UNIT - II

Distributed Machine Learning: Introduction to DML, The Definition of DML, DML Platforms, Scalability- Motivated DML, Large-Scale Machine Learning, Scalability-Oriented DML Schemes, Privacy-Motivated DML, Privacy-Preserving Decision Trees, Privacy-Preserving Techniques, Privacy-Preserving DML Schemes, Privacy-Preserving Gradient Descent, Vanilla Federated Learning, Privacy-Preserving Methods

UNIT - III

Horizontal Federated Learning: The Definition of HFL, Architecture of HFL, The Client-Server Architecture, The Peer-to-Peer Architecture, Global Model Evaluation, The Federated Averaging Algorithm, Federated Optimization, The FedAvg Algorithm, The Secured FedAvg Algorithm, Improvement of the FedAvg Algorithm, Communication

Efficiency, Client Selection Vertical Federated Learning: The Definition of VFL, Architecture of VFL, Algorithms of VFL, Secure Federated Linear Regression, Secure Federated Tree-Boosting

UNIT - IV

Federated Transfer Learning: Heterogeneous Federated Learning, Federated Transfer Learning, The FTL Framework, Additively Homomorphic Encryption, The FTL Training Process, The FTL Prediction Process, Security Analysis, Secret Sharing-Based FTL Incentive Mechanism Design for Federated Learning: Paying for Contributions, Profit-Sharing Games, Reverse Auctions, A Fairness-Aware Profit Sharing Framework, Modeling Contribution, Modeling Cost, Modeling Regret, Modeling Temporal Regret, The Policy Orchestrator, Computing Payoff Weightage

UNIT - V

Federated Learning for Vision, Language, and Recommendation: Federated Learning for Computer Vision, Federated CV, Federated Learning for NLP, Federated NLP, Federated Learning for Recommendation Systems, Recommendation Model, Federated Recommendation System.

Federated Reinforcement Learning:

Introduction to Reinforcement Learning, Policy, Reward, Value Function, Model of the Environment, RL Background Example, Reinforcement Learning Algorithms, Distributed Reinforcement Learning, Asynchronous Distributed Reinforcement Learning, Synchronous Distributed Reinforcement Learning, Federated Reinforcement Learning, Background and Categorization

TEXT BOOK:

1. Federated Learning, Qiang Yang, Yang Liu, Yong Cheng, Yan Kang, Tianjian Chen, and Han Yu Synthesis Lectures on Artificial Intelligence and Machine Learning 2019.

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B22AI37: AUGMENTED REALITY & VIRTUAL REALITY

(Professional Elective –V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- Provide a foundation to the fast growing field of AR and make the students aware of thevarious AR concepts**.**
- To give historical and modern overviews and perspectives on virtual reality. It describes thefundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

Course Outcomes:

1. Describe how AR systems work and list the applications of AR.
2. Understand the software architectures of AR.
3. Understand the Visual perception and rendering in VR
4. Understand the interaction, auditory perception and rendering in VR

UNIT - I

Introduction to Augmented Reality: Augmented Reality - Defining augmented reality, history ofaugmented reality, Examples, Related fields

Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial DisplayModel, Visual Displays

Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of TrackingTechnology, Stationary Tracking Systems, Mobile Sensors

UNIT - II

Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking,Natural Feature Tracking by Detection, Outdoor Tracking.

Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on RealSurfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction

Software Architectures: AR Application Requirements, Software Engineering Requirements,Distributed Object Systems, Dataflow, Scene Graphs

UNIT - III

Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology andPerception

The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations.

Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, The Human Eye, Cameras, Displays

UNIT - IV

The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR

Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color **Visual Rendering:** Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

UNIT - V

Motion in Real and Virtual Worlds: Velocities and Accelerations, The Vestibular System, Physics inthe Virtual World, Mismatched Motion and Vection

Interaction: Motor Programs and Remapping, Locomotion, Social Interaction

Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, AuditoryRendering

TEXT BOOKS:

1. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson EducationIndia;First edition (12 October 2016),ISBN-10: 9332578494
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

REFERENCE BOOKS:

1. Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978- 1484236178
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, WilliamR Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija — Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.

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(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI38: WEB SECURITY (Professional Elective –V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes: Students should be able to

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

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 andProtocols, Legal Restrictions on Cryptography, Digital Identification

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web ServerSecurity, 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 DataProcessing 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

TEXT BOOKS:

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

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B22CS59: AD-HOC & SENSOR NETWORKS (Professional Elective – V)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites

- Computer Networks
- Distributed Systems
- Mobile Computing

Course Objectives

- To understand the challenges of routing in ad-hoc and sensor networks
- To understand various broadcast, mutlicast and geocasting protocols in ad hoc and sensornetworks
- To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN

Course Outcomes

1. Understand the concepts of sensor networks and applications
2. Understand and compare the MAC and routing protocols for adhoc networks
3. Understand the transport protocols of sensor networks

UNIT - I

Introduction to Ad Hoc Networks

Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs

Criteria for classification, Taxonomy of MANET routing algorithms, *Topology-based* routing algorithms- Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; *Position-based* routing algorithms- Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies, Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT - II

Data Transmission

Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area- based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT - III

Geocasting

Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.**

TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT - IV

Basics of Wireless Sensors and Lower Layer Issues-Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT - V

Upper Layer Issues of WSN

Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

TEXT BOOKS

1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P.Aggarwal*, World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

REFERENCE BOOKS:

1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

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B22AI39: SPEECH AND VIDEO PROCESSING

(Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- To make students understand speech and video processing techniques

Course Outcomes:

1. Describe the mechanisms of human speech production systems and methods forspeech feature extraction.
2. Understand basic algorithms of speech analysis and speech recognition.
3. Explain basic techniques in digital video processing, including imaging characteristicsand sensors.
4. Apply motion estimation and object tracking algorithms on video.

UNIT - I

Speech processing concepts

The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and non linear filter banks, spectral estimation of speech using DFT.

Linear Prediction analysis of speech.

UNIT - II

Speech recognition

Feature extraction for speech, static and dynamic feature for speech recognition, MFCC, LPCC, Distance measures, vector quantization models, Gaussian Mixture model, HMM.

UNIT - III

Multi-Dimensional Signals and Systems

Multi-Dimensional Signals, Multi-Dimensional Transforms, Multi-Dimensional Systems, Multi- Dimensional Sampling Theory, Sampling Structure Conversion

Digital Images and Video: Human Visual System and Color, Digital Video

UNIT - IV

Motion Estimation

Image Formation, Motion Models, 2D Apparent-Motion Estimation, Differential Methods, Matching Methods, Nonlinear Optimization Methods, Transform-Domain Methods, 3D Motion and Structure Estimation

UNIT - V

Video Segmentation and Tracking

Image Segmentation, Change Detection, Motion Segmentation, Motion Tracking, Image and Video Matting, Performance Evaluation

TEXT BOOKS:

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series
2. Digital Video processing, A Murat Tekalp, 2nd edition,Prentice Hall.

REFERENCE BOOKS:

1. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
2. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, PearsonEducation
3. "Speech and Audio Signal Processing", B.Gold and N. Morgan, Wiley.
4. "Digital image sequence processing, Compression, and analysis", Todd R. Reed, CRC Press
5. "Handbook of Image and Video processing", Al Bovik, Academic press, second Edition.

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B22CS62: ROBOTIC PROCESS AUTOMATION
(Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- Introduce robotic process automation, techniques of automation using UIPath RPA tool.

Course Outcomes:

1. Understand the concepts of Robotic Process Automation.
2. Apply the flow chart mechanism in various calculations.
3. Applying UIPath tool for debugging process
4. Design system managing techniques.
5. Create application for process automation using UIPath tool.

UNIT - I

Robotic Process Automation: Introduction**,** Scope and techniques of automation, Robotic process automation, Components of RPA, RPA platforms, About UiPath

UIPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator

UIPath Studio Projects, User interface

The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

UNIT - II

Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control Flow, varioustypes of loops and decision making

Data Manipulation: Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa.

UNIT - III

Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder,When to use OCR, Types of OCR available, How to use OCR.

Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management.

UNIT - IV

Handling User Events and Assistant Bots: Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard

event

Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Errorreporting

UNIT - V

Managing and Maintaining the Code: Project organization, nesting workflows, Reusability of

workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files

Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and Managing updates

TEXT BOOK:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool — UiPath Kindle Edition

REFERENCE BOOK:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition

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B22AI40: RANDOMIZED ALGORITHMS (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**
3 0 0 3

Course Objective:

- To introduce the power of randomization in the design of algorithms.

Course Outcomes:

- Appreciate the fundamentals of randomized algorithm design.
- Understand the fundamentals of Markov chains and the Monte Carlo method.
- Apply high probability analysis to selected randomized algorithms.
- Understand the Fingerprint and Pattern Matching techniques

UNIT- I

Introduction, A Min — Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence

Game-Theoretic Techniques: Game Tree Evaluation, The Minimax Principle

UNIT- II

Moments and Deviations: Occupancy Problems, The Markov and Chebyshev Inequalities, Randomized Selection, Two Point sampling, The Coupon Collector's problem.

Markov Chains and Random Walks: A 2-SAT example, Markov Chains, Random Walks on Graphs, Graph Connectivity

UNIT – III

Algebraic Techniques: Fingerprinting and Freivald's Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, PatternMatching

UNIT- IV

Data Structures: The Fundamental of Data-structures, Random Treaps, Skip Lists, Hash Tables

Graph Algorithms: All Pairs Shortest Path, The Min- Cut Problem, Minimum Spanning Trees

UNIT – V

Geometric Algorithms: Randomized Incremental Construction, Convex Hulls in the Plane, Duality, Half-Space Intersections, Dalaunay Triangulations, Trapezoidal Decompositions,

Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings

TEXT BOOKS:

1. Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan, Cambridge University Press
2. Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and
3. Data Analysis by Eli Upfal and Michael Mitzenmacher.

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B22AI41: COGNITIVE COMPUTING (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Prerequisites: Probability theory

Course Objectives:

- To provide an understanding of the central challenges in realizing aspects ofhuman cognition.
- To provide a basic exposition to the goals and methods of human cognition.
- To develop algorithms that use AI and machine learning along with human interactionand feedback to help humans make choices/decisions.
- To support human reasoning by evaluating data in context and presenting relevantfindings along with the evidence that justifies the answers.

Course Outcomes:

1. Understand cognitive computing
2. Plan and use the primary tools associated with cognitive computing.
3. Plan and execute a project that leverages cognitive computing.
4. Understand and develop the business implications of cognitive computing.

UNIT - I

Introduction to Cognitive Science: Understanding Cognition, IBM's Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition,a dynamical systems approach to cognition.

UNIT - II

Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT - III

Cognitive Modeling: modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.

UNIT - IV

Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.

UNIT - V

DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

TEXT BOOK:

1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.

REFERENCE BOOKS:

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Hollan.

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B22AI42: CONVERSATIONAL AI (Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- To be familiar with the basic knowledge about conversational systems.
- To understand the different techniques of natural language processing
- Study the fundamental role of machine learning in building conversational systems.
- To know the various applications of conversational systems and its future development

Course Outcomes:

- Understand the basic technologies required for building a conversational system.
- Learn the rule-based dialogue system
- Involve AI in building conversational system and build advanced systems that are cognitivelyinclined towards human behaviour.
- Develop a real time working conversational system for social domain that can intelligentlyprocess inputs and generate relevant replies.

UNIT- I Introducing Dialogue Systems

Introduction of Dialogue System, History of Dialogue Systems, Present-Day Dialogue Systems, Modeling Conversation Dialogue Systems, Designing and Developing Dialogue Systems

UNIT- II Rule-Based Dialogue Systems: Architecture, Methods, and Tools

Dialogue Systems Architecture, designing a Dialogue System, Tools for Developing Dialogue Systems, Rule-Based Techniques in Dialogue Systems Participating in the Alexa Prize

UNIT- III Statistical Data-Driven Dialogue Systems

Motivating the Statistical Data-Driven Approach, Dialogue Components in the Statistical Data-Driven Approach, Reinforcement Learning (RL), Representing Dialogue as a Markov Decision Process, From MDPs to POMDPs, Dialogue State Tracking, Dialogue Policy, Problems and Issues with Reinforcement Learning in POMDPs

UNIT- IV Evaluating Dialogue Systems

Process of Evaluation, Evaluating Task-Oriented Dialogue Systems, Evaluating Open-Domain Dialogue Systems, Evaluation Frameworks- PARADISE, Quality of Experience (QoE), Interaction Quality, Best Way to Evaluate Dialogue Systems.

UNIT- V End-to-End Neural Dialogue Systems

Neural Network Approaches to Dialogue Modeling, A Neural Conversational Model, Introduction to the Technology of Neural Dialogue, Retrieval-Based Response Generation, Task-Oriented Neural Dialogue Systems, Open-Domain Neural Dialogue Systems, Some Issues and Current Solutions, Dialogue Systems: Datasets, Competitions, Tasks, and Challenges.

TEXT BOOKS:

1. Michael McTear, "Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots", Second Edition, Moran and Claypool Publishers, 2020.

REFERENCE BOOK:

1. Cathy Pearl, "Designing Voice User Interfaces: Principles of Conversational Experiences",O'REILLY, 2016.

VAAGDEVI COLLEGE OF ENGINEERING

(AUTONOMOUS)
COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI43: CHATBOTS (Open Elective – III)

B.Tech. IV Year II Sem. **L T P C**
3 0 0 3

Course Objectives:

- Knowledge on concepts of chatbots and understanding the developer environment bot framework.

Course Outcomes:

1. Understand basic concepts of chatbots
2. Analyze different entities in building bots
3. Understand the concepts of advanced bot building
4. Discuss different types of chatbot use cases

UNIT - I

Introduction to Chatbots: Definition of chatbots, Journey of Chatbots, Rise of Chatbots, Messaging Platforms

UNIT - II

Setting Up the Developer Environment Botframework

Local Installation, Installing NodeJS, Following the Development Pipeline, Storing Messages in Database.

UNIT - III

Basics of Bot Building- Intents, Entities

UNIT - IV

Advanced Bot Building

Design Principles, Showing Product Results, Saving Messages, Building Your Own Intent Classifier

UNIT - V

Business and Monetization

Analytics, Chatbot Use Cases- Modes of Communication- Business-to-Business (B2B), ChapBusiness-to-Consumer (B2C) Consumer-to-Consumer (C2C) Business-to-Employee (B2E), Employee-to-Employee (E2E), Chatbots by Industry Vertical

TEXT BOOK:

1. Rashid Khan, Anik Das, Build Better Chatbots: A Complete Guide to Getting Started with Chatbots, Apress

REFERENCE BOOKS:

1. Drexen Braxley, Chat GPT #1 Bible - 10 Books in 1: A Comprehensive Guide to AI: Elevate Your Daily Life, Increase Work Output, Secure Financial Gains, Foster Career Growth, and Cultivate Modern Talents Paperback
2. D. Nardo Publications, ChatGPT Made Simple How Anyone Can Harness AI To Streamline Their Work, Study & Everyday Tasks To Boost Productivity & Maintain Competitive Edge By Mastering Prompt Engineering

3. Robert E. Miller,Prompt Engineering Bible Join and Master the AI Revolutions Profit Online with GPT-4 & Plugins for Effortless Money Making!
4. Lucas Foster, Chat GPT Bible Developer and Coder Special Edition: Enhancing Coding Productivity with AI-Assisted Conversations.

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B22AI44: EVOLUTIONARY COMPUTING (Open Elective – III)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Prerequisites: Knowledge on algorithms

Course Objectives:

- Introduce the concepts of evolutionary computing and various evolution algorithms

Course Outcomes:

1. Appraise the significance of evolutionary computing
2. Apply genetic operators and genetic programming for classification problems
3. Hybridization of genetic algorithms with other techniques
4. Understand multi objective, interactive evolutionary algorithms

UNIT - I

Optimization, Modelling, and Simulation Problems

Search Problems, Optimization Versus Constraint Satisfaction, The Famous NP Problems

Evolutionary Computing: The Origins: The Main Evolutionary Computing Metaphor, Brief History, The Inspiration from Biology, Evolutionary Computing

Evolutionary Algorithm: Definition, Components of Evolutionary Algorithms, An Evolutionary Cycle by Hand, Example Applications, The Operation of an Evolutionary Algorithm, Natural Versus Artificial Evolution, Evolutionary Computing, Global Optimization, and Other Search Algorithms

UNIT - II

Representation, Mutation, and Recombination

Representation and the Roles of Variation Operators, Binary Representation, Integer Representation, Real-Valued or Floating-Point Representation, Permutation Representation, Tree Representation **Fitness, Selection, and Population Management:** Population Management Models, Parent Selection, Survivor Selection, Selection Pressure, Multimodal Problems, Selection, and the Need for Diversity

Popular Evolutionary Algorithm Variants: Genetic Algorithms, Evolution Strategies, Evolutionary Programming, Genetic Programming, Learning Classifier Systems, Differential Evolution, Particle Swarm Optimization, Estimation of Distribution Algorithms

UNIT - III

Parameters and Parameter Tuning: Evolutionary Algorithm Parameters, EAs and EA Instances, Designing Evolutionary Algorithms, The Tuning Problem, Algorithm Quality: Performance and Robustness, Tuning Methods.

Parameter Control: Introduction, Examples of Changing Parameters, Classification of Control Techniques, Examples of Varying EA Parameters

UNIT - IV

Working with Evolutionary Algorithms: Working of EA, Performance Measures, Test Problems for Experimental Comparisons, Example Applications.

Hybridization with Other Techniques: Memetic Algorithms: Motivation for Hybridizing EAs, A Brief Introduction to Local Search, Structure of a Memetic Algorithm, Adaptive Memetic Algorithms, Design Issues for Memetic Algorithms, Example Application: Multistage Memetic Timetabling

UNIT - V

Multi objective Evolutionary Algorithms

Multi objective Optimization Problems, Dominance and Pareto Optimality, EA Approaches to Multi objective Optimization, Example Application: Distributed Coevolution of Job Shop Schedules **Constraint Handling:** Two Main Types of Constraint Handling, Approaches to Handling Constraints, Example Application: Graph Three-Colouring.

Interactive Evolutionary Algorithms: Characteristics of Interactive Evolution, Algorithmic Approaches to the Challenges of IEAs, Interactive Evolution as Design vs. Optimization, Example Application: Automatic Elicitation of User Preferences.

TEXT BOOK:

1. A. E. Eiben, J. E. Smith, Introduction to Evolutionary Computing, Second Edition, Springer.

REFERENCE BOOKS:

1. David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning".
2. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

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COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B22AI45: PROJECT STAGE-II (including Seminar)