JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGEOFENGINEERING(Autonomous),ANANTHAPURAMU
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
B.Tech (R19 Regulation)

Course Structure for R19 Regulations

S.No	Course No	Course Name	Category	L-T-P	Credits
Semester – 1					
1.	19A15101	Linear Algebra And Calculus	BS	3-1-0	4
2.	19A15201	Applied Physics	BS	3-0-0	3
3.	19A10501	Problem Solving & Programming	ES	3-1-0	4
4.	19A15501	Communicative English 1	HS	2-0-0	2
5.	19A10504	Computer Science & Engineering Workshop	LC	0-0-2	1
6.	19A15202	Applied Physics Lab	BS	0-0-3	1.5
7.	19A10506	Problem Solving & Programming Lab	ES	0-0-3	1.5
8.	19A15502	Communicative English Lab-1	HS	0-0-2	1
				Total	**18**

S.No	Course No	Course Name	Category	L-T-P	Credits
Semester - 2					
1	19A10502	Python Programming	ES	3-0-0	3
2	19A15103	Probability And Statistics	BS	3-0-0	3
3	19A15303	Chemistry	BS	2-1-0	3
4	19A10503	Data Structures	ES	2-1-0	3
5	19A10303	Engineering Workshop	LC	0-0-2	1
6	19A10304	Engineering Graphics	ES	1-0-3	2.5
7	19A10804	Environmental Science	MC	3-0-0	0
8	19A10508	Statistical Programming Lab	BS	0-0-3	1.5
9	19A10505	Python Programming Lab	ES	0-0-3	1.5
10	19A15304	Chemistry Lab	BS	0-0-3	1.5
11	19A10507	Data Structures Lab	ES	0-0-3	1.5
				Total	**21.5**

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S.No	Course No	Course Name	Category	L-T-P	Credits
11		II B.Tech I Sem			
1.	19A20605	Number Theory and its Applications	BSC	3-0-0	3
2.	19A20501	Digital Logic Design	PCC	3-0-0	3
3.	19A20502	OOPS Through JAVA	PCC	2-0-0	2
4.	19A20503	Design and Analysis of Algorithms	PCC	3-0-0	3
5.	19A22451	Basic Electrical and Electronics Engineering	BSC/ESC	3-0-0	3
6.	19A20504	Database Management Systems	PCC	3-0-0	3
7.	19A20901	Universal Human Values	HE	2-0-0	2
8.	19A20505	OOPS Through Java Lab	PCC	0-0-3	1.5
9.	19A22552	Basic Electrical Electronics-Lab	PCC	0-0-3	1.5
10.	19A20506	Database Management Systems – Lab	PCC	0-0-3	1.5
11.	19A28801	Biology For Engineers	MC	3-0-0	0
				Total	**23.5**

S.No	Course No	Course Name	Category	L-T-P	Credits
11		II B.Tech II Sem			
1.	19A20507	Computer Organization	PCC	3-0-0	3
2.	19A20508	Operating Systems	PCC	3-0-0	3
3.	19A20509	Computer Graphics	PCC	3-0-0	3
4.	19A20510	Discrete Mathematics	PCC	3-0-0	3
5.	19A20511	Entrepreneurship	BSC/ESC	3-0-0	3
6.	19A20512	Software Engineering	PCC	3-0-0	3
7.	19A20513	Operating Systems Lab	PCC	0-0-2	1
8.	19A20514	Software Engineering Lab	PCC	0-0-2	1
9.	19A20515	Computer Graphics Lab	PCC	0-0-2	1
10.	19A20902	Constitution of India	MC	3-0-0	0
				Total	**21**

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		III B.Tech I Sem			
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A50501	Formal Languages and Automata Theory	PCC	4-0-0	4
2.	19A50502	Computer Networks	PCC	3-0-0	3
3.	19A55501	English Language Skills	HSMC	3-0-0	3
4.	19A50503 19A50504 19A50505	Professional Elective-I ● Software Testing ● Data Mining and Warehousing ● Principles of Programming Languages	PEC-1	3-0-0	3
5.	19A50506 19A50507 19A50508	Open Elective-I ● Artificial Intelligence ● Web Technologies ● Distributed computing	OEC-1	3-0-0	3
6.	19A50509	Object Oriented Analysis and Design	PCC	1-0-0	1
7.	19A50510	Computer Networks Lab	PCC	0-0-3	1.5
8.	19A55502	English Language Skills Lab	HSMC	0-0-3	1.5
9.	19A50511	Object Oriented Analysis and Design Lab	PCC	0-0-3	1.5
10.	19A50512	Socially Relevant Project	PR	0-0-0.5	0.5
				Total	**22**

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S.No	Course No	Course Name	Category	L-T-P	Credits
		III B.Tech II Sem			
1.	19A60501	Compiler Design	PCC	3-0-0	3
2.	19A60502	Cryptography & Network Security	PCC	3-0-0	3
3.	19A60503	Machine Learning	HSMC	3-0-0	3
4.	19A60504 19A60505 19A60506	Professional Elective-II • Virtual Reality and Augmented Reality • Distributed Systems • Design patterns	PEC-2	3-0-0	3
5.	19A60507 19A60508 19A60509	Open Elective-II • Game Design and Development • Mobile Application Development • Soft computing	OEC-2	3-0-0	3
6.	19A65401 19A65402 19A65403	Humanities Elective-I • Managerial Economics and Financial Analysis • Business Ethics and Corporate Governance • Entrepreneurship & Incubation	HSMC	3-0-0	3
7.	19A60510	Network Security and Compiler Design Lab	PCC	0-0-3	1.5
8.	19A60511	Machine Learning Lab	HSMC	0-0-2	1
9.	19A60512	Socially Relevant Project	PR	0-0-0.5	0.5
10.	19A55401	Research Methodology	MC	3-0-0	0
				Total	**21**

* Marks shall be awarded in 7th semester, but started at end of 6th semester and complete before beginning of 7th semester.

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S.No	Course No	Course Name	Category	L-T-P	Credits
		IV B.Tech I Sem			
1.	19A70501	Data Analytics	PCC	3-0-0	3
2.	19A70502	Internet of Things	PCC	3-0-0	3
3.	19A70503 19A70504 19A70505	Professional Elective-III ● Service Oriented Architecture ● High performance computing ● Block chain technologies	PEC-3	3-0-0	3
4.	19A70506 19A70507 19A70508	Open Elective-III ● Mobile Computing ● No SQL data bases ● Data Visualisation techniques	OEC-3	3-0-0	3
5.	19A75401 19A75402 19A75403	Humanities Elective-II ● Management Science ● Organizational Behaviour ● Business Environment	HSMC	3-0-0	3
6.	19A70509	Data Analytics Lab	PCC	0-0-3	1.5
7.	19A70510	Internet of Things Lab	PCC	0-0-3	1.5
8.	19A70511	Project	PR	------	1.5
9	19A70512	SEMINAR		0-0-1	0.5
9.	19A70513	Industrial Training/Skill Development/Research Project/Internship/Two subjects MOOCs*	PR	------	10
				Total	**30**

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S.No	Course No	Course Name	Category	L-T-P	Credits
IV B.Tech II Sem
1.	19A80501 19A80502 19A80503	Professional Elective-IV ● Software Project Management ● Cloud Computing ● Deep learning	PEC-4	3-0-0	3
2.	19A80504 19A80505 19A80506	Open Elective-IV ● Digital Marketing ● Natural Language Processing ● Cyber Security	OEC-4	3-0-0	3
3.	19A80507	Project	PR	0-0-14	7
				Total	**13**

SubjectCode	TitleoftheSubject	L	T	P	C
19A15101	**Linear Algebra and Calculus** (Common to all branches of Engineering)	3	1	0	4

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linearalgebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and theirapplications.

Bridge Course: Limits, continuity, Types of matrices

Unit1:Matrices   10hrs

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Learning Outcomes:

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

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix;(L3)
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics;(L3)

Unit 2: MeanValueTheorems   6hrs

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

Learning Outcomes:

At the end of this unit, the student will be able to
- Translate the given function as series of Taylor's and Maclaurin's with remainders(L3)
- Analyzethebehaviourof functions by using mean value theorems(L3)

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Unit 3:Multivariablecalculus   8hrs

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies.(L3)
- Acquire the Knowledge maxima and minima of functions of several variable(L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit4:MultipleIntegrals   10hrs

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

Learning Outcomes:

- At the end of this unit, the student will be ableto
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates(L5)
- Apply double integration techniques in evaluating areas bounded by region(L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries(L5)

Unit5:SpecialFunctions   6hrs

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to
- understand beta and gamma functions and its relations(L2)
- Conclude the use of special function in evaluating definite integrals(L4)

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

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Reference Books:
1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.,2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers,2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers,201.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearsonedn
5. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRCPress
6. Peter O'neil, Advanced Engineering Mathematics, CengageLearning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, PearsonEducation
8. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education
9. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems(L3)
- familiarize with functions of several variables which is useful in optimization(L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems(L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of specialfunctions

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B.Tech –I/IISem

SubjectCode	TitleoftheSubject	L	T	P	C
19A15201	**Applied Physics (Common to ECE, CSE, EEE & IT)**	3	0	0	3

Course Objectives:

> To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineeringapplications.
> To explain the significant concepts of dielectric and magnetic materials this leads to potential applications in the emerging microdevices.
> To impart knowledge in basic concepts of electromagnetic waves and its propagation in optical fibers along with its Engineeringapplications.
> To identify the importance of semiconductors in the functioning of electronicdevices.
> To teach the concepts related to superconductivity which lead to their fascinating applications.
> To familiarize the applications of nanomaterials relevant to engineeringbranches.

Unit-I :WaveOptics   8hrs

Interference-Principle of Superposition-Interference of light-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength- Engineering applications ofInterference

Diffraction-Fraunhofer Diffraction-Single and Double slits - Diffraction Grating – Grating Spectrum -Determination of Wavelength - Engineering applications of diffraction

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

Unit Outcomes:
The students will be able to

> **explain** the need of coherent sources and the conditions for sustained interference(L2)
> **identify** engineering applications of interference including homodyne and heterodyne detection(L3)
> **analyze**the differences between interference and diffraction with applications(L4)
> **illustrate** the concept of polarization of light and its applications(L2)
> **classify** ordinary polarized light and extraordinary polarized light(L2)

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Unit-II : Dielectric andMagneticMaterials   (8hrs)

Introduction--Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic, (Quantitative), Orientation Polarizations (Qualitative)- Frequency dependence of polarization-Lorentz (internal) field- Claussius - Mosotti equation-Applications of Dielectrics:Ferroelectricity.

Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

Unit Outcomes:
The students will be able to

- **explain** the concept of dielectric constant and polarization in dielectric materials(L2)
- **summarize** various types of polarization of dielectrics(L2)
- **interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **explain** the applications of dielectric and magnetic materials(L2)
- **Apply** the concept of magnetism to magnetic devices(L3)

Unit – III: Electromagnetic Waves andFiberOptics   10hrs

Divergence and Curl of Electric and Magnetic Fields- Gauss' theorem for divergence and Stokes' theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium) -Poynting'sTheorem.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile– Propagation of electromagnetic wave through optical fiber – modes -importance of V-number- Attenuation, Block Diagram of Fiber optic Communication -Medical Applications-Fiber optic Sensors.

Unit Outcomes:
The students will be able to

- **apply** the Gauss' theorem for divergence and Stokes' theorem for curl(L3)
- **evaluate** the Maxwell's equations, Maxwell's displacement current and correction in Ampere's law(L5)
- **asses** the electromagnetic wave propagation and its power in non-conducting medium(L5)
- **explain** the working principle of optical fibers(L2)
- **classify** optical fibers based on refractive index profile and mode of propagation(L2)
- **identify** the applications of optical fibers in medical, communication and other fields(L2)
- **Apply** the fiber optic concepts in various fields(L3).

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Unit –IV:Semiconductors   8hrs

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors - density of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hallcoefficient-ApplicationsofHalleffect-DriftandDiffusioncurrents-Continuityequation - Applications ofSemiconductors.

Unit Outcomes:

The students will be able to

> ➢ **classify** the energy bands of semiconductors(L2)
> ➢ **outline** the properties of n-type and p-type semiconductors and charge carriers(L2)
> ➢ **interpret** the direct and indirect band gap semiconductors(L2)
> ➢ **identify** the type of semiconductor using Hall effect(L2)
> ➢ **identify** applications of semiconductors in electronic devices(L2)

Unit – V: SuperconductorsandNanomaterials   8

hrsSuperconductors-Properties- Meissner's effect-BCS Theory-Josephson effect (AC &DC)-Types of Super conductors-Applications ofsuperconductors.

Nano materials – Significance of nanoscale – Properties of nanomaterials: Physical, Mechanical, Magnetic, Optical – Synthesis of nanomaterials: Top-down-Ball Milling, Bottom-up -Chemical vapour deposition – characterization of nanomaterials: X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM) - Applications of Nano materials.

Unit Outcomes:

The students will be able to

> ➢ **explain** how electrical resistivity of solids changes with temperature(L2)
> ➢ **classify** superconductors based on Meissner's effect(L2)
> ➢ **explain** Meissner's effect, BCS theory & Josephson effect in superconductors(L2)
> ➢ **identify** the nano size dependent properties of nanomaterials(L2)
> ➢ **illustrate** the methods for the synthesis and characterization of nanomaterials(L2)
> ➢ **Apply** the basic properties of nanomaterials in various Engineering branches(L3).

TextBooks:

1. M. N. Avadhanulu, P.G. Kshirsagar&TVS ArunMurthy" AText book of Engineering Physics"- S. Chand Publications, 11th Edition2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning,2012.

Reference Books:

1. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", PearsonEducation,2018
2. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, PearsonEducation

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I B.TECH – I SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A10501	Problem Solving & Programming	2	1	0	3

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

Unit 1:
Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.
Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.

Unit Outcomes:
Student should be able to

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

Unit 2:

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

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Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.

Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do-while, break and continue, Goto and labels.

Learning Outcomes: Student should be able to

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

Unit 3:

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

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Learning Outcomes: Student should be able to

1. Recognize the programming elements of C Programming language (L1)
2. Select the control structure for solving the problem (L4)
3. Apply modular approach for solving the problem (L3)

Unit 4:

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

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

Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the kth smallest element

Learning Outcomes: Student should be able to

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

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Unit 5:
Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

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

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

Learning Outcomes: Student should be able to

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

Text Books:

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.

Reference Books:

1. P.Chenna Reddy, " Computer Fundamentals and C Programming" 2018, BS Publications
2. RS Bichkar" Programming with C", 2012, Universities Press.
3. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage Learning.

Course Outcomes:

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

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I B.TECH – I SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A15501	Communicative English-I	2	0	0	2

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives

➢ Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
➢ Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
➢ Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
➢ Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
➢ Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Speaking:Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. Reading for Writing :Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea

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and/or providing a transition to the next paragraph.Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

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

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

Unit 2

Lesson: The Brook: Alfred Tennyson

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

Learning Outcomes

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

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

Unit 3

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to. Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed   Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.Writing: Summarizing - identifying main idea/s and rephrasing what

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is read; avoiding redundancies and repetitions. Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

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

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

Unit4

Lesson: Innovation: Muhammad Yunus

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

Learning Outcomes

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

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

Unit 5

Lesson: Politics and the English Language: George Orwell

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

Learning Outcomes

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

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

Prescribed Text:

Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011

Course Outcomes

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

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

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I B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10504	**Computer Science & Engineering Workshop**	0	0	2	1

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- Teach them how to connect two or more computers
- Introduce to the Raspberry Pi board
- Explain storytelling by creating Graphics, Web pages and Videos

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Productivity tools

Task 5: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including

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images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 6: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 7: Presentations: creating, opening, saving and running the presentations,Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Networking

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

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

IoT

Task 10: Raspberry Pi

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

Story Telling

Task 11: Storytelling

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

References:

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

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2. "MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
4. Rusen, "Networking your computers and devices", PHI
5. Bigelows, "Trouble shooting, Maintaining& Repairing PCs", TMH.
6. https://www.adobe.com
7. https://www.raspberrypi.org

Course Outcomes:

- Construct a computer from its parts and prepare it for use (L3)
- Develop Documents using Word processors (L3)
- Develop presentations using the presentation tool (L3)
- Perform computations using spreadsheet tool (L3)
- Connect computer using wired and wireless connections (L4)
- Design Graphics, Videos and Web pages (L6)
- Connect things to computers (L30

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I B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A15202	**Applied Physics Lab**	0	0	3	1.5

COURSE OBJECTIVES	
1	To make the students gain practical knowledge to co-relate with the theoretical studies. To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.

COURSE OUTCOMES	
CO1	**Operate** optical instruments like microscope and spectrometer (L2)
CO2	**Estimate** the desired physical parameters by performing the concerned experiments (L2)
CO3	**Plot** the concerned physical parameter to know their related variations (L3)
CO4	**Identify** the role of various physical phenomenon in relation with the experimental concepts (L3)

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		2		2	2		2		1		2		
CO2	3	2		2		2	2		2		1		2		
CO3	3	3		2		2	2		2		1		2		
CO4	3	2		2		2	2		2		1		2		

List of Physics Experiments

1. Determination of thickness of thin object by wedge method
2. Determination of radius of curvature of lens by Newton's rings
3. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
4. Determination of dispersive power of the prism
5. Determination of dielectric constant and Curie temperature of a ferroelectric material
6. B-H curve
7. Determination of numerical aperture of an optical fiber
8. Laser: Determination of wavelength using diffraction grating
9. Laser: Determination of particle size
10. To determine the resistivity of semiconductor by four probe method
11. Energy gap of a material using p-n junction diode
12. Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method
13. Hall effect : Determination of mobility of charge carriers in semiconductor
14. Measurement of resistance of a semiconductor with varying temperature

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15. To determine the self inductance of the coil (L) using Anderson's bridge

Note: Out of twelve experiments, two experiments will be performed using virtual laboratory.
Data Books Required: Nil
References:
   1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand
   Publishers, 2017.
   2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

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I B.TECH – I SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A10506	**Problem Solving & Programming Lab**	0	0	3	1.5

Laboratory Experiments

1. Basic DOS Commands/Unix Commands
2. Familiarize with windows/Linux Environment.
3. Familiarize with development environment of C Language
4. Design a C program which reverses the number
5. Design a C program which finds the second maximum number among the given list of numbers.
6. Construct a program which finds the kth smallest number among the given list of numbers.
7. Design an algorithm and implement using C language the following exchanges
     a b□ c   d

6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.

7. Implement the C program which computes the sum of the first n terms of the series

   Sum = 1 – 3 + 5 -7 + 9

8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.

9. Design an algorithm and implement using a C program which finds the sum of the infinite series

   $1 – x^2/2! + x^4/4! – x^6/6! + ...$

10 Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.

11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.

12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.

13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.

14. Design a C program which reverses the elements of the array.

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

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16. Implement the sorting algorithms a. Insertion sort   b. Exchange sort   c. Selection sort

d.. Partitioning sort.

17. Illustrate the use of auto, static, register and external variables.

18. Designalgorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.

19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.

20. Design a C program which sorts the strings using array of pointers.

Course outcomes: Student should be able to

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

References:

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", Tata McGraw-Hill, 2nd edition, 2002.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. P.Chenna Reddy, " Computer Fundamentals and C Programming" 2018, BS Publications

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I B.TECH – I SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A15502	**Communicative English Lab-1**	0	0	3	1.5

Course Objectives

➢ students will be exposed to a variety of self instructional, learner friendly modes of language learning
➢ students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
➢ students will learn better pronunciation through stress, intonation and rhythm
➢ students will be trained to use language effectively to face interviews, group discussions, public speaking
➢ students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes

☐ CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
☐ CO2: Apply communication skills through various language learning activities
☐ CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
☐ CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings
☐ CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

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

Learning Outcomes
At the end of the module, the learners will be able to
☐ understand different accents spoken by native speakers of English
☐ employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
☐ learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2
1. JAM
2. Small talks on general topics
3. Debates

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Learning Outcomes

At the end of the module, the learners will be able to
- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3
1. Situational dialogues – Greeting and Introduction
2. Summarizing andNote making
3. Vocabulary Building

Learning Outcomes

At the end of the module, the learners will be able to
- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4
1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes

At the end of the module, the learners will be able to
- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5
1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes

At the end of the module, the learners will be able to
- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software
- Young India Films
- Walden Infotech
- Orell

Reference Books
- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.

- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.

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- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

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I B.TECH – II SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A10502	**Python Programming**	3	0	0	3

Course Objectives:

1. To teach the fundamentals of Python
2. To elucidate problem-solving using a Python programming language
3. To introduce a function-oriented programming paradigm through python
4. To train in the development of solutions using modular concepts
5. To introduce the programming constructs of python

Unit – I
Introduction: What is a program, Running python, Arithmetic operators, Value and Types. Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.
Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Learning Outcomes: Student should be able to

1. List the basic constructs of Python (L1)
2. Solve the problems by applying modularity principle (L3)

Unit – II
Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.
Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.
Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types,

Learning Outcomes: Student should be able to

1. Apply the conditional execution of the program (L3)
2. Apply the principle of recursion to solve the problems (L3)

Unit - III

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Learning Outcomes: Student should be able to

1. Use the data structure list (L3)
2. Design programs for manipulating strings (L6)

Unit – IV

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions:

Learning Outcomes: Student should be able to
1. Apply object orientation concepts (L3)
2. Use data structure dictionaries (L3)
3. Organize data in the form of files (L6)

Unit – V

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, The __str__method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args,

Learning Outcomes: Student should be able to
1. Plan programs using object orientation approach (L6)

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2. Illustrate the principle of inheritance (L4)

Text books:
1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.

Reference Books:

1. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
3. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019

Course Outcomes: Student should be able to

1. Explain the features of Python language (L2)
2. Select appropriate data structure for solving a problem (L4)
3. Design object oriented programs for solving real-world problems (L6)

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I B.TECH – II SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A15103	Probability and Statistics	3	0	0	3

Course Objectives:
1) To familiarize the students with the foundations of probability and statistical methods
2) To impart probability concepts and statistical methods in various engineering applications

Unit 1: Descriptive statistics and methods for data science   10 hrs
 Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variable: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.
Learning Outcomes:
At the end of this unit, the student will be able to
- summarize the basic concepts of data science and its importance in engineering (L2)
- analyze the data quantitatively or categorically , measure of averages, variability (L4)
- adopt   correlation methods and principle of least squares, regression analysis (L5)

UNIT 2: Probability   8 hrs
Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.
Learning Outcomes:
At the end of this unit, the student will be able to
- define the terms trial, events, sample space, probability, and laws of probability (L1)
- make use of probabilities of events in finite sample spaces from experiments (L3)
- apply Baye's theorem to real time problems (L3)
- explain the notion of random variable, distribution functions and expected value(L2)

UNIT 3: Probability distributions   6 hrs
Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshevs inequality). Approximation of the binomial distribution to normal distribution.
Learning Outcomes:
At the end of this unit, the student will be able to
- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (L3)
- interpret the properties of normal distribution and its applications (L2)

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Unit4: Estimation and Testing of hypothesis, large sample tests   **8 hrs**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Learning Outcomes:

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

- explain the concept of estimation, interval estimation and confidence intervals (L2)
- apply the concept of hypothesis testing for large samples (L4)

Unit 5: Small sample tests   **8 hrs**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi2$ - test for goodness of fit, $\chi2$ - test for independence of attributes.

Learning Outcomes:

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

- apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- estimate the goodness of fit (L5)

Textbooks:

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
4. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Learning Outcomes:

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

- make use of the concepts of probability and their applications (L3)
- apply discrete and continuous probability distributions (L3)
- classify the concepts of data science and its importance (L4)
- interpret the association of characteristics and through correlation and regression tools
       (L4)
- Design the components of a classical hypothesis test   (L6)
- infer the statistical inferential methods based on small and large sampling tests   (L6)

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A15303	**Chemistry**	3	0	0	3

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

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

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		2		2	2		2		1		2		
CO2	3	2		2		2	2		2		1		2		
CO3	3	3		2		2	2		2		1		2		
CO4	3	2		2		2	2		2		1		2		
CO5	3	2		2		2	2		2		1		2		

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SYLLABUS

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

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2, applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – splitting in octahedral and tetrahedral geometry, magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

Unit 2: Electrochemistry and Applications: (10 hrs)

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

Primary cells – Zinc- MnO_2battery(Laclanche cell), Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions.Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Unit 3: Polymer Chemistry:(10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-6,6, carbon fibres, Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, mechanism of conduction and applications.

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Unit 4: Instrumental Methods and Applications: (10 hrs)

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

Unit 5: Advanced Engineering Materials:(10 hrs)

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

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

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

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

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

References:
1.A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

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I B.TECH – II SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A10503	**Data Structures**	3	0	0	3

Course Objectives:
1. To teach the representation of solution to the problem using algorithm
2. To explain the approach to algorithmanalysis
3. To introduce different data structures for solving the problems
4. To demonstrate modeling of the given problem as a graph
5. To elucidate the existing hashing techniques

Unit – 1: Introduction
Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort
Learning Outcomes:
Student should be able to
1. Analyze the given algorithm to find the time and space complexities.(L4)
2. Select appropriate sorting algorithm (L4)
3. Designa sorting algorithm (L6)

Unit – 2: Stack, Queue and Linked lists
Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.
Learning outcomes:
Student should be able to
1. Evaluate expressions (L5)
2. Develop the applications using stacks and queues (L3)
3. Construct the linked lists for various applications (L6)

Unit – 3 :Trees
Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, AVL Trees.

Learning outcomes
1. Explain the concept of a tree (L2)
2. Compare different tree structures (L4)
3. Apply trees for indexing (L3)

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Unit – 4 :Graphs and Hashing

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

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

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

Unit – 5: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.
Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning outcomes:
Student should be able to
1. Organize data in the form of Files (L6)
2. Apply sorting on large amount of data (L3)

Text Books:
1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2007.
2. Alan L. Tharp, "File Organization and Processing", Wiley and Sons, 1988.

Reference Text Books:
1. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
3. Richard F.Gilberg, Behrouz A.Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

Course Outcomes:

Students should be able to

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

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10303	**Engineering Workshop**	3	0	0	3

Course Objective:
To familiarize students with wood working, sheet metal operations, fitting and electrical house
Wiring skills
Wood Working:
Familiarity with different types of woods and tools used in wood working and make following
joints
        a) Half – Lap joint*
        b) Mortise and Tenon joint*
        c) Corner Dovetail joint or Bridle joint
Sheet Metal Working:
Familiarity with different types of tools used in sheet metal working, Developments of following
sheet metal job from GI sheets
        a) Tapered tray *
        b) Conical funnel *
        c) Elbow pipe *
        d) Brazing
Fitting:
Familiarity with different types of tools used in fitting and do the following fitting exercises
        a) V-fit*
         b) Dovetail fit *
        c) Semi-circular fit
        d) Wheel balancing, tubeless tyre puncture and change of two wheelertyre.
Electrical Wiring:
Familiarities with different types of basic electrical circuits and make the following connections
        a) Parallel and series*
        b) Two way switch*
        c) Godown lighting
        d) Tube light*
        e) Three phase motor
        f) Soldering of wires
Note:* Students exercise. Remaining all for demonstration.
Course Outcomes:
After completion of this labthe student will be able to
1. Apply wood working skills in real world applications.
2. Build different parts with metal sheets in real world applications.
3. Apply fitting operations in various applications.
4. Apply different types of basic electric circuit connections.
5. Demonstrate soldering and brazing.
6.Understanding the principle of automobile wheel balancing and alignment.

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10304	**Engineering Graphics**	1	0	3	2.5

UNIT-I

Introduction to EngineeringDrawing, Principles of Engineering Graphics and their significance.
Curves used in practice:
Conic sections – Ellipse, Parabola, Hyperbola & Rectangular Hyperbola(general method)
 Cycloid, Epicycloid and Hypocycloid – Normal and Tangent
Involutes – Normal and Tangents

UNIT –II

Principles of orthographic projections – First and Third angle projections Projection of points. Projections of lines inclined to one plane and inclined to both planes – True length, true angles of projected lines- Projection of regular planes inclined to one plane and both planes.

UNIT –III

Projection of solids inclined to one plane and inclined to both planes by rotational method – Prism, Cylinder, Pyramid, Cone.

UNIT –IV

Sections of solids: Sections and Sectional views of Regular solids – Prism, Cylinder, Pyramid, Cone – True shapes. Development of Regular solids- Prism, Cylinder, Pyramid, Cone.

UNIT –V

Orthographic projections: Conversion of Pictorial views to orthographic views – Conventions.

Isometric projection: Isometric views of lines, plane figures, simple solids – orthographic views into isometric views.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana & P. Kannaih, Scitech Publishers, Chennai.

REFERENCES:

3. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
4. Engineering Drawing, Shah and Rana,2/e, Pearson Education
5. Engineering Drawing and Graphics, Venugopal/New age Publishers
6. Engineering Graphics, John&john.

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10804	**Environmental Science**	3	0	0	3

OBJECTIVE: To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT – I:
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.
NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II:
ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
    a.   Forest ecosystem.
    b.   Grassland ecosystem
    c.   Desert ecosystem
    d.   Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

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UNIT – III:
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :
  a.   Air Pollution.
  b.   Water pollution
  c.   Soil pollution
  d.   Marine pollution
  e.   Noise pollution
  f.   Thermal pollution
  g.   Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV:
SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V:
HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health –

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :
  (1) Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
  (2) Environmental Studies by Palani Swamy – Pearson education
  (3) Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

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<u>**REFERENCES :**</u>
(1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications.
(2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
(3) Comprehensive Environmental studies byJ.P.Sharma, Laxmi publications.
(4) Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
(5) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Pubilishing House
(6) Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A15304	**Statistical Programming Lab**	3	0	0	3

1. History of R

2. Installing R and packages in R

3. Programs on data types in R

i. Use R to calculate the following

 a) 31*78   b) 697/41

c) assign the value of 39 to X

d) assign the value of 22 to Y

e) make the value of X-Y

f) display the value of Z in the console

4. calculate the square root of 2345 and perform a log2 transformation on the result

5. Print 1 to 100 numbers in reverse order.

6. Find 10 random numbers between 0 and 100

7. Built-in functions in R

8. Creating and manipulating a vector in R

i) consider two vectors, X,Y   X=c(4,6,5,7,10,9,4,15) Y=c(0.10.1.8.2.3.4.1) what is the value of X*Y and X+Y

ii) If X=c(1:2) what is the value of: dim(X)

what is the value of: length(X)

iii) I X= c('blue', 'red', green, 'black') what is the value of: is. Character(X)

9. Creating matrix and manipulating in R

i) matrix <- matrix (data = 1, nrow=3, ncolumn=3)

ii) vector8 <- 1:12 matrix3 <- matrix(data = vector8, nrow=4)

iii) V1 <- matrix(c(1,2,3,4,5,6,7,8,9), nrow=3)

iv) Consider A=matrix(c(2,0,1,3),ncol=2) and B=matrix(c(5,2,4,-1),ncol=2)

a) Find A+B   b) Find A-B

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10. Creating and operations on factor in R

i) If X=c(1,2,3,,3,5,3,2,4,NA), what are the levels of Factor(X)?

11. Operations on data frames in R

i) Create the following data frame, afterwards invert Age for all Individuals.

	Age	Height	Weight	Sex
Alex	25	177	57	F
Lilly	23	163	69	F
Mark	52	190	83	M
Oliver	76	179	75	M
Martha	49	163	70	F
Lucas	26	183	83	M
Caroline	31	164	53	F

12. Operations in lists in R

13. Programs on operators in R

14. Comparison of matrices and vectors in R

15. Programs on if-else statements in R

16. programs on while loops in R

17. customising and saving to graphs in R

18. PLOT function in R to customize graphs

19. 3D PLOT in R to customise graphs

Text Books:

1.Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014

The Art of Data Science: A Guide for Anyone Who Works with Data,RogerD.Peng,Elizabeth Matsui, LeanPub, 2015.

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3. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking, Foster Provost and Tom Fawcett. 2013

Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2009.

Reference Books:

1. Mining of Massive Datasets,JureLeskovek, AnandRajaraman and Jeffrey Ullman. , Cambridge University Press. 2014.

2.Machine Learning: A Probabilistic Perspective.Kevin P. Murphy, MIT Press, 2013.

3. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.

4.Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press. 2014.

5. R Programming for Data Science, Roger D. Peng, LeanPub, 2015.

6.Python for Data Science for Dummies, Luca Massaron and John Paul Mueller, John Wiley and Sons, 2015.

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10505	**Python Programming Lab**	0	0	3	1.5

Course Objectives:

1. To train solving computational problems
2. To elucidate solving mathematical problems using Python programming language
3. To illustrate the features of Python language

Laboratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator
2. Write a function that draws a grid like the following:

```
+ - - - - + - - - - +
|       |       |
|       |       |
|       |       |
|       |       |
+ - - - - + - - - - +
|       |       |
|       |       |
|       |       |
|       |       |
+ - - - - + - - - - +
```

3. Write a function that draws a Pyramid with # symbols

```
        #
      # # #
    # # # # #
  # # # # # # #
        .
        .
        .
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of your choice

5. Write a program that draws Archimedean Spiral

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6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of the alphabet.

7. The time module provides a function, also named time that returns the current Greenwich Mean Time in "the epoch", which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January 1970.

   >>> import time

   >>>time.time()

   1437746094.5735958

   Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

8. Given $n+r+1 <= 2^r$ .n is the input and r is to be determined. Write a program which computes minimum value of r that satisfies the above.

9. Write a program that evaluates Ackermann function

10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a numerical approximation of $1/\pi$:

11. Write a function called estimate_pi that uses this formula to compute and return an estimate of π.

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

   It should use a while loop to compute terms of the summation until the last term is smaller than 1e-15 (which is Python notation for 10^{-15}). You can check the result by comparing it to math.pi.

12. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.

13. Given a text of characters. Write a program which counts number of vowels, consonants and special characters.

14. Given a word which is a string of characters. Given an integer say 'n'. Rotate each character by 'n' positions and print it. Note that 'n' can be positive or negative.

15. Given rows of text, write it in the form of columns.

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16. Given a page of text. Count the number of occurrences of each latter (Assume case insensitivity and don't consider special characters). Draw a histogram to represent the same

17. Write program which performs the following operations on list's. Don't use built-in functions

    a) Updating elements of a list

    b) Concatenation of list's

    c) Check for member in the list

    d) Insert into the list

    e) Sum the elements of the list

    f) Push and pop element of list

    g) Sorting of list

    h) Finding biggest and smallest elements in the list

    i) Finding common elements in the list

18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lowercase.

19. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in different eras.

20. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from the file.

21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the same contents.

22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.

23. Write a program illustrating the object oriented features supported by Python.

24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

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25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD

format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.

26. Design a Python Script to determine the time difference between two given times in HH:MM:SS

format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)

Course outcomes: Student should be able to

1. Design solutions to mathematical problems (L6)
2. Organize the data for solving the problem (L6)
3. Develop Python programs for numerical and text based problems (L3)
4. Select appropriate programming construct for solving the problem (L5)
5. Illustrate object oriented concepts (L3)

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016

3. DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10507	**Chemistry Lab**	0	0	3	1.5

COURSE OBJECTIVES	
1	Verify the fundamental concepts with experiments

COURSE OUTCOMES	
CO1	determine the cell constant and conductance of solutions
CO2	prepare advanced polymer materials
CO3	measure the strength of an acid present in secondary batteries
CO4	analyse the IR and NMR of some organic compounds
CO5	Would have acquired the practical skill to handle the analytical methods with confidence.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		2		2	2		2		1		2		
CO2	3	2		2		2	2		2		1		2		
CO3	3	3		2		2	2		2		1		2		
CO4	3	2		2		2	2		2		1		2		
CO5	3	2		2		2	2		2		1		2		

LIST OF EXPERIMENTS

1. Conductometrictitration of strong acid vs strong base
2. Conductometrictitration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Estimation of Ferrous Iron by Dichrometry.
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Verify Lambert-Beer's law
9. Thin layer chromatography
10. Identification of simple organic compounds by IR
11. Separation of Organic mixtures by paper chromatography.
12. Preparation of Nano materials

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TEXT BOOKS:

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

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I B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A10508	**Data Structures Lab**	0	0	3	1.5

Course Objectives:

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

Laboratory Experiments

Week 1:

1. Searching Algorithms (With the Number of Key Comparisons)Sequential, Binary search.

Week 2:
2. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, and Bubble Sort.

Week 3:
3. Sorting Algorithms:, Quick Sort, Heap Sort,Merge Sort.

Week 4:
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List

Week 5:
5. Stack implementation using arrays and Linked list.

Week 6:
6. Queue implementation using arrays and Linked list.

Week 7:
7. Implement Circular linked list using arrays and Linked list.

Week 8:
8. Implement double ended Queue using linked list.

Week 9:
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.

Week 10:
10. Implement Breadth first and Depth first search techniques in graphs.

Week 11:
11. Implement file operations (Create, Read, append, close).

Week 12:
12. Convert infix expression into post fix expression.
13. Evaluate post fix expression.

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20605	**Number theory and its Applications**	3	0	0	3

Course Objective:
This course enables the students to learn the concepts of number theory and its applications to information security.

Unit-I-Integers, Greatest common divisors and prime Factorization

The well-ordering property-Divisibility- Representation of integers-Computer operations with integers-Prime numbers-Greatest common divisors-The Euclidean algorithm -The fundamental theorem of arithmetic-Factorization of integers and the Fermat numbers-Linear Diophantine equations

Learning Outcomes:

Students will be able to

1. Understand basics of number theory concepts.
2. Solve problems on prime numbers.
3. Understand euclidean algorithm and its applications.

Unit-II-Congruences

Introduction to congruences -Linear congruences-The Chinese remainder theorem-Systems of linear congruences

Learning Outcomes:

Students will be able to

1. Understand Congruences and its basic properties.
2. Understand Chinese remainder theorem and its applications.

Unit-III Applications of Congruences

Divisibility tests-The perpetual calendar-Round-robin tournaments-Computer file storage and hashing functions. Wilson's theorem and Fermat's little theorem- Pseudo primes- Euler's theorem- Euler's p hi-function- The sum and number of divisors- Perfect numbers and Mersenne primes.

Learning Outcomes:

Students will be able to

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1. Understand divisibility tests.
2. Apply the concept of congruences to various applications.
3. Understand various theorems on number theory and its applications.

Unit-IV- Finite fields & Primality, factoring

Finite fields- quadratic residues and reciprocity-Pseudo primes-rho method-fermat factorization and factor bases.

Learning outcomes:

Students will be able to

1. Understand the terminology of finite fields.
2. Understand rho method and fermat factorization.

Unit-V- Cryptology

Basic terminology-complexity theorem-Character ciphers-Block ciphers-Exponentiation ciphers- Public-key cryptography-Discrete logarithm-Knapsack ciphers- RSA algorithm-Some applications to computer science.

Learning Outcomes:

Students will be able to

1. Understand the terminology of cryptology.
2. Understand different encryption mechanisms.

Text books:

1. Elementary number theory and its applications, kenneth h rosen, at & t information systems & bell laboratories.
2. A course in Number theory & Cryptography, Neal Koblitz, Springer.

Reference Books:

1. An Introduction To The Theory Of Numbers, Herbert S. Zuckerman, Hugh L. Montgomery, Ivan Niven, wiley publishers
2. Introduction to Analytic number theory-Tom M Apostol, springer
3. Elementary number theory, VK Krishnan, Universities press

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Course Outcomes:

After the completion of course, student will be able to

1. Understand number theory and its properties.
2. Understand principles on congruences
3. Develop the knowledge to apply various applications

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20501	**DIGITAL LOGIC DESIGN**	3	0	0	3

Course Objectives:

- Understanding basic number systems, codes and logical gates.
- Acquiring the skills to manipulate and examine Boolean algebraic expressions, logical operations, and Boolean functions
- Acquainting with classical hardware design for both combinational and sequential logic circuits
- Experiencing about synchronous circuits.
- Obtaining the knowledge about various types of memories.

UNIT - I

Digital Systems and Binary Numbers: Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, binary codes, binary storage and registers, binary logic.

Boolean algebra and logic gates: Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

Unit Outcomes:

- Summarize the binary number system
- Illustrate various binary codes
- Describe the basic postulates of Boolean Algebra
- Develop a logic diagram using gates from a Boolean function

UNIT - II

Gate–Level Minimization: The Map Method, Four-Variable K-Map, sum of products, product of sums simplification, Don't care conditions, Simplification by Quine- McClusky Method, NAND and NOR implementation and other two level implementations, Exclusive-OR function.

Unit Outcomes:

- Student is able to Apply the map method for simplifying Boolean Expressions.
- Apply don't care conditions to simplify a Karnaugh map.
- Design two-level Boolean functions with NAND gates and NOR gates

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UNIT - III

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

Unit Outcomes:

Student is able to

- Select fundamental combinational logic circuits.
- Analyze and design combinational circuits.
- Design Boolean function with a multiplexer.

UNIT - IV

Synchronous Sequential Circuits: Latches, Flip-flops, analysis of clocked sequential circuits, Register and Counters: Registers, Shift registers, Ripple counters, Synchronous counters and other counters.

Unit Outcomes:

Student is able to

- Explain the functionalities of latch and different flip-flops.
- Analyze and design clocked sequential circuits. □ Describe the use of sequential circuit components in complex digital systems.

UNIT - V

Memory and Programmable Logic: Random-Access memory, Memory decoding, ROM, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices.

Digital Integrated Circuits: RTL and DTL Circuits, Transistor-Transistor Logic (TTL), EmitterCoupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families

Unit Outcomes:

Student is able to

- Interpret the types of memories.
- Construct the Boolean functions with PLA and PAL.
- Describe the most common integrated circuit digital logic families.

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Course Outcomes:

Students should be able to

- Analyze the number systems and codes.
- Decide the Boolean expressions using Minimization methods.
- Design the sequential and combinational circuits.
- Apply state reduction methods to solve sequential circuits.
- Describe various types of memories.

TEXT BOOKS:

1. M. Morris Mano, M.D. Ciletti, "Digital Design", 5th edition, Pearson, 2018.

REFERENCE BOOKS:

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and applications", Mc Graw Hill , 8th Edition,2015.

2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press, 3rd Reprinted Indian Edition, 2012

3. R.D. Sudhakar Samuel, "Digital Logic Design", Elsevier Publishers.

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20502	**OOPS Through JAVA**	2	0	0	2

Course Objectives:
- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

UNIT - I

Introduction: Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

Unit Outcomes:

Student should be able to

- Understand the syntax, semantics and features of Java Programming Language.
- Learn object oriented features and understanding type conversion and casting.
- Understand different types of string handling functions and its usage.

UNIT - II

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,

Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Unit Outcomes:

Student should be able to

- Implement types of Inheritance and developing new classes based on existing classes

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- Distinguish between system packages and user defined packages.
- Demonstrate features of interfaces to implement multiple inheritances.

UNIT - III

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

Unit Outcomes:

Student should be able to

- Learn what exceptions are and how they are handled.
- Learn when to use exception handling and how to create user defined exceptions
- Learn the difference between various files and streams.

UNIT - IV

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

Unit Outcomes:

Student should be able to

- Understand concurrency, parallelism and multithreading
- Learn the importance of collections and use prebuilt generic data structures from framework.

UNIT – V

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar,

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jmenuand jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog.

Accessing Databases with JDBC:

Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Unit Outcomes:

Student should be able to

- Learn how to use the Nimbus look-and-feel
- Understand the GUI programming.
- Understand basic steps in developing JDBC applications,

Course Outcomes:

After the completion of the course the student will be able

- To solve real world problems using OOP techniques.
- To apply code reusability through inheritance, packages and interfaces
- To solve problems using java collection framework and I/O classes.
- To develop applications by using parallel streams for better performance.
- To develop applets for web applications.
- To build GUIs and handle events generated by user interactions.
- To use the JDBC API to access database

 Text Books:

1. Herbert Schildt "Java The complete reference", 9th edition, McGraw Hill Education (India) Pvt. Ltd.

2. Paul Dietel, Harvey Dietel "Java How to Program", 10th Edition, Pearson Education.

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20503	**DESIGN AND ANALYSIS OF ALGORITHMS**	**3**	0	0	3

Course Objectives:
- To demonstrate the importance of algorithms in computing.
- To explain the analysis of algorithms
- To illustrate the method of finding the complexity of algorithms
- To explain the advanced algorithm design and analysis techniques.
- To introduce special classes of algorithms NP – completeness and the classes P and NP.

UNIT- I

Introduction: Algorithm, Algorithm specification, Performance analysis.

Divide and Conquer: General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection, Strassen's matrix multiplication.

At the end of the unit, students will be able to:

- Understand growth functions and Asymptotic notations
- Derive the recurrence equation for running time of a given algorithm and solve.
- Understand the general principle of Divide and Conquer and identify suitable problems to apply Divide and Conquer paradigm
- Analyze the time complexities of Binary Search, Finding the maximum and minimum, and Strassen's matrix multiplication algorithms.
- Compare complexities of Merge sort, Quick sort and Selection sort techniques

UNIT -II

Greedy Method General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.

Dynamic programming: General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, the traveling salesperson problem.

At the end of the unit, students will be able to:

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- Understand optimization problems and the general principles of Greedy and Dynamic Programming paradigms to solve them.
- Apply subset and ordering paradigms of greedy strategy for Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, and finding Single-source shortest paths.
- Define Principle of optimality with examples.
- Differentiate Greedy and Dynamic programming paradigms.
- Apply dynamic programming strategy for Optimal binary search trees, Multistage graphs, All-pairs shortest paths, 0/1 knapsack, the traveling salesperson problem.

UNIT -III

Basic Traversal and Search Techniques: Techniques for binary trees, Techniques for Graphs, Connected components and Spanning trees, Bi-connected components and DFS

Back tracking: General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

At the end of the unit, students will be able to:

- Define solution space tree.
- Illustrate graph search strategies: BFS, DFS and D-Search .
- Determine articulation points and bi-connected components in a given graph using Depth First Spanning Trees.
- Demonstrate the recursive and iterative backtracking algorithms.
- Apply backtracking strategy to solve N – queens problem, Sum of subsets problem and Knapsack problem.
- Apply backtracking to solve m-colorability optimization problem.
- Determine all possible Hamiltonian Cycles in a graph using backtracking algorithm.

UNIT- IV

Branch and Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency considerations

Lower Bound Theory: Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

At the end of the unit, students will be able to:

- Illustrate the state space search techniques; FIFO, LIFO and LC.
- Analyze the advantage of bounding functions in Branch and Bound technique to solve the Travelling Salesperson problem.
- Compare the LC and FIFO branch and bound solutions for 0/1 knapsack problem.
- Understand lower bound theory concept in solving algebraic problems.

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UNIT- V

NP – Hard and NP – Complete Problems: NP Hardness, NP Completeness Consequences of being in P, Cook's Theorem, Reduction Source Problems, Reductions: Reductions for some known problems

At the end of the unit, students will be able to:

- Differentiate deterministic and Non-deterministic algorithms.
- Define P, NP, NP –hard and NP-complete classes of problems.
- Understand the satisfiability problem.
- State Cook's Theorem.
- Understand the reduction techniques.

Course outcomes

- Determine the time complexity of an algorithm by solving the corresponding recurrence equation
- Apply the Divide and Conquer strategy to solve searching, sorting and matrix multiplication problems. □ Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.
- Apply Backtracking technique for solving constraint satisfaction problems.
- Analyze the LC and FIFO branch and bound solutions for optimization problems, and compare the time complexities with Dynamic Programming techniques.
- Define and Classify deterministic and Non-deterministic algorithms; P, NP, NP –hard and NP-complete classes of problems.

Text Books

1. Ellis Horowitz, SartajSahni and Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, 2012, University Press.

2. ParagHimanshu Dave and HimanshuBhalchandra Dave, "Design and Analysis of Algorithms", Second Edition, Pearson Education.

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A22451	**Basic Electrical and Electronics Engineering**	3	0	0	3

Electrical Engineering

Course Objectives:

  To make the students learn about:

1	The basics of AC & DC Circuits, DC generators &motors.
2	The construction and operation of Transformers, Induction motors and their performance aspects will be studied.

Course Outcomes:

After completing the course, the student should be able to :

CO1	understand the basics of AC & DC circuits and AC & DC machines
CO2	analyze the circuit elements, various AC and DC machines

Mapping of Course outcomes with Program outcomes:

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

Syllabus:

UNIT – I Introduction to DC & AC Circuits

Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Resistive Networks, Series Parallel Circuits, Star-Delta and Delta-Star Transformation. Principle of AC Voltages, Waveforms and Basic Definitions, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak

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Factor, Phasor Representation of Alternating Quantities, The 'j'Operator and Phasor Algebra, Basic concepts of AC series circuits.

Unit Outcomes : After the completion of the unit the students will be able to
1. Perceive and analyze the basic laws of electrical circuits
2. Apply to basic laws to solve real life problems

UNIT-II: DC Machines

Constructional details of DC Machines

DC Generators: Principle of Operation, EMF equation, Types, O.C.C. of a DC Shunt Generator

DC Motors:Principle of Operation, Types, Torque Equation, Losses and Efficiency Calculation, Swinburne's Test, concepts of speed control.

Unit Outcomes : After the completion of the unit the students will be able to
1. Apprehend and interpret basic principles of DC machines
2. Evaluate the performance of DC machines

UNIT-III   AC Machines

Transformers: Principles of Operation, Constructional Details, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.

Three Phase Induction Motors: Principle of Operation, Slip and Rotor Frequency, Torque (Simple Problems)..

Alternators: Principle of Operation, Constructional Details, EMF Equation, Voltage Regulation by Synchronous Impedance Method.

Unit Outcomes: After the completion of the unit the students will be able to
1. Identify different types of AC machines
2. Analyze the performance of various AC machines

TEXT BOOKS:
1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshiah – TMH.
2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.
3. Electrical and Electronic Technology-By Hughes – Pearson Education.
REFERENCES:
1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari& I.J. Nagrath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Fundamentals of Electrical Electronics Engineering by T.Thyagarajan, SCITECH Publications 5th Edition-2007

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Basic electrical and Electronics Engineering

COURSE OBJECTIVES

1. Understand principles and terminology of electronics.
2. Familiar with the theory, construction, and operation of electronic devices.
3. Learn about biasing of BJTs and MOSFETs.
4. Design and construct amplifiers.

UNIT- I
P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.
Rectifiers and Filters: P-N junction as a rectifier – Half Wave Rectifier, Ripple Factor – Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT- II
Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations. Transistor Biasing and Stabilization – Operating point, DC and AC load lines, Biasing – Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors.
BJT Amplifiers: Classification of Amplifiers, Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier.

UNIT- III
Junction Field Effect Transistor: JFET/MOSFET Construction, Principle of Operation, Symbol, Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET/MOSFET.
Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR.

TEXT BOOKS:

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Electronic Devices and Circuits – J.Millman and C.C.Halkias, Satyabratajit, TMH, 2/e, 1998.

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REFERENCES:

1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
2. Electronic Devices and Circuits – Anil K. Maini, VarshaAgarwal – Wiley India Pvt. Ltd. 1/e 2009.
3. Electronic Devices and Circuits – Muhammad H.Rashid, 2nd Edition, Cengage Learning.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Explain the theory, construction, and operation of electronic devices.
CO2: Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and its characteristics.
CO3: Design and analyze small signal amplifier circuits applying the biasing techniques.
CO4: Design simple amplifier circuits. Analyze the small signal equivalent circuits of transistors.
CO5: Correlate the fundamental concepts to various Real life applications of today.

II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20504	**Database Management Systems**	3	0	0	3

Course objectives:

This course is designed to:

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
- Enable students to model ER diagram for any customized application
- Inducting appropriate strategies for optimization of queries.
- Provide knowledge on concurrency techniques
- Demonstrate the organization of Databases

UNIT-I: Introduction: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction, Management Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database users and Administrators,

Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations

At the end of the Unit, students will be able to:

- Distinguish between Database and File System
- Categorize different kinds of data models
- Define functional components of DBMS

UNIT-II: Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data types and schemas, Authorization.

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal relational query languages.

At the end of the Unit, students will be able to:

- Outline the elements of the relational model such as domain, attribute , tuple, relation and entity

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- Distinguish between various kinds of constraints like domain, key and integrity
- Define relational schema
- Develop queries using Relational Algebra and SQL
- Perform DML operations on databases

UNIT-III: Database Design and the E-R Model: Overview of the Design Process, The EntityRelationship Model, Constraints, Removing Redundant Attributes in Entity Sets, EntityRelationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms

At the end of the Unit, students will be able to:

- Develop E-R model for the given problem
- Derive tables from E-R diagrams
- Differentiate between various normal forms based on functional dependency
- Apply normalization techniques to eliminate redundancy

UNIT-IV: Query Processing: Overview, Measures of Query cost, Selection operation, sorting, Join Operation, other operations, Evaluation of Expressions. Query optimization: Overview, Transformation of Relational Expressions, Estimating statistics of Expression results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.

At the end of the Unit, students will be able to:

- Identify variety of methods for effective processing of given queries.
- Obtain knowledge related to optimization techniques.

UNIT V: Transaction Management: Transactions: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements. Concurrency Control: Lock based Protocols, Deadlock Handling, Multiple granularity, Timestamp based Protocols, Validation based Protocols. Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.

At the end of the Unit, students will be able to:

1. Understand various properties of transaction.
2. Design atomic transactions for an application.
3. Gain the knowledge about log mechanism and check pointing techniques for system recovery.

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Course Outcomes, Students will be able to :

- Design a database for a real world information system
- Define transactions which preserve the integrity of the database
- Generate tables for a database
- Organize the data to prevent redundancy
- Pose queries to retrieve the information from database.

TEXT BOOKS:

1. A.Silberschatz, H.F.Korth, S.Sudarshan, "Database System Concepts", 6/e, TMH 2019

REFERENCE BOOKS:

1. Shamkant B. Navathe, "Database Management System" 6/e RamezElmasri PEA
2. "Database Principles Fundamentals of Design Implementation and Management", Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.
3. Raghurama Krishnan, Johannes Gehrke, "Database Management Systems", 3/e, TMH

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II B.TECH – I SEMESTER

SubjectCode	TitleoftheSubject	L	T	P	C
19A20901	**Universal Human Values**	2	0	0	2

Course Objectives:
- Exposure to the value of life, society and harmony
- Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
- Bringing transition from the present state to Universal Human Order
- Instill commitment and courage to act.
- Know about appropriate technologies and management patterns

Course Outcomes:
CO1: Analyze the terms like Natural Acceptance, Happiness and Prosperity
CO2: Understand awareness of oneself, and one's surroundings (family, society nature)
CO3: Apply what they have learnt to their own self in different day-to-day settings in real life
CO4: Relate human values with human relationship and human society.
CO5: Justify the need for universal human values and harmonious existence
CO6: Develop as socially and ecologically responsible engineers

CO & PO Attainments:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3								3					
CO2							3			2	3		3		
CO3		2						3			3		2		
CO4		2						3		2					3
CO5		2						2		2					2
CO6			3				3							3	

UNIT – I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education
Universal Human Values-I – Self-Exploration- content and process; 'Natural Acceptance' and Experiential Validation – self-exploration - Continuous Happiness and Prosperity - Human Aspirations - current scenario - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT – II: Understanding Harmony among Human Beings & Self Harmony!
Human being as a co-existence of the sentient 'I' and the material' Body' - the needs - happiness and physical facility -the Body as an instrument of 'I' - the characteristics and activity of 'I' and harmony in 'I' - the harmony of I with the Body

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UNIT – III:Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship
Values in human relationship; meaning of Justice; Trust and Respect; Difference between intention and competence; the other salient values in relationship - the harmony in the society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals – Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT – IV: **Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**
The harmony in the Nature - Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature - Understanding Existence as Co-existence of mutually interacting units in all- pervasive space - Holistic perception of harmony at all levels of existence.

UNIT – V: Implications of the above Holistic Understanding of Harmony on Professional Ethics
Humanistic Education - Competence in professional ethics: professional competence - people friendly and eco-friendly production systems - appropriate technologies and management patterns for above production systems. Individuals as socially and ecologically responsible engineers, technologists and managers.

Textbooks:
1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:
1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999
2. HumanValues, A.N.Tripathi, NewAgeIntl.Publishers, NewDelhi,2004.
3. The Story of Stuff (Book).
4. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj - PanditSunderlal 9. Rediscovering India - byDharampal
5. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi
6. India Wins Freedom - Maulana Abdul Kalam Azad 12. Vivekananda - Romain Rolland (English)

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20505	**OOPS Through Java Lab**	0	0	3	1.5

Course Objectives

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

Week-1

a. Installation of Java software, study of any integrated development environment, Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

b. Write a Java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.

c. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, and type of EB connection (i.e domestic or commercial). Commute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

- First 100 units - Rs. 1 per unit
- 101-200 units - Rs. 2.50 per unit
- 201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
- 201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

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d. Write a Java program to multiply two given matrices.

Week-2

a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.

b. Write Java program on dynamic binding, differentiating method overloading and overriding.

c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen) using Interfaces.

Week-3

a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.

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

c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing. By using String Toknizer class.

Week-4

a. Write a Java program to implement user defined exception handling.

b. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

Week-5

a. Write a Java program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

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b. Write a Java program that creates three threads. First thread displays ―Good Morning‖ every one second, the second thread displays ―Hello‖ every two seconds and the third thread displays ―Welcome‖ every three seconds.

Week-6

a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.

b. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

Week-7

a. Write a java program that displays the number of characters, lines and words in a text file.

b. Write a java program that reads a file and displays the file on the screen with line number before each line.

Week-8

a. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

b. Develop a Java application for stack operation using Buttons and JOptionPane input and Message dialog box.

c. Develop a Java application to perform Addition, Division, Multiplication and substractionusingJOption Pane dialog Box and Text fields.

Week-9

a. Develop a Java application for the blinking eyes and mouth should open while blinking.

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

Week-10

a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.

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b. Develop a Java application by using JtextField to read decimal value and converting a decimal number into binary number then print the binary value in another JtextField.

Week-11

a. Develop a Java application 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.

b. Develop a Java application to demonstrate the key event handlers.

Week-12

a. Develop a Java application to find the maximum value from the given type of elements using a generic function.

b. Develop a Java application 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.

c. Develop a Java application for handling mouse events.

Week-13

a. Develop a Java application to establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

Course Outcomes:

On successful completion of this laboratory students will be able to:

- Recognize the Java programming environment.
- Develop efficient programs using multithreading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming construct to solve a problem.

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A22552	**Basic Electrical Electronics-Lab**	0	0	3	1.5

PART – A: BASIC ELECTRICAL ENGINEERING LAB

Course Objectives: To make the student learn about:

1	The DC motors, DC Generators and know various characteristics, performance analysis of DC machines and speed control techniques of DC machines.
2	Various test conditions of single phase transformers.

Course Outcomes:

After completing the course, the student should be able to do the following:

CO1	Learn about DC motors, DC Generators and know various characteristics, performance analysis of DC machines and speed control techniques of DC machines.
CO2	Various test conditions of single phase transformers.

Mapping of Course outcomes with Program outcomes:

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

Syllabus:

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
2. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors and Determination of Equivalent Circuit).
3. Brake Test on 3-Phase Induction Motor (Determination of Performance Characteristics)

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4. Regulation of Alternator by Synchronous Impedance Methods.

5. Speed Control of D.C.ShuntMotor by

   a) Armature Voltage Control   B) Field Flux Control Method

6. Brake Test on D.C Shunt Motor

ELECTRONICS ENGINEERING LAB

COURSE OBJECTIVES:

The students will be able to

1. Understand the characteristics of PN junction diode and zener diode.
2. Understand the characteristics of BJT in CE and CB configurations and FET in CS configuration.
3. Understand the application of diode as rectifier.
4. Learn the fundamental principles of amplifier circuits and need of Bias in Amplifier circuits.

LIST OF EXPERIMENTS:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.

2. Zener diode characteristics and Zener as voltage Regulator

3. Full Wave Rectifier with & without filter

4. Input & Output characteristics of Transistor in CB / CE configuration.

5. Input and Output characteristics of FET in CS configuration

6. Measurement of h-parameters of transistor in CB, CE, CC configurations

7. Frequency response of CE amplifier.

8. Frequency response of CS amplifier.

        LAB REQUIREMENTS:
1. Cathode Ray Oscilloscopes (30MHz)
2. Signal Generator /Function Generators (3 MHz)
3. Dual Regulated Power Supplies (0 – 30V)
4. Bread Boards
5. Electronic Components

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COURSE OUTCOMES:

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

CO1: Learn and plot the characteristics of electronic devices Like PN junction diode, Zener diode and SCR.
CO2: Design and analyze the application of diode as rectifiers.
CO3: Learn and plot the characteristics of BJT & FET in Various configurations.
CO4: Measure the h-parameters experimentally.
CO5: Design and construct BJT & FET amplifiers and plot frequency response.

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20506	**Database Management Systems Lab**	0	0	3	1.5

Course Objectives:

- To implement the basic knowledge of SQL queries and relational algebra.
- To construct database models for different database applications.
- To apply normalization techniques for refining of databases.
- To practice various triggers, procedures, and cursors using PL/SQL.
- To design and implementation of a database for an organization

Week-1: CREATION OF TABLES

1. Create a table called Employee with the following structure.

Name	Type
Empno	Number
Empname	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

a) Add a column commission with domain to the Employee table.
b) Insert any five records into the table.
c) Update the column details of job
d) Rename the column of Employ table using alter command.
e) Delete the employee whose empno is19.

2. Create department table with the following structure.

Name	Type

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Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

a) Add column designation to the department table.
b) Insert values into the table.
c) List the records of emp table grouped by dept no.
d) Update the record where dept no is9.
e) Delete any column data from the table

3. Create a table called Customer table

Name	**Type**
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

a) Insert records into the table.
b) Add salary column to the table.
c) Alter the table column domain.
d) Drop salary column of the customer table.
e) Delete the rows of customer table whose ust_city is 'hyd'.
f) Create a table called branch table.

Name	**Type**
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

4. Increase the size of data type for asserts to the branch.

a) Add and drop a column to the branch table.
b) Insert values to the table.
c) Update the branch name column
d) Delete any two columns from the table

5. Create a table called sailor table

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Name	Type
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

a) Add column age to the sailor table.
b) Insert values into the sailor table.
c) Delete the row with rating>8.
d) Update the column details of sailor.
e) Insert null values into the table.

6. Create a table called reserves table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

a) Insert values into the reserves table.
b) Add column time to the reserves table.
c) Alter the column day data type to date.
d) Drop the column time in the table.`
e) Delete the row of the table with some condition.

Week-2: QUERIES USING DDL AND DML
1. a. Create a user and grant all permissions to the user.
   b. Insert the any three records in the employee table and use rollback. Check the result.
   c. Add primary key constraint and not null constraint to the employee table.
   d. Insert null values to the employee table and verify the result.

2. a. Create a user and grant all permissions to the user.
   b. Insert values in the department table and use commit.
   c. Add constraints like unique and not null to the department table.
   d. Insert repeated values and null values into the table.
3. a. Create a user and grant all permissions to the user.

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   b. Insert values into the table and use commit.
   c. Delete any three records in the department table and use rollback.
   d. Add constraint primary key and foreign key to the table.
4. a. Create a user and grant all permissions to the user.
   b. Insert records in the sailor table and use commit.
   c. Add save point after insertion of records and verify save point.
   d. Add constraints not null and primary key to the sailor table.
5. a. Create a user and grant all permissions to the user.
   b. Use revoke command to remove user permissions.
   c. Change password of the user created.
   d. Add constraint foreign key and not null.
6. a. Create a user and grant all permissions to the user.
   b. Update the table reserves and use save point and rollback.
   c. Add constraint primary key , foreign key and not null to the reserves table
   d. Delete constraint not null to the table column

Week-3:QUERIES USING AGGREGATE FUNCTIONS

1. a. By using the group by clause, display the names who belongs to dept no 10 along with average salary.
   b. Display lowest paid employee details under each department.
   c. Display number of employees working in each department and their department number.
   d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert dept name to dept table and insert dept name for each row, do the required thing specified above.
   e. List all employees which start with either B or C.
   f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2. a. Calculate the average salary for each different job.

   b. Show the average salary of each job excluding manager.

   c. Show the average salary for all departments employing more than three people.

   d. Display employees who earn more than the lowest salary in department 30

   e. Show that value returned by sign (n)function.

   f. How many days between day of birth to current date

3. a. Show that two substring as single string.

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b. List all employee names, salary and 15% rise in salary.

c. Display lowest paid emp details under each manager

d. Display the average monthly salary bill for each deptno.

e. Show the average salary for all departments employing more than two people.

f. By using the group by clause, display the eid who belongs to dept no 05 along with a verage salary.

4. a. Count the number of employees in department20

b. Find the minimum salary earned by clerk.

c. Find minimum, maximum, average salary of all employees.

d. List the minimum and maximum salaries for each job type.

e. List the employee names in descending order.

f. List the employee id, names in ascending order by empid.

5. a. Find the sids , names of sailors who have reserved all boats called "INTERLAKE Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.

b. Find the sname, bid and reservation date for each reservation.

c. Find the ages of sailors whose name begin and end with B and has at least 3characters.

d. List in alphabetic order all sailors who have reserved red boat.

e. Find the age of youngest sailor for each rating level.

6. a. List the Vendors who have delivered products within 6 months from or derdate.

b. Display the Vendor details who have supplied both Assembled and Subparts.

c. Display the Sub parts by grouping the Vendor type (Local or Non Local).

d. Display the Vendor details in ascending order.

e. Display the Sub part which costs more than any of the Assembled parts.

f. Display the second maximum cost Assembled part

Week-4: PROGRAMS ON PL/SQL

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1. a. Write a PL/SQL program to swap two numbers.

   b. Write a PL/SQL program to find the largest of three numbers.

2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.

   b. Write a PL/SQL program to find the sum of digits in a given umber.

3. a. Write a PL/SQL program to display the number in reverse order.

   b. Write a PL/SQL program to check whether the given number is prime or not.

4. a. Write a PL/SQL program to find the factorial of a given number.

   b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.

5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed

to the program it should display 'Hll' removing e and o from the worldHello).

   b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to

   10. Else display an error message. Otherwise Display the remainder in words.

Week-5: PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.

2. Accept year as parameter and write a Function to return the total net salary spent for a givenyear.

3. Create a function to find the factorial of a given number and hence find NCR.

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4. Write a PL/SQL block o pint prime Fibonacci series using local functions.

5. Create a procedure to find the lucky number of a given birth date.

6. Create function to the reverse of given number

Week-6: TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:

CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadapa	3000
3	Catri	26	Guntur	4000
4	Dena	28	Hyerabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellore	7000

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the

passenger database. Passenger(Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) NotNULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) NotNULL);

   a. Write aInsert Trigger to check the Passport_id is exactly six digits ornot.

   b. Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is

updated' when insertion, deletion and updation are done on passenger respectively.

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3. Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETE occurs.

4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire

before the insert or update.

5. Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called

delete _emp and also record user who has deleted the record and date and time of delete.

6. Create a transparent audit system for a table CUST_MSTR. The system must keep track of the records that

are being deleted or updated

Week-7: PROCEDURES

1. Create the procedure for palindrome of given number.

2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.

3. Write the PL/SQL programs to create the procedure for factorial of given number.

4. Write the PL/SQL programs to create the procedure to find sum of N natural number.

5. Write the PL/SQL programs to create the procedure to find Fibonacci series.

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6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not

Week-8: CURSORS

1. Write a PL/SQL block that will display the name, dept no, salary of fist highest paid employees.

2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.

3. Write a PL/SQL block that will display the employee details along with salary using cursors.

4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.

5. To write a Cursor to find employee with given job and dept no.

6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary are updated we geta message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table

Week-9: CASE STUDY: BOOK PUBLISHING COMPANY

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications. A

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publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with on editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.

2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-10: CASE STUDY GENERAL HOSPITAL

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.

2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-11: CASE STUDY: CAR RENTAL COMPANY

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of

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services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database.

For the above case study, do the following:

1. Analyze the data required.

2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-12: CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre- requisites modules and some degree programs have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance.

i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the datarequired.

2. Normalize theattributes.

3. Create the logical data model i.e., ERdiagrams.

4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys whereverrequired.

5. Insert values into the tables created (Be vigilant about Master- Slavetables).

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6. Display the Students who have taken M.Sccourse

7. Display the Module code and Number of Modules taught by eachLecturer.

8. Retrieve the Lecturer names who are not Module Leaders.

9. Display the Department name which offers 'English'module.

10. Retrieve the Prerequisite Courses offered by every Department (with Departmentnames).

11. Present the Lecturer ID and Name who teaches'Mathematics'.

12. Discover the number of years a Module istaught.

13. List out all the Faculties who work for 'Statistics'Department.

14. List out the number of Modules taught by each ModuleLeader.

15. List out the number of Modules taught by a particularLecturer.

16. Create a view which contains the fields of both Department and Module tables. (Hint- The fields like Module code, title, credit, Department code and itsname).

17. Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Moduletable.

Unit Outcomes:

Students should be able to

1. Design database for any real world problem

2. Implement PL/SQL programs

3. Define SQL queries

4. Decide the constraints

5. Investigate for data inconsistency

Reference Books:

1. RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.

2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

Web References: http://www.scoopworld.in

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II B.TECH – I SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A28801	**Biologyforengineers**	3	0	0	0

Course Objectives: To provide basic understanding about life and life Process. Animal an plantsystems.Tounderstandwhatbimolecules,are,theirstructuresarefunctions.Applicationofcertai nbimolecules inIndustry.

- Briefintroductionabouthumanphysiologyandbioengineering.
- Tounderstandhereditaryunits,i.e.DNA(genes)andRNAandtheirsynthesisinlivingorganism.
- HowbiologyPrinciplescanbeappliedinourdailylifeusingdifferenttechnologies.
- Briefintroductiontotheproductionoftransgenicmicrobes,Plantsandanimals.

UnitI:IntroductiontoBasicBiology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes.Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Briefintroductiontofivekingdomsofclassification.

UnitOutcomes:

After completingthisunit,thestudentwillbeableto
- Summarizethebasisoflife.(L1)
- Understandthedifferencebetweenlowerorganisms(prokaryotes)fromhigherorganisms(eukary otes).(L2)
- Understandhoworganismsareclassified.(L3)

UnitII:IntroductiontoBiomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and theirtypes.Enzymes,EnzymeapplicationinIndustry.LargescaleproductionofenzymesbyFermentat ion.

UnitOutcomes:
After completingthisunit,thestudentwillbeableto

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- Understandwhatarebiomolecules?theirroleinlivingcells,theirstructure,functionandhowtheyareproduced.(L1)
- Interprettherelationshipbetweenthestructureandfunctionofnucleicacids.(L2)
- Summarizetheapplicationsofenzymesinindustry.(L3)
- Understandwhatisfermentationanditsapplicationsoffermentationinindustry.(L4)

UnitIII:HumanPhysiology

Nutrition:Nutrientsorfoodsubstances.Digestivesystem,Respiratorysystem,(aerobicandanaerobic Respiration).Respiratoryorgans,respiratorycycle.Excretorysystem.

UnitOutcomes:

Aftercompletingthisunit,thestudentwillbeableto

- Understandwhatnutrientsare(L1)
- Understandthemechanismandprocessofimportanthumanfunctions(L2&L3)

UnitIV:IntroductiontoMolecularBiologyandrecombinantDNATechnology

ProkaryoticgeneandEukaryoticgenestructure.DNAreplication,TranscriptionandTranslation.rDNAtechnology. Introductiontogenecloning.

UnitOutcomes:

After completingthisunit,thestudentwillbeableto

- Understandandexplainaboutgenestructureandreplicationinprokaryotes andEukaryotes (L1)
- Howgeneticmaterial isreplicatedandalsounderstandshowRNAandproteinsaresynthesized.(L2)
- UnderstandaboutrecombinantDNAtechnologyanditsapplicationindifferentfields.(L3)
- Explainwhatiscloning.(L4)

UnitV:ApplicationofBiology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins,Vaccines andantibodies. Basics of biosensors, biochips, Biofuels, andBioEngineering. BasicsofProductionofTransgenicplants andanimals.

UnitOutcomes:

Aftercompletingthisunit,thestudentwillbeabletoUnderstand.

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- Howbiologyisappliedforproductionofusefulproductsformankind.(L1)
- Whatarebiosensors,biochipsetc.(L2)
- Understandtransgenicplantsandanimalsandtheirproduction(L3)

CourseOutcomes:

After studyingthecourse,thestudentwillbeableto:

- Explainaboutcellsandtheir structureandfunction.
  DifferenttypesofcellsandbasicsforclassificationoflivingOrganisms.
- Explainaboutbiomolecules,
  theirstructureandfunctionandtheirroleinthelivingorganisms.Howbiomoleculesareuseful
  ulinIndustry.
- Brieflyabouthumanphysiology.
- Explainaboutgeneticmaterial,DNA,genesandRNAhowtheyreplicate,
  passandpreservevitalinformationinlivingOrganisms.
- Know
  aboutapplicationofbiologicalPrinciplesindifferenttechnologiesfortheproductionofmedic
  inesandPharmaceuticalmoleculesthroughtransgenicmicrobes,plantsandanimals.

Textbooks:

1. P.K.Gupta,CellandMolecularBiology,5thEdition,RastogiPublications-
2. U.Satyanarayana.Biotechnology,Books&AlliedLtd2017

ReferenceBooks:

1. N.A.Campbell,J.B.Reece,L.Urry,M.L.CainandS.A.Wasserman,"Biology:AGlobalApproach", PearsonEducationLtd,2018.
2. TJohnson,BiologyforEngineers,CRCpress,2011
3. J.M.WalkerandE.B.Gingold,MolecularBiologyandBiotechnology2nded..PanimaPublications.PP434.
4. DavidHames,InstantNotesinBiochemistry–2016
5. PhilTunner,A.Mctennan,A.Bates&M.White,InstantNotes–MolecularBiology –-2014

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20507	**Computer Organization**	3	0	0	3

Course Objectives:

1. To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design.
2. To understand the structure and behaviour of various functional modules of a computer.
3. To learn the techniques that computers use to communicate with I/O devices.
4. To acquire the concept of pipelining and exploitation of processing speed.
5. To learn the basic characteristics of multiprocessors.

Unit – 1: Introduction

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer. Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

Learning Outcomes:

1. Identify the basic functional units and different ways of interconnecting to form a computer system.
2. Illustrate various addressing modes for accessing register and memory operands.
3. Describe the instruction sequencing and various types of instructions.

Unit – 2Arithmetic:

Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple BusOrganisation , Hardwired Control, Multi programmed Control.

Learning outcomes: Student should be able to

1. Outline the arithmetic operations on signed numbers.
2. Describe the operations performed on floating point numbers.
3. Distinguish between hardwired and micro programmed control units.

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Unit – 3: The Memory System:
Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management, Requirements, Secondary Storage.
Learning outcomes: Student should be able to

1. Recognize the various types of memories.
2. Analyze the performance of cache memory.
3. Apply effective memory management strategies.

Unit – 4 :Input/output Organization:
Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces. Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning outcomes: Student should be able to

a. Examine the basics of I/O data transfer synchronization.
b. Analyze the interrupt handling mechanisms of various processors.
c. Describe various techniques for I/O data transfer methods.

Unit – 5 Pipelining:
Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets. Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose multiprocessors, Interconnection Networks.
Learning outcomes: Student should be able to

1. Investigate the use of pipelining and multiple functional units in the design of high-performance processors.
2. Design and analyze a high performance processor.
3. Describe the interconnection networks for multiprocessors.

TEXT BOOKS: 1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education.
2. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGE Learning.
3. Smruti Ranjan Sarangi, "Computer Organization and Architecture", McGraw Hill Education.
4. John P.Hayes, "Computer Architecture and Organization", McGraw Hill Education

Course Outcomes:

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Students should be able to

1. Understand computer architecture concepts related to design of modern processors, memories and I/Os Identify the hardware requirements for cache memory and virtual memory
2. Design algorithms to exploit pipelining and multiprocessors
3. Understand the importance and tradeoffs of different types of memories.
   Identify pipeline hazards and possible solutions to those hazards

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20508	**Operating Systems**	3	0	0	3

Course Objectives:

1. Understand basic concepts and functions of operating systems
2. Understand the processes, threads and scheduling algorithms.
3. Provide good insight on various memory management techniques
4. Expose the students with different techniques of handling deadlocks
5. Explore the concept of file-system and its implementation issues
6. Familiarize with the basics of Linux operating system
7. Implement various schemes for achieving system Protection

Unit – 1: Operating Systems Overview:
Introduction: What operating system Do, Operating System Structure, Resource Management, Protection and Management, History of Operating Systems.

System Structures: Operating System Services, User and Operating-System Interface, Systems Calls, System Services, Operating system Design and Implementation, Operating System Structure.

Processes: Process Concept, Process scheduling, Operations on Processes, Inter-process Communication, Communication in Client Server Systems.

Learning Outcomes: Student should be able to
1. Identify major components of operating systems
2. Understand how the operating systems are used in various computing Environments.
3. Understand the services and howsystem calls are used to provide operating system services.
4. Choose suitable operating system architecture.
5. Understand how processes are created and IPC, client–server communication using
Sockets and remote procedurecalls.

Unit – 2:

Multithreaded Programming: Multithreading models, Thread libraries, threading issues.

ProcessScheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiprocessor Scheduling, Thread scheduling.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and Wakeup, Semaphores, Mutexes, Monitors, Message passing.

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Classical IPC Problems: Dining Philosopher's problem, Readers and writers problem.

Learning outcomes: Student should be able to

1. Understand the importance, features of a process and methods of communication between processes.
2. Improving CPU utilization through Process Scheduling, multithreaded programming.
3. Examine several classical synchronization problems.

Unit – 3: Memory-Management Strategies:
Main Memory: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping, Segmentation.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page Replacement, Allocation of Frames, Thrashing, Memory-mapped files, Allocating Kernel Memory.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

 Learning outcomes: Student should be able to

1.   Examine the various techniques of allocating memory to processes
2.   Summarize how paging works in contemporary computer systems
3.   Understanding the benefits of virtual memory systems.
4.   Understand how deadlock can occur, conditions that characterize deadlock, different approaches for preventing deadlocks and how to recover.

Unit – 4:
File Systems: File concept, Access Methods, Directory Structure, Memory mapped files,
File system Structure, File System Operations, Directory Implementation, Allocation Methods.

Secondary-Storage Structure: Disk Scheduling, Disk-scheduling Criteria, Disk-scheduling Algorithms, RAID structure.

CASE STUDY1: History of UNIX and LINUX, Overview of LINUX, Processes in LINUX, Memory Management in LINUX, Input/ Output in LINUX, The LINUX File System.

Learning outcomes: Student should be able to

1. Understand the function of file systems, the interfaces to file systems.
2. Understand the file-system design tradeoffs, including access methods, file sharing, file locking, and directory structures.
3. Examine file systems and its interface in various operating systems
4. Analyze different disk scheduling algorithms.
5. Examine the history and evolution of UNIX andLINUX, Processes,
Memory management, I/O, the file system, and security in Linux.

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Unit – 5:
Android: Android and Google, History of Android, Design Goals, Android Architecture, Linux Extensions, Dalvik, Android Applications.

CASE STUDY 2: History of Windows through 8.1, System Structure, Processes and Threads in Windows, Memory Management
Operating System Design: The nature of the Design, Interface Design, Implementation, Trends in Operating System.
Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix.

Learning outcomes: Student should be able to

1. Understand the Android new concepts to the Linux kernel using most of theLinux facilities.
2. Understand the Operating System Design, Implementation and Trends of Operating Systems
3. Examine various aspects of Windows 8, starting with a brief history, then moving on to its architecture.
4. Understand how protection domains, combined with an access matrix, are used to specify the resources a process may access.

Text Books:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 4th edition, Pearson Education, 2006.

Reference Books:

1. William Stallings, Operating Systems internals and design principles, 9th edition, Pearson Education, 2018
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

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SubjectCode	TitleoftheSubject	L	T	P	C
19A20509	**Computer Graphics**	3	0	0	3

Course objectives:
1. To Learn graphics hardware devices and software.
2. To understand the two-dimensional graphics and their transformations.
3. To Design computer animations
4. To Understand systems and formats
5. To Learn multimedia compression and transmission.

Unit-I: Graphic Systems: Video Display Devices, Raster-Scan System, Random-Scan Systems, Graphics Monitors and Workstations, Input Devices, Hard-Copy Devices, Graphics Software
2-D Transformations: Basic Transformations Matrix Representations, Other Transformations.
2D Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to viewport Coordinate Transformation.
3-D Concepts: Three-Dimensional Display Methods, Three-Dimensional Graphics
> **Learning outcomes:**
>> 1. Understand Graphics hardware and software (L1)
>> 2. Describe 2D transformations and 3D Graphics (L1)

Unit-II: 3D Object Representations: Polygon Surfaces, Curved Lines and Surfaces, Quadric Sutiaces, Super quadrics, Blobby Objects, Spline Representations, Particle Systems, Physically Based Modeling.
3D Transformations: Translation, Rotation, Scaling and Other Transformations, Viewing Pipeline, Viewing Coordinates, Projections.
> **Learning outcomes:**
>> 1. Learn surfaces and representations.(L1)
>> 2. Use viewing when designing graphics. (L3)

Unit-III: Classification of Visible-Surface Detection Algorithms, Ray-Casting Method, Light Sources, Basic Illumination Models,
Light: Properties of Light, Standard Primaries and theChromaticity Diagram, Intuitive Color Concepts, Design of Animation Sequences, General Computer-Animation, Functions, Raster Animations, Computer-Animation Languages.
> **Learning outcomes:**
>> 1. Classify surface detection algorithms. (L3)
>> 2. Understand Illumination models. (L1)

Unit-IV: Introduction to Multimedia: Historical Perspective, Multimedia Data and Multimedia Systems, A Multimedia System Today ,The Multimedia Revolution, A Possible Future.

Media Representation and Media Formats Digital Images, Digital Video, Digital Audio, Graphics.

Color Theory: The Color Problem, TrichromacityTheory,ColorCalibrationColorSpaces,Gamma Correction and Monitor Calibration.

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Learning outcomes:

1. Recognize different media types in multimedia (L1)
2. Understand media representation and formats (L2)

Unit-V :Compression:A Taxonomy of Compression, Practical Issues Related to Compression Systems, The Need for Audio Compression, The Need for Graphics Compression,2D Graphics Objects:Points,Regions, Curves

Types of Predictions: I Frames,PFrames,BFrames, Multi-frame Prediction, Video Structure—Group of Pictures , Video-Coding Standards:

Multimedia Communication: Modes of Communication, Multimedia Traffic Control, Multimedia Networking Performance and Quality of Service.

Learning outcomes:

1. Understand need of compression (L1)
2. Experience the quality of service for multimedia applications(L4)

Textbooks:
1. Donald Hearn and Pauline Baker M, ―Computer Graphics - C Version", Prentice Hall, New Delhi, 2007 [UNIT I – III]
2. Parag Havaldar, Gerard Medioni "Multimedia Systems: Algorithms, Standards, and Industry Practices" Course Technology ISBN: 1418835943, 9781418835941 [Unit IV- V]

References:

1. Andleigh, P. K and Kiran Thakrar, ―Multimedia Systems and Design‖, PHI, 2003.
2. Foley, Vandam, Feiner and Hughes, ―Computer Graphics: Principles and Practice, 2nd Edition, Pearson Education, 2003.
3. Jeffrey McConnel, ―Computer Graphics: Theory into Practice, Jones and Bartlett Publishers,2006.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, ―Fundamentals of Computer Graphics, CRC Press, 2010.
5. Hill F S Jr., "Computer Graphics", Maxwell Macmillan , 1990.

Course outcomes:
1. Design two dimensional graphics. (L6)
2. Apply two dimensional transformations. (L3)
3. Apply Illumination and color models. (L3)
4. Apply viewing techniques to graphics (L3)
5. Experience the quality of service for multimedia applications(L4)

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SubjectCode	TitleoftheSubject	L	T	P	C
19A20510	**Discrete Mathematics**	3	0	0	3

Course Objectives:

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

Unit –1: Statements and Notation, Connectives- Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.
Normal Forms: Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF), Ordering and Uniqueness of Normal Forms. **The Theory of Inference for the Statement Calculus:** Rules of Inference, Consistency of Premises and Indirect Method of Proof. The predicate Calculus, Inference theory of the Predicate Calculus.

Learning Outcomes: Student should be able to

1. Describe logical sentences in terms of predicates, quantifiers, and logical connectives (L1).
2. Evaluate basic logic statements using truth tables and the properties of logic (L5).
3. Apply rules of inference to test the consistency of premises and validity of arguments (L3).
4. Verify the equivalence of two formulas and their duals (L4).
5. Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula (L1).

Unit – 2: Set Theory: Basic concepts of Set Theory, Representation of Discrete structures, Relations and Ordering, Functions, Recursion.

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

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

Learning outcomes: Student should be able to

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1. Describe equivalence, partial order and compatible relations (L1).
2. Compute Maximal Compatibility Blocks (L3).
3. Identify the properties of Lattices (L2).
4. Evaluate Boolean functions and simplify expression using the properties of Boolean algebra (L5).
5. Infer Homomorphism and Isomorphism (L4).
6. Describe the properties of Semi groups, Monoids and Groups (L1).

Unit – 3:Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with repetitions, Enumerating Permutations and Combinations with constrained Representations Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion and Exclusion

Learning outcomes: Student should be able to

1. Explain fundamental principle of counting (L2).
2. Examine the relation between permutation and combination (L4).
3. Solve counting problems by applying elementary counting techniques using the product and sum rules (L3).
4. Apply permutations, combinations, the pigeon-hole principle, and binomial expansion to solve counting problems (L3).

Unit – 4:Recurrence Relations:
Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations.

Learning outcomes: Student should be able to

1. Find the generating functions for a sequence (L1).
2. Design recurrence relations using the divide-and-conquer algorithm (L6).
3. Solve linear recurrence relations using method of Characteristic Roots (L3).
4. Outline the general solution of homogeneous or Inhomogeneous Recurrence Relations using substitution and method of generating functions (L2).
5. Solve problems using recurrence relations and recursion to analyze complexity of algorithms (L3).

Unit – 5:Graphs:
Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs, Chromatics Number, The Four-Color Problem

Learning outcomes: Student should be able to

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1. Investigate if a given graph is simple or a multi graph, directed or undirected, cyclic or acyclic (L4).
2. Describe complete graph and complete bipartite graphs (L1).
3. Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).
4. Apply the concepts of functions to identify the Isomorphic Graphs (L3).
5. Apply depth-first and breadth-first search (L3).
6. Apply Prim's and Kruskal's algorithms to find a minimum spanning tree (L3).

Text Books:

1. Joe L. Mott. Abraham Kandel and Theodore P.Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2nd Edition, Pearson, 2008 (For Units III to V).

2. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill, 2017(For Unit I&II).

Reference Text Books:

1. Ralph P. Grimaldi and B.V. Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5th Edition, Pearson, 2016.

2. Narsingh Deo, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.

3. D.S. Malik and M.K. Sen "Discrete Mathematics theory and Applications", 1 st Edition, Cenegage Learning, 2012.

4. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach by", 4 th edition, MCGRAW-HILL, 2018.

Course Outcomes:

Students should be able to

1. Evaluate elementary mathematical arguments and identify fallacious reasoning (L5).
2. Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Hassee Diagrams (L1).
3. Understand the general properties of Algebric Systems, Semi Groups, Monoids and Groups (L1).
4. Design solutions for problems using breadth first and depth first search techniques (L6)
5. Solve the homogeneous and non-homogeneous recurrence relations (L3).
6. Apply the concepts of functions to identify the Isomorphic Graphs (L2).
7. Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20511	**Entrepreneurship**	2	0	0	2

SEMESTER: IV
Course Objectives:

- To inculcate the Entrepreneurial qualities in students
- To train the students for Entrepreneurship
- To introduce the business model and business plan
- To teach about the methods of attracting investment in start-ups

Unit-I:**Entrepreneurship: Evolution and Revolution:**Entrepreneurs facing the unknown, Are you a business or social entrepreneur, Entrepreneurs have a particular enterprising mind-set, The evolution of the Under-taking, Entrepreneurship through the ages, Early definitions of Entrepreneurship, Approaches to Entrepreneurship, The entrepreneurial revolution: a global phenomenon.

The Entrepreneurial Mind-Set-Cognition And Career: The entrepreneurial mind, behaviour and career, Who are entrepreneurs, The dark side of entrepreneurship, The entrepreneur's confrontation with risk, Stress and the entrepreneur, The entrepreneurial ego, Pathways to your entrepreneurial career.

Entrepreneurship and Sustainable Development: Entrepreneurship as if the planet mattered, Entrepreneurship in times of crisis, Climate change effects for entrepreneurs, Climate chance economics for entrepreneurs, entrepreneurial ecology.

Learning outcomes

- Understand the entrepreneur qualities (L2)
- Developing entrepreneurial mind-set (L3)

Unit- II: Social And Ethical Entrepreneurship: Entrepreneurial Edge: Social Entrepreneurship, The mind-set of social entrepreneurs, Ecopreneurs, Ethics and Entrepreneurs, Defining entrepreneurial ethics, Ethics in the cross-cultural business world, Entrepreneurship and organized crime, Environmental criminal entrepreneurs, Entrepreneurship an disadvantaged groups, Indigenous entrepreneurs.

Pathways To Entrepreneurial Ventures: Walking entrepreneurship pathways, Bootstrapping, The classical pathway: Disruptive new venture creation, Acquiring an established entrepreneurial venture, Franchising one's way into entrepreneurship, Social venturing as a pathway to entrepreneurship.

Learning outcomes

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- Compare Social and Commercial Entrepreneurship (L4)
- Design a path way to entrepreneurship (L6)

Unit- III :Opportunity And The Creative Pursuit Of Innovative Ideas: Ideas and the search for opportunity, four models of market-based opportunities, Entrepreneurial imagination and creating, Arenas of creativity, Creating the right setting for creativity, Innovation and the entrepreneur, The innovation process, Innovation in the era of climate change.

Developing Entrepreneurship Within Organisations: The entrepreneurial mind-set inorganisations, Re-engineering organizational thinking, Not for business only: public sector entrepreneurship, Intrapreneurial strategy, social intrapreneurship bycreating shared value,

Learning outcomes

- Evaluate the opportunities (L5)
- Develop entrepreneurship environment in an organization (L3)

Unit –IV:**The Assessment Of Entrepreneurial Opportunities:** The elements of an opportunity assessment, How do we model the entrepreneurial process, How to assess an opportunity, When is an idea not an opportunity, The evaluation process, The emergence of entrepreneurial ecosystems.

Marketing For Entrepreneurial Ventures: Entrepreneurial marketing is essential, Entrepreneurial marketing defined, The components of effective marketing, Developing a marketing plan, Marketing research, Marketing on the Internet, Green entrepreneurial marketing, Pricing strategies.

Learning outcomes

- Outline the strategies for marketing (L2)
- Critique opportunities (L4)

Unit –V:Legal And Regulatory Challenges For Entrepreneurial Ventures: Legal and regulatory challenges, Understanding Asia-Pacific regulatory environments, International protections for intellectual property, Patents, Copyrights,, Trademarks, Domain names, Trade secrets, Opportunities from changing intellectual, Property attitudes, Identifying legal structures for entrepreneurial ventures, Incorporated companies, Unincorporated businesses, Other business forms, Insolvency and Bankruptcy, The legal framework regulating climate change.

Sources Of Capital For Entrepreneurial Ventures: The times they are a-changing, What are the forms of entrepreneurial capital, Sources of financial capital, Debt Vs Equity, Equity financing The venture capital market, Angel financing, New forms of Entrepreneurial capital, Peer-to-peer lending.

Learning outcomes

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- Understand the Loss of the Land (L2)
- Develop sources of Capital (L3)

Textbook:
1. Howard Fredrick, Allan O Conner, and Donald F.Kuratko, "Entrepreneurship Theory/Process/Practices" 4th Edition, Cengage Learning, 2016.

References:
1. Bill Aulet, "Disciplined Entrepreneurship Workbook" Willey Publishers
2. William Bygrave, A.Zacharakis, " Entrepreneurship" 2nd Edition, Willey Publishers
3. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011

Course Outcomes:

Students should be able to

- Design business model and business plan (L6)
- Demonstrate the Venture infront of investors (L2)
- Build the team for a strartup (L6)
- Illustrate successful cases of start-ups (L3)
- Develop strategies for market survey (L6)

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20512	**Software Engineering**	3	0	0	3

Course Objectives:

1. To learn the basic concepts of software engineering and life cycle models
2. To explore the issues in software requirements specification and enable to write SRS documents for software development problems
3. To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems
4. To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing
5. To reveal the basic concepts in software project management

Unit – 1: Basic concepts in software engineering and software project management Basic concepts: abstraction versus decomposition, evolutionof software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.
Learning Outcomes: Student should be able to
    1. Recognize the basic issues in commercial software development.

     2. Summarize software lifecycle models.

    3. Infer Workout project cost estimates using COCOMO and schedules using PERT and GANTT charts.

Unit – 2: Requirements analysis and specification

The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques. axiomatic specification, algebraic specification.

Learning outcomes: Student should be able to

1. Identify basic issues in software requirements analysis and specification.
2. Develop SRS document for sample problems using IEEE 830 format.
3. Develop algebraic and axiomatic specifications for simple problems.

Unit – 3:Software Design

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Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based Vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology.
Learning outcomes: Student should be able to

1. Identify the basic issues in software design.

2. Apply the structured, object oriented analysis and design (SA/SD) technique.

3. Recognize the basic issues in user interface design.

Unit – 4:Coding and Testing
Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.

Learning outcomes: Student should be able to

1. Identify the basic issues in coding practice.
2. Recognize the basic issues in software testing.
3. Design test cases for black box and white box testing.

Unit – 5:Software quality, reliability, and other issues
 Software reliability, Statistical testing, Software quality and management ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.
Learning outcomes: Student should be able to

1. Summarize various methods of software quality management.
2. Instruct the quality management standards ISO 9001, SEI CMM, PSP, and Six Sigma.
3. Outline software quality assurance, quality measures, and quality control.
4. Identify the basic issues in software maintenance, CASE support, and software reuse

Text Books:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.

2. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.

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Reference Text Books:

1. Somerville, "Software Engineering", Pearson 2.

2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.

3. Jalote Pankaj, "An integrated approach to Software Engineering", Narosa

Course Outcomes: Students should be able to

1. Obtain basic software life cycle activity skills.
2. Design software requirements specification for given problems.
3. Implement structure, object oriented analysis and design for given problems.
4. Design test cases for given problems.
5. Apply quality management concepts at the application level.

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20513	**Operating Systems Lab**	0	0	2	1

Course Objectives:

1. To familiarize students with the architecture of OS.
2. To provide necessary skills for developing and debugging CPU Scheduling algorithms.
3. To elucidate the process management and scheduling and memory management.
4. To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
5. To provide insights into system calls, file systems and deadlock handling.

List of Experiments

1. Practicing of Basic UNIX Commands.

2. Write programs using following UNIX operating system calls

   Fork, exec, getpid, exit, wait, close, stst, opendir and readdir

3. Simulate UNIX commands like cp, ls, grep, etc.,

4. Simulate the following CPU scheduling algorithms

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

5. Implement dynamic priority scheduling algorithm.

6. Assume that there are five jobs with different weights ranging from 1 to 5. Implement round robin algorithm with time slice equivalent to weight.

7. Implement priority scheduling algorithm. While executing, no process should wait for more than 10 seconds. If waiting time is more than 10 seconds that process has to be executed for at least 1 second before waiting again.

8. Control the number of ports opened by the operating system with

   a) Semaphore b) Monitors.

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9. Simulate how parent and child processes use shared memory and address space.

10. Simulate sleeping barber problem.

11. Simulate dining philosopher's problem

12. Simulate producer and consumer problem using threads.

13.Implement the following memory allocation methods for fixed partition

    a) First fit b) Worst fit c) Best fit

14. Simulate the following page replacement algorithms

    a) FIFO b) LRU c) LFU etc.,

15. Simulate Paging Technique of memory management

16. Simulate Bankers Algorithm for Dead Lock avoidance and prevention

17. Simulate following file allocation strategies

    a) Sequential b) Indexed c) Linked

18. Simulate all File Organization Techniques

    a) Single level directory b) Two level c) Hierarchical d) DAG

Reference Books:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Eighth Edition, John Wiley.

2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition–2009, Pearson Education 3. Andrew S Tanenbaum "Modern Operating Systems", Second Edition, PHI.

4. S. Haldar, A.A. Aravind, "Operating Systems", Pearson Education.

5. B.L.Stuart, "Principles of Operating Systems", Cengage learning, India Edition.2013-2014

6. A.S.Godbole "Operating Systems", Second Edition, TMH. 7. P.C.P. Bhatt, "An Introduction to Operating Systems", PHI.

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Course Outcomes: Students should be able to

1. Trace different CPU Scheduling algorithm (L2).
2. Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
3. Evaluate Page replacement algorithms (L5).
4. Illustrate the file organization techniques (L4).
5. Illustrate shared memory process (L4).
6. Design new scheduling algorithms (L6)

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20514	**Software Engineering Lab**	0	0	2	1

Course Objectives:

1. To Learn and implement the fundamental concepts of software Engineering.
2. To explore functional and non functional requirements through SRS.
3. To practice the various design diagrams through appropriate tool.
4. To learn to implement various software testing strategies.

List of Experiments:

1. Draw the Work Breakdown Structure for the system to be automated.
2. Schedule all the activities and sub-activities using the PERT/CPM charts.
3. Define use cases and represent them in use-case document for all the stakeholders of the System to be automated.

4. Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated.
5. Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause & Effect Diagram).
6. Define Complete Project plan for the system to be automated using Microsoft Project Tool.
7. Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document.
8. Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document.
9. Define the following traceability matrices:
   1. Use case Vs. Features

   2. Functional requirements Vs.Usecases

10. Estimate the effort using the following methods for the system to be automated:
    1. Function point metric

    2. Use case point metric

11. Develop a tool which can be used for quantification of all the non-functional requirements.
12. Write C/C++/Java/Python program for classifying the various types of coupling.
13. Write a C/C++/Java/Python program for classifying the various types of cohesion.

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14. Write a C/C++/Java/Python program for object oriented metrics for design proposed Chidamber and kremer . (Popularly called as CK metrics) Explain the concept of a tree (L2).
15. Convert the DFD into appropriate architecture styles.
16. Draw complete class diagram and object diagrams using Rational tools.
17. Define the design activities along with necessary artifacts using Design Document.
18. Reverse Engineer any object-oriented code to an appropriate class and object diagrams.
19. Test a piece of code which executes a specific functionality in the code to be tested and asserts a certain behavior or state using J unit.
20. Test the percentage of code to be tested by unit test using any code coverage tools.
21. Define an appropriate metrics for at least 3 quality attributes for any software application of your interest.
22. Define a complete call graph for any C/C++ code. (Note: The student may use any tool that Generate call graph for source code).

Unit Outcomes: Students should be able to

1. Acquaint with historical and modern software methodologies
2. Understand the phases of software projects and practice the activities of each phase
3. Practice clean coding
4. Take part in project management
5. Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment

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II B.TECH – II SEMESTER(R-19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A20515	**Computer Graphics Lab**	0	0	2	1

At the end of the course the student will have
- the generic skills to design algorithms for Computer Graphics
- Understand the need of developing graphics application
- Learn algorithmic development of graphics primitives like: line, circle, polygon etc.
- Learn the representation and transformation of graphical images and pictures.

1. Write a program to draw a line using Digital Differential Analyzer (DDA) Algorithm
2. Write a program to draw a line using Bresenham's Line Algorithm (BLA) for lines with slopes negative and less than 1.
3. Write a program to draw a line using Bresenham's Line Algorithm (BLA) for lines with slopes positive and less than 1.
4. Write a program to draw a line using Bresenham's Line Algorithm (BLA) for lines with slopes positive and greater than 1.
5. Write a program to draw a line using Bresenham's Line Algorithm (BLA) for lines with slopes negative and greater than 1.
6. Write a program to draw a circle using Bresenham's Circle Algorithm.
7. Write a program to draw a circle using MidPoint Circle Algorithm
8. Write a program to draw a circle using Trigonometric Method.
9 Write a program to draw a circle using Polynomial Method.
10. Write a program to draw an ellipse using MidPoint Ellipse Algorithm.
11. Write a program to draw an ellipse using Trigonometric Method.
12. Write a program to draw an ellipse using Polynomial Method.
13. Write a program to fill different types of geometric shapes using Flood Fill Algorithm
14. Write a program to fill different types of geometric shapes using Boundary Fill Algorithm
15. Write a program to draw a C-Curve of nth order.

Course outcomes:

- Draw Geometric primitives (L5)
- Execute scan line polygon filling(L4)
- Implement basic transformations on objects (L6)
- Implement clipping algorithm on lines using OpenGL(L6)

Text Books
Interactive Computer Graphics A Top-Down Approach with OpenGL, Edward Angel, Pearson, 5th Edition, 2009.

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SubjectCode	TitleoftheSubject	L	T	P	C
19A20516	**CONSTITUTION OF INDIA** **(Mandatory course for Semester III/IV)**				

COURSE OBJECTIVES :	The objective of this course is	
	1	To Enable the student to understand the importance of constitution
	2	To understand the structure of executive, legislature and judiciary
	3	To understand philosophy of fundamental rights and duties
	4	To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
	5	To understand the central-state relation in financial and administrative control

Syllabus

UNIT-I Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution-Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

LEARNING OUTCOMES:-After completion of this unit student will

- ➢ Understand the concept of Indian constitution
- ➢ Apply the knowledge on directive principle of state policy
- ➢ Analyze the History and features of Indian constitution
- ➢ Learn about Preamble, Fundamental Rights and Duties

UNIT-II Union Government and its Administration Structure of the Indian Union - Federalism - Centre-State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

LEARNING OUTCOMES:-After completion of this unit student will

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- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

LEARNING OUTCOMES:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role ofZillaParishath block level organization

UNIT-V Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

LEARNING OUTCOMES:-After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

TEXT BOOKS

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1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. New Delhi

2. Subash Kashyap, Indian Constitution, National Book Trust

REFERENCES:

1. J.A. Siwach, Dynamics of Indian Government & Politics,

2. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

3. .J.C. Johari, Indian Government andPolitics, Hans India

4. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES: 1.nptel.ac.in/courses/109104074/8 2.nptel.ac.in/courses/109104045/

3.nptel.ac.in/courses/101104065/

4.www.hss.iitb.ac.in/en/lecture-details

5.www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

COURSE OUTCOMES: At the end of the course, students will be able to	
CO1	Understand historical background of the constitution making and its importance for building a democratic India.
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO4	Analyze the decentralization of power between central, state and local self-government
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50501	**Formal Languages and Automata Theory**	3	0	0	3

Course Objectives:
This course is designed to:
- Introduce languages, grammars, and computational models
- Explain the Context Free Grammars
- Enable the students to use Turing machines
- Demonstrate decidability and un-decidability for NP Hard problems

Course Outcomes:
Upon completion of the course, the students should be able to:

1. Apply formal machines, languages and computations
2. Design finite state machines for acceptance of strings
3. Develop context free grammars for formal languages
4. Build pushdown automata for context free grammars
5. Validate decidability and undesirability

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			2									3	2	
CO2	3	3	3						1				3	3	
CO3		3	3						2					3	
CO4				2								2			
CO5		2										1	2		

UNIT – I: Finite Automata
Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

Learning Outcomes: At the end of the unit, students will be able to:
1. Distinguish DFA and NFA. (L4)
2. Construct DFA for an input string. (L6)
3. Perform minimization of Automata.(L5)
4. Compare Moore and Mealy Machines.(L2)

UNIT – II: Regular Expressions

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Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

Learning Outcomes: At the end of the unit, students will be able to:
1. Construct regular expression for the given Finite Automata.(L6)
2. Construct finite automata for the given regular expression.(L6)
3. Apply closure properties on regular expressions.(L3)

UNIT – III: Context Free Grammars
Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

Learning Outcomes: At the end of the unit, students will be able to:
1. Define Context Free Grammar. (L1)
2. Distinguish Chomsky Normal Form and Greibach Normal form.(L4)
3. Apply Pumping Lemma theorem on Context Free Grammar.(L3)

UNIT – IV: Pushdown Automata
Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence   of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

Learning Outcomes: At the end of the unit, students will be able to:
1. List the applications of Pushdown Automata. (L1)
2. Construct Pushdown Automata for context free grammar.(L6)

UNIT – V: Turing Machine
Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.
Decidable and Undecidable Problems: NP, NP-Hard and NP-Complete Problems.

Learning Outcomes: At the end of the unit, students will be able to:
1. List types of Turing Machines.(L1)
2. Design Turing Machine.(L6)
3. Formulate decidability and undecidability problems. (L6)

Text Books:

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1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3rd Edition, PHI, 2007.
Reference Books:
1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50502	**Computer Networks**	3	0	0	3

Course Objectives:
This course is designed to:
- Introduce the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Expose the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Familiarize with the applications of Internet
- Elucidate the design issues for a computer network

Course Outcomes:

Students will be able to:
CO1: Identify the software and hardware components of a Computer network
CO2: Design software for a Computer network
CO3: Develop new routing, and congestion control algorithms
CO4: Analyze the functionality of each layer of a computer network
CO5: Employ the appropriate transport protocol based on the application requirements

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3								1	2			3	
CO2			3	2						1					
CO3			3				2						2		
CO4		3		2							2			2	
CO5	3				3	2		2					2	2	

Unit – 1: Computer Networks and the Internet

What is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet

Learning Outcomes: Student should be able to
1. Enumerate the hardware components of a computer network (L1)

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2. List the layers of a Computer Network (L1)
3. Identify the performance metrics of a computer network (L2)

Unit – 2: Application Layer

Principles of Network Applications, The web and HTTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications, Video Streaming and Content Distribution Networks.

Learning outcomes: Student should be able to

1. Design new applications of a computer network (L6)
2. Analyze the application protocols (L4)
3. Extend the existing applications (L3)

Unit – 3 : Transport Layer

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Learning outcomes: Student should be able to

1. Design Congestion control algorithms (L6)
2. Select the appropriate transport protocol for an application (L2)
3. Identify the transport layer services (L1)

Unit – 4: The Network Layer

Data Plane: Overview of Network Layer, the Internet Protocol (IP): IPv4, Addressing, IPv6, Generalized Forwarding and SDN,

Control Plane: Introduction, Routing Algorithms, Intra-AS Routing in the Internet: OSPF, Routing Among the ISPs: BGP, The SDN Control Plane, ICMP: The Internet Control Message Protocol, Network Management and SNMP,

Learning outcomes: Student should be able to

1. Analyze routing algorithms for computing least cost paths in a graph (L4)
2. Implementing data-plane forwarding functions (L3)
3. Implementing control-plane functions (L3)

Unit – 5: The Link Layer and LANs

Introduction to the Link Layer, Error-Detection and – Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a link Layer, Data Center Networking, Retrospective: A Day in the life of a Web Page Request.

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Learning outcomes: Student should be able to

1. Analyze Error-Detection and -Correction Techniques (L4)

2. Operating the access of multiple sending and receiving nodes to a shared broadcast channel(L3)

Text Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

References:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.
3. YouluZheng, ShakilAkthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A55501	**English Language Skills**	3	0	0	3

Course Description:
English Language Skills aims to enable the engineering students to meet the demands of the modern job market through thorough training in LSRW skills, presentation skills, interview skills, academic writing etc. Students of our region have knowledge of their respective subjects, but the surveys make it clear that they are lagging behind in expressing themselves effectively in a professional setting. So this course will enable them to hone these skills and excel in their respective fields.

Course Objectives:
- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

Course Outcomes:

CO1: To recall and memorize the basic concepts of effective communication

CO2: To understand the various components of effective communication.

CO3: To apply writing skills in order to meet the demands of work place environment.

CO4: To analyze verbal and non-verbal interpretations in multicultural context.

CO5: To evaluate different aspects of verbal and linguistic competence to become effective presenters.

CO6: To design and develop an effective written document in technical domain.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3		2			3
CO2									3	3		3			3
CO3									3	3					3
CO4									3	3					3
CO5									3	3					2
CO6									3	3		2			3

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UNIT 1: LSRW SKILLS

Introduction to LSRW Skills – Definition – Importance of LSRW Skills - Advantages and Disadvantages of Oral and Written Skills – Advantages and disadvantages of Written & Speaking skills - Barriers to effective communication

Learning Outcomes:

- To recall and memorize the basic concepts of LSRW skills
- To understand the various components of oral and written skills
- To apply English language skills to avoid barriers to effective communication

UNIT II: VERBAL & NON-VERBAL SKILLS

Informal and Formal Conversation - Non-verbal Skills–Kinesics, Proxemics, Chronemics, Haptics, Oculesics , Paralinguistic features – Body language for interviews

Learning Outcomes:

- To understand the basic components of non-verbal communication.
- To apply the knowledge of the difference between informal and formal conversation in order to meet the demands of work place environment.
- To analyze non-verbal interpretations in multicultural context.

UNIT III: ACADEMIC WRITING SKILLS

Writing Skills–Art of condensation- summarizing and paraphrasing - Abstract Writing, Synopsis Writing – Formal Letter Writing - Report Writing

Learning Outcomes:

- To understand the basic components of written communication.
- To apply knowledge of different formats of written communication needed in work place environment.
- To analyze the structure of letters, reports etc.

UNIT IV: CREATIVE WRITING SKILLS

Film Review Writing – Creative Writing- Short Story Writing – Speeches for academic settings – Writing Skits – Script for Short Films/Web Series

Learning Outcomes:

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- To apply writing skills in creative writing to meet the demands of documentation in professional life
- To analyze different figures of speech in creative writing
- To evaluate different aspects creative and academic writing to become effective at written communication

UNIT V: PROFESSIONAL SPEAKING SKILLS

Job Interviews –Types of Job Interviews – Characteristics of a job interview - Interview Preparation Techniques –How to overcome Stage fright
Group Discussions(GD): Importance of Group Discussion- Characteristics of a GD - GD as a tool for selection – GD Strategies – Do's & Don't of GD - GD Vs Debates

Learning Outcomes:

- To analyze the different aspects of interviews and group discussions
- To evaluate the group dynamics to excel in group discussions
- To design and develop strategies to answer effectively in interviews

Text Books:

1. Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011
2. Technical Communication by Meenakshi Raman & Sangeeta Sharma,3rd Edition, O U Press 2015

References:

1. Communication Skills by Pushpalatha& Sanjay Kumar, Oxford Univsesity Press

2. Books on TOEFL/GRE/GMAT/CAT/IELTS by Barron's/DELTA/Cambridge University Press.2012.

3. Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.

4. Management Shapers Series by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.

5. Successful Presentations by John Hughes & Andrew Mallett, Oxford.

6. Winning at Interviews by Edgar Thorpe and Showick Thorpe, Pearson

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50503	**Software Testing (Professional Elective – I)**	3	0	0	3

Course Objectives:

- Finding defects which may get created by the programmer while developing the software.
- Gaining confidence in and providing information about the level of quality.
- To prevent defects.
- To make sure that the end result meets the business and user requirements.
- Execute specific software tests with well-defined objectives and targets.

Course Outcomes:
Upon completion of the course, the students should be able to:

CO1: Acquire knowledge on distinct types of testing methodologies.
CO2: Describe the principles and procedures for designing test cases.
CO3: Understand the stages of testing from Development to acceptance testing
CO4: Formulate test cases for testing different programming constructs.
CO5: Test the applications using different testing methods and automation tools.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2						2			3		2		
CO2	3				2						2	1		1	
CO3		3	1									2			2
CO4		3		2	1	1			1	2					
CO5				2				1			3				2

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.
Learning Outcomes:
At the end of the unit, students will be able to:
   1. Explain the purpose of Testing. (L2)

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2. Interpret the need of testing (L2)
3. Classify different types of Bugs. (L4)

UNIT II

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Apply data flow testing (L3)
2. Design Transaction flow testing (L6)
3. Outline the strategies of dataflow testing. (L2)
4. List the applications of dataflow testing. (L1)

UNIT III

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

Learning Outcomes:
At the end of the unit, students will be able to:
1. Apply testing in various domains. (L3)

UNIT IV

Paths, Path products and Regular expressions: Path Products &Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.
Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, Specifications.
Learning Outcomes:

At the end of the unit, students will be able to:
1. Analyze the paths in testing.(L4)
2. Design testing for checking the logic (L6)

UNIT V:

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.
Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.
Learning Outcomes:
At the end of the unit, students will be able to:

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1. Use state graphs for testing. (L3)
2. Create algorithms for node reduction (L6)

Text Books:

1. Boris Beizer, "Software testing techniques", Dreamtech, second edition, 2002.

Reference Books :

1. Brian Marick, "The craft of software testing", Pearson Education.

2. Yogesh Singh, "Software Testing", Camebridge

3. P.C. Jorgensen, "Software Testing" 3rd edition, Aurbach Publications (Dist.by

SPD).

4. N.Chauhan, "Software Testing", Oxford University Press.

5. P.Ammann&J.Offutt, "Introduction to Software Testing" , Cambridge Univ.

Press.

6. Perry, "Effective methods of Software Testing", John Wiley, 2nd Edition, 1999.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50504	**Data Mining and Warehousing (Professional Elective – I)**	3	0	0	3

Course Objectives:
- Familiarize with mathematical foundations of data mining tools.
- Introduce classical models and algorithms in data warehouses and data mining.
- Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Explore data mining techniques in various applications like social, scientific and environmental context.

Course Outcomes:

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

CO1: Apply suitable pre-processing and visualization techniques for data analysis
CO2: Apply frequent pattern and association rule mining techniques for data analysis
CO3: Design appropriate classification and clustering techniques for data analysis
CO4: Infer knowledge from raw data

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CO1	2	2								2	2				
CO2			3	2							2		2		
CO3			2		1			2		2	3		2	3	
CO4		2			3						3		2		

UNIT I:

Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

Learning Outcomes:

At the end of the unit, students will be able to:
   1. Identify the component of Data warehouse (L1)

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2. Create the architecture of Data warehouse (L6)
3. Apply different types of OLAP operations (L3)

UNIT II:

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Summarize the data processing steps (L2)
2. Apply data cleaning process (L3)

UNIT III:

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Understand Association Rules(L2)
2. Apply different Mining Methods (L3)
3. Review Classification using Frequent Patterns (L2)

UNIT IV:

Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –– Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Creating Decision Tree (L6)
2. Evaluate Classification techniques (L5)

UNIT V: WEKA TOOL

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Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Investigate WEKA tool (L4)
2. Explain learning, clustering algorithms (L2)

Text Book:

1.Jiawei Han and Micheline Kamber, ―Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

References:

1.Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016.

2.K.P. Soman, Shyam Diwakar and V. Ajay, ―Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.

3.Ian H.Witten and Eibe Frank, ―Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50505	**Principles of Programming Language (Professional Elective – I)**	3	0	0	3

Course Objectives:
- Understand the salient features in the landscape of programming languages.
- Understand the essence of defining concepts of programming languages, so to allow critical choice about the level of abstraction.
- Develop, analyze, and compare programs written in the various Programming Paradigms
- Choose an appropriate programming language solution for a given programming task.

Course Outcomes:

CO1: Student able to analyze basic concepts of programming and syntax of programming languages.
CO2: Student able to analyzing semantic issues associated with function implementations, including variable binding, scoping rules, parameter passing, and exception handling.
CO3: Student able to implement object oriented programming concepts using subprograms.
CO4: Student able to analyzing design issues of object - oriented and functional languages.
CO5: Student able to apply principles of programming to various programming languages.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2											3	2	
CO2		2		2					2					1	
CO3			2										2		
CO4	1		2	1					2						
CO5	1	2	1	2					1				1		

UNIT-I: Preliminary Concepts: Reasons for studying concepts of programming languages, programming domains, language evaluation criteria, influences on language design, language categories, language design trade-offs, implementation methods, programming environments, Evolution of Major Programming Languages. Syntax and Semantics: General problem of describing syntax, formal methods of describing syntax, attribute grammars, describing the meanings of programs

Learning Outcomes:

1. Student is able to study basic knowledge on programming principles and syntaxes (L1)

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UNIT-II: Names, Bindings, and Scopes: Introduction, names, variables, concept of binding, scope, scope and lifetime, referencing environments, named constants Data types: Introduction, primitive, character, string types, user defined ordinal types, array, associative arrays, record, tuple types, list types, union types, pointer and reference types, type checking, strong typing, type equivalence Expressions and Statements: Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, short- circuit evaluation, assignment statements, mixed-mode assignment Control Structures – introduction, selection statements, iterative statements, unconditional branching, guarded commands.

Learning Outcomes:
1. Student is able to understand how to use data types in programming languages (L1)
2. Student is able to understand type conversions, conditional and loop control statements (L1)

UNIT-III: Subprograms: Fundamentals of subprograms, design issues for subprograms, local referencing environments, parameter passing methods, parameters that are subprograms, calling subprograms indirectly, overloaded subprograms, generic subprograms, design issues for functions, user defined overloaded operators, closures, co routines Implementing subprograms: General semantics of calls and returns, implementing simple subprograms, implementing subprograms with stack-dynamic local variables, nested subprograms, blocks, implementing dynamic scoping Abstract Data types: The concept of abstraction, introductions to data abstraction, design issues, language examples, parameterized ADT, encapsulation constructs, naming encapsulations

Learning Outcomes:
1. Student is able to learn how to communicate with one function to other functions (Parameter passing methods) (L1)
2. Student is able to understand variable scope, abstraction and encapsulation concepts (L1)

UNIT-IV: Object Oriented Programming: Design issues for OOP, OOP in Smalltalk, C++, Java, Ada 95, Ruby, Implementation of Object-Oriented constructs. Concurrency: introduction, introduction to subprogram level concurrency, semaphores, monitors, message passing, Ada support for concurrency, Java threads, concurrency in functional languages, statement level concurrency. Exception Handling and Event Handling: Introduction, exception handling in Ada, C++, Java, introduction to event handling, event handling with Java and C#.

Learning Outcomes:
1. Student is able to understand object oriented concepts with various programming languages(L1)
2. Student is able to learn concepts of Exception handlings and Event handling (L1)

UNIT-V: Functional Programming Languages: Introduction, mathematical functions, fundamentals of functional programming language, LISP, support for functional programming in primarily imperative languages, comparison of functional and imperative languages Logic Programming Language: Introduction, an overview of logic programming, basic elements of prolog, deficiencies of prolog, applications of logic programming. Scripting Language: Pragmatics, Key Concepts, Case Study : Python

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– Values and Types, Variables , Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

Learning Outcomes:

1. Student study the functional programming LISP (L3)
2. Student able to understand python programming using Case Study (L1)

Text Books:

1. Concepts of Programming Languages, Robert .W. Sebesta 10th edition, Pearson Education.
 2. Programming Language Design Concepts, D. A. Watt, Wiley India Edition.

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SubjectCode	TitleoftheSubject	L	T	P	C
19A50507	**Artificial Intelligence** (**Open Elective – I**)	3	0	0	3

Course Objectives:
- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

Course outcomes:
Upon completion of the course, the students should be able to:

CO1: Apply searching techniques for solving a problem
CO2: Design Intelligent Agents
CO3: Develop Natural Language Interface for Machines
CO4: Design mini robots
CO4: Summarize past, present and future of Artificial Intelligence

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1									3	2	3
CO2	3	3	2	1									3	2	3
CO3	3	3	2	2		1	1	2					3	2	3
CO4	3	3	3	3	2	1	1	2	1	1	1	2	3	2	3
CO5	3	3	3	3	2	1	1	2	1	1	1	2	3	3	3

Unit – I: **Introduction**: What is AI, Foundations of AI, History of AI, The State of Art.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:
At the end of the unit, students will be able to:
1. Recognize the importance of Artificial Intelligence (L1)
2. Identify how intelligent agent is related to its environment (L2)

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3. Build an Intelligent agent (L3)

Unit – II: **Solving Problems by searching**: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:
At the end of the unit, students will be able to:
1. Explain how an agent can formulate an appropriate view of the problem it faces. (L2)
2. Solve the problems by systematically generating new states (L2)
3. Derive new representations about the world using process of inference (L5)

Unit – III: **Reinforcement Learning**: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL
Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.
Learning Outcomes:
At the end of the unit, students will be able to:
1. Examine how an agent can learn from success and failure, reward and punishment. (L5)
2. Develop programs that make queries to a database, extract information from texts, and
   Retrieve relevant documents from a collection using Natural Language Processing. (L6)

Unit-IV: **Natural Language for Communication**: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition
Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.
Learning Outcomes:
At the end of the unit, students will be able to:
1. Develop programs that translate from one language to another, or recognize spoken words. (L6)
2. Explain the techniques that provide robust object recognition in restricted context.(L2)

Unit-V: Robotics: Introduction, Robot Hardware, Robotic Perception,Planning to move, Planning uncertain movements, Moving, Robotic software architectures, application domains
Philosophical foundations: Weak AI,Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.
Learning Outcomes:
At the end of the unit, students will be able to:
    1.Explain the role of Robot in various applications. (L2)
    2.List the main philosophical issues in AI. (L1)
Textbook:

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1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

References:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50508	**Web Technologies (Open Elective – I)**	3	0	0	3

Course Objectives:
- Familiarize the tags of HTML.
- Understand different Client side Scripting.
- Learn -specific web services of server side Programming.
- Connect different applications using PHP & XML.
- Connect XHTML, Java Scripting, Servlet Programming, Java Server Pages.

Course Outcomes:

At the end of the course, the students should be able to:

CO1: Construct a basic website using HTML and Cascading Style Sheets.

CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

CO3: Develop server side programs using Servlets and JSP.

CO4: Construct simple web pages in PHP and represent data in XML format.

CO5: Utilize AJAX and web services to develop interactive web applications.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3		2					2				3	
CO2	3	2				2			2			1	2	3	1
CO3	2				3	2			2					3	
CO4	2				3	1				3				3	
CO5	3					2			1		1		3	2	

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UNIT I

WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

Learning Outcomes:

At the end of the unit, students will be able to:
   1. Create standard tags of HTML tags and Knowing the features of designing static webpages. (L6)
   2. List different types of CSS to design webpage attractively. (L1)
   3. Utilize different tools like Adobe Dream weaver and Microsoft Frontpage.(L3)

UNIT II

CLIENT SIDE PROGRAMMING

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling - DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL.

Learning Outcomes:

At the end of the unit, students will be able to:

   1. Explain different types of client side scripting. (L2)
   2. Construct dynamic webpages using DHTML.(L6)
   3. Illustrate validation for webpages.(L2)

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UNIT III

SERVER SIDE PROGRAMMING

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions-Session Handling-Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Analyze the importance of Server side scripting.   (L4)
2. Demonstrate deployment of the application using Tomcat Server.(L2)
3. Experiment with Storing and Retrieving data from JDBC. (L3)

UNIT IV

PHP and XML

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML-Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

Learning Outcomes:

At the end of the unit, students will be able to:

1. Understand how XML interacts with different applications. (L1)
2. Develop PHP Programs using WAMP and XAMPP Server.(L3)
3. Examine background applications using XSL and XSLT.(L4)

UNIT V
INTRODUCTION TO AJAX and WEB SERVICES

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

Learning Outcomes:

1. Explain the importance of AJAX Architecture.(L2)
2. Integrate and test web services.(L4)

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Text Books:

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program‖,Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. The Complete Reference PHP by Steven Holzner, MGH HILL Education, Indian Edition, 2008.

References

1. Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, WileyPublications, 2009.
3. Jeffrey C and Jackson, ―Web Technologies A Computer Science PerspectivePearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., ―Web Technology, Prentice Hall of India, 2011.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50508	**Distributed Computing (Open Elective – I)**	3	0	0	3

Course Objectives:

This course is designed to:
- Study the fundamentals of distributed computing systems
- Study the concepts of IPC,PRC and distributed shared memory
- Provide the knowledge on clock synchronization and scheduling algorithms
- Study different file models, DCE directory services and work on different case studies

Course Outcomes:

At the end of the course, the students should be able to:

CO1: Understand different distributed systems and apply different Message Passing Techniques

CO2: Design distributed shared memory and implement RPC mechanism

CO3: Get knowledge in synchronization and apply scheduling algorithms

CO4: Analyze distributed file system access and Compare NFS & AFS

CO5: Develop case studies on Mach & Chorus effectively as a team work

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1											3		
CO2			3			1								3	
CO3	3				2		1							1	
CO4		3		3									2		
CO5			3		3		2	1	3	2	1	2	2	2	3

UNIT I: Fundamentals

Evolution of Distributed Computing Systems, System models, issues in design of Distributed Systems, Distributed- computing environment, web based distributed model, computer networks related to distributed systems and web based protocols.

Message Passing: Inter process Communication, Desirable Features of Good Message-Passing Systems, Issues in IPC by Message, Synchronization, Buffering, Multi datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.

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Learning Outcomes:

At the end of the unit, students will be able to:
1. Understand evolution of distributed computing systems (L2)
2. Analyze design issues in inter process Communication (L4)
3. Apply Encoding and Decoding of Message Data(L3)

UNIT II:Remote Procedure Calls

The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, Lightweight RPC, Optimization for Better Performance.

Distributed SharedMemory: Design and Implementation issues of DSM, Granularity, Structure of Shared memory Space, Consistency Models, replacement Strategy, Thrashing, Other Approaches to DSM, Advantages of DSM.
Learning Outcomes:

At the end of the unit, students will be able to:
1. Design RPC mechanism (L6)
2. Apply exception handling and security mechanism (L3)
3. Discuss different approaches to DSM (L2)
4. Analyze distributed shared memory (L4)

UNIT III: Synchronization

Clock Synchronization, Event Ordering, Mutual Exclusion, Election Algorithms

Resource and ProcessManagement

Desirable Features of a good global scheduling algorithm, Task assignment approach, Load Balancing approach, Load Sharing Approach, Process Migration, Threads, Processor allocation, Real time distributed Systems.
Learning Outcomes:

At the end of the unit, students will be able to:

1. Discuss Clock Synchronization, Event Ordering (L2)

2. Apply different scheduling algorithms (L4)

3. Use Process Migration and Threads concepts (L3)

4. Understand Real time distributed Systems (L2)

UNIT IV:DistributedFileSystems

Desirable Features of a good Distributed File Systems, File Models, File Accessing Models, File-sharing Semantics, File- caching Schemes, File Replication,Fault Tolerance, Design Principles, Sun's network file system, Andrews file system, comparison of NFS and AFS.

Naming: Desirable Features of a Good Naming System, Fundamental Terminologies and Concepts,

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Systems-Oriented Names, Name caches, Naming &security, DCE directory services.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Analyze distributed file system access (L2)
2. Discover Fault Tolerance (L3)
3. Compare NFS and AFS (L4)
4. Evaluate Fundamental Terminologies and Concepts on Naming (L5)

UNIT V: Case Studies: Mach & Chorus (Keep case studies as tutorial)
Term work/ Practical: Each candidate will submit assignments based on the above syllabus along with the flow chart and program listing will be submitted with the internal test paper.
Learning Outcomes:

At the end of the unit, students will be able to:
1. Develop case studies on Mach & Chorus effectively (L6)
2. Write an assignments and construct flow chart and program listing (L6)

Text Books:

1. Distributed OS by Pradeep K. Sinha(PHI)

References:

1. Tanenbaum S: Distributed   Operating   Systems,   Pearson Education

2. Tanenbaum S. Maarten V.S.: Distributed Systems Principles and Paradigms, (PearsonEducation)
3. George Coulouris, Jean Dollimore. Tim Kindberg: Distributed Systems concepts anddesign.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50509	**Object Oriented Analysis and Design**	2	0	0	2

Course Objectives:
- Understand the basic concepts of object-oriented techniques
- Build the Model of the software system using UML diagrams
- Elucidate design patterns as templates for good design
- Learn the object-oriented methodology in software design
- Demonstrate activity diagram and their modelling techniques.

Course outcomes:

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

CO1: Analyze the problem from object oriented perspective
CO2: Model complex systems using UML Diagrams
CO3: Determine the suitable design patterns in software design
CO4: Adapt Object-Oriented Design Principles
CO5: Apply basic structural modeling concepts for designing real-time applications

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		1	2				1			3		
CO2		1		1					1		1		1		
CO3	2		1				1							2	
CO4	3								3			1	3		
CO5	3		3			2			2				2	2	

Unit – 1: Basic concepts

Basic concepts: objects, classes, abstract classes, data types, ADT, encapsulation and information hiding, inheritance, association, aggregation, composition, polymorphism, dynamic binding, object-oriented principles.

Learning Outcomes:

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At the end of the unit, students will be able to:
1. Recognize basic issues of object-orientation (L1)
2. Identify class relations from problem statements (L4)
3. Construct basic principles of object-orientation (L6)

Unit – 2:

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Learning outcomes:
At the end of the unit, students will be able to:
1. Describe the basic syntax and semantics of UML (L2)
2. Design class diagram and object-diagrams (L6)

Unit – 3: Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams
Basic Behavioral Modeling-I: Interactions, Interaction diagrams.
Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.
Learning outcomes
At the end of the unit, students will be able to:
1. Develop modeling of the user's view using use case diagrams (L6)
2. Summarize behavioral modeling of a given problem using sequence diagram, collaboration diagram, and state chart diagram (L2)

Unit – 4: Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Learning outcomes:

At the end of the unit, students will be able to:
1. Interpret domain modeling (L2)
2. Develop sequence diagram for any given use case (L6)

Unit – 5: Patterns and Frameworks, Artifact Diagrams. Case Study: The Unified Library application

Learning outcomes:

At the end of the unit, students will be able to:
1.Describe Design patterns(L1)
2.Create Unified library application(L6)

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Text Book:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018

Reference Books:

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson, 2009

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SubjectCode	TitleoftheSubject	L	T	P	C
19A50510	**Computer Networks Lab**	0	0	3	1.5

Course Objectives:

- Understand the different types of networks
- Discuss the software and hardware components of a network
- Enlighten the working of networking commands supported by operating system
- Impart knowledge of Network simulator 2/3
- Familiarize the use of networking functionality supported by JAVA
- Familiarize with computer networking tools.

Course outcomes:

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

CO1: Design scripts for Wired network simulation (L6)
CO2: Design scripts of static and mobile wireless networks simulation (L6)
CO3: Analyze the data traffic using tools (L4)
CO4: Design JAVA programs for client-server communication (L6)
CO5: Construct a wired and wireless networks using the real hardware (L3)

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3	2		1	3	2	3		3	3	
CO2				1	3	2					3			3	
CO3	3	3	3		3				3				3	3	
CO4	3	3	3		3				3		3	2	3	3	
CO5	3				3	2			3		3	2	3	3	2

List of Experiments

1.

- Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect
  the cables.
- Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of Different ports.

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- Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN AndWireless LAN. Consider both adhoc and infrastructure mode of operation.

2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup

3. Use Sniffers for monitoring network communication (Ethereal)

4. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.

5. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.

6. Use Packet tracer software to build network topology and configure using Link State routing protocol.

7. Using JAVA RMI Write a program to implement Basic Calculator

8. Implement a Chatting application using JAVA TCP and UDP sockets.

9. Hello command is used to know whether the machine at the other end is working or not.

Echo command is used to measure the round trip time to the neighbour. Implement Hello and Echo commands using JAVA.

10. Use Ethereal tool to capture the information about packets.

11. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

12. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

13. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

Reference Books:

1. **Shivendra S.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, "TCP/IP Essentials A Lab-Based Approach", Cambridge University Press, 2004.**
2. **Cisco Networking Academy, "CCNA1 and CCNA2 Companion Guide", Cisco Networking Academy Program, 3rd edition, 2003.**
3. Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.
4. Elloitte Rusty Harold, "Java Network Programming", 3rd edition, O'REILLY, 2011.

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A55502	**English Language Skills Lab**	0	0	3	1.5

Course Description:

English Language Skills Lab aims to enable the engineering students to meet the demands of the modern job market through group activities, individual presentations, mock interviews and group discussions. Students of our region have knowledge of their respective subjects, but the surveys make it clear that they are lagging behind in expressing themselves effectively in a professional setting. So, this course will enable them to hone these skills and excel in their respective fields.

Course Objectives:
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.
- To initiate them into greater use of the computer in resume preparation, report writing, format making etc.
- To train them to use language effectively to face interviews, group discussions, public speaking.

Course Outcomes:
CO1: To recall and memorize tips to communicate effectively
CO2: To understand various listening components that includes listening comprehension of gist and detailed information.
CO3: To apply extensive and intensive reading methods for specific reading and voracious reading of vast material.
CO4: To analyze different descriptive and technical writing material.
CO5: To evaluate and develop, academic research paper with appropriate citations, quotations, and references when needed.
CO6: To develop communicative competency and make the students job ready

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3		1			2
CO2									3	3		1			2
CO3									3	3		2			2
CO4											2				

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										3				
CO5										3				
CO6							3	3						3

UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose

Learning Outcomes:

1. To recall and memorize the basic concepts of reading and listening skills
2. To understand the various components to build up vocabulary
3. To apply English language skills to avoid barriers to effective reading and listening

UNIT-II: TECHNICAL WRITING
1. Email Writing
2. CV/Resume Writing
3. Mini Project Writing

Learning Outcomes:

1. To understand the basic components of writing Emails
2. To apply the knowledge of writing eye catching resumes
3. To analyze different ways of writing a mini project

UNIT-III: ORAL PRESENTATION SKILLS
1. Self-Introduction – Introducing Others – Welcome Speech – Vote of Thanks
2. Oral Presentation-Individual/Impromptu Speeches/ JAM
3. Stage Dynamics– Barriers to Effective Presentation

Learning Outcomes:

1. To understand the basic components of speeches
2. To apply knowledge of different forms of presentation.
3. To analyze stage dynamics for effective presentation

UNIT-IV: TECHNICALPRESENTATION SKILLS

1. Information Transfer
2. PPT Presentation
3. Poster Presentation

Learning Outcomes:

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1. To apply knowledge of different types of pictograms to transfer the information
2. To analyze the techniques of preparing PPTs
3. To evaluate different skills in poster presentation

UNIT-V: PROFESSIONAL SKILLS

1. Group discussions-II
2. Interview skills
3. Answering Strategies

Learning Outcomes:

1. To analyze the different aspects of interviews and group discussions
2. To evaluate the group dynamics to excel in group discussions
3. To design and develop strategies to answer effectively in interviews

MINIMUM REQUIREMENT FOR ELCS LAB:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- 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 & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE:

1. Orell: Language Lab Software
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
7. Cambridge Advanced Learners' English Dictionary with CD.

The software consisting of the prescribed topics elaborated above should be procured and used.

Reference Books:

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1. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
2. TOEFL &GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
3. Train2success.com

1. Objective English for Competitive Exams, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. Technical Communication by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
3. Books on TOEFL/GRE/GMAT/CAT/IELTS by Barron's/DELTA/Cambridge University Press.2012.
4. Handbook for Technical Writing by David A McMurrey& Joanne Buckely CENGAGE Learning 2008.
5. English for Technical Communication for Engineering Students, AyshaVishwamohan, Tata Mc Graw-Hill 2009.
6. Word Power Made Handy, Shalini Verma, S Chand Publications, 2011.
7. Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011.

WEB LINKS

1.https://www.slideshare.net/ruschellecossid/reading-comprehension-56872438

2.https://www.slideshare.net/FiveEEE/listening-comprehension-40031081

3.https://www.slideshare.net/shrutisalunkhe2/english-for-competitive-exams

4.https://www.slideshare.net/nidhipandey16/email-writing-52942112

5.https://www.slideshare.net/aamirmuhammadaamir77/resume-writing-ppt

6.https://www.powershow.com/view/1d8cf2-OWFhN/Mini_Project_Report_Writing_Workshop_powerpoint_ppt_presentation

7.https://www.slideshare.net/8788902/oral-presentations-28994496

8.https://www.slideshare.net/nandapalit/presentation-skills-33500438

9.https://www.slideshare.net/ritikadhameja/group-discussion-46255658

10.https://www.slideshare.net/vikkerkar/interview-skills-presentation

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III B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A50511	**Object Oriented Analysis and Design Lab**	0	0	3	1.5

Course Objectives:
1. Findsolutionstotheproblemsusingobjectoriented approach
2. Understand and define the context and the external interaction with the System
3. Identify the principle objects in the system
4. Develop the design models
5. Familiarize with usage of open source UML Case tools

Course Outcomes:

CO1: Perform OO analysis and design for a given problem specification.
CO2: Identify and map basic software requirements in UML mapping.
CO3: Improve the software quality using design patterns and to explain the rationale behind
Applying specific design patterns.
CO4: Test the compliance of the software with the SRS.
CO5: Construct projects using UML diagrams

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		1	2				1			3		
CO2	3	1							2		1		3		
CO3	3					1				1				2	
CO4		1	2	1					2		1	1	3		
CO5	3		3			2			2				3	2	

Laboratory Experiments

Students are divided into batches of 5 each and each batch has to draw the following diagrams using UML for an ATM system whose description is given below. UML diagrams to be developed are:
1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.

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4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

Description for an ATM System –
The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of Rs. 100, Rs. 500 and Rs. 1000), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)

The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned - except as noted below.

The ATM must be able to provide the following services to the customer:
1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of Rs. 100 or Rs. 500 or Rs. 1000. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between any two accounts linked to the card.
4. A customer must be able to make a balance inquiry of any account linked to the card.
5. A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.)

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If the bank determines that the customer's PIN is invalid, the customer will be required to reenter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back.

If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction. The ATM will provide the customer with a printed receipt for each successful transaction

The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on" position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the "off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.

List of Tasks for which students have to design all UML diagrams:
1. Banking system
2. Online bookshop system
3. University Systems
4. Library management system
5. Hospital management system
6. Result processing system

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60501	**Compiler Design**	3	0	0	3

Course Objectives:

- This course in Computer Science, as it combines skills in software design, programming, data structures and algorithms, theory of computing, documentation, and machine architecture to produce a functional compiler
- Realize that computing science theory can be used as the basis for real
- Applications
- Introduce the major concept areas of language translation and compiler design.
- Learn how a compiler works
- Know about the powerful compiler generation tools and techniques, which are
- useful to the other non-compiler applications
- Know the importance of optimization and learn how to write programs that execute faster

Course Outcomes:

CO1: Able to understand the various phases of compiler and analyze the lexical tool.

CO2: Students should be in a position to understand the different types of parsing Techniques and apply Lex tool & YAAC tools.

CO3: Design syntax directed translations for semantic analysis of various language features and produce intermediate code.

CO4: Students should be able to understand and design different code generation techniques and algorithms.

CO5: Apply various optimization techniques to the intermediate code/machine code.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1													
CO2	1	3		1									2		
CO3	2	2	1	2	1	1							2		
CO4	3	3	1	3	1								2	2	
CO5	1	2	2	3	2	1			1				1		

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UNIT-I

Introduction: Language processors, Phases of a compiler, Pass and phase, Bootstrapping, Compiler construction tools, Applications of compiler technology.
Lexical Analysis: Role and Responsibility, Input buffering, Specification of tokens, Recognition of tokens, LEX tool.
At the end of the unit, Students will be able to:
  1. Study phases of compiler(L1)
  2. Define Bootstrapping(L1)
  3. Explain Role of Lexical analysis(L5)
  4. construct the tokens(L6)

UNIT-II

Syntax Analysis: Role of the parser, Context Free Grammars: Definition, Derivations, Parse trees, Ambiguity, Eliminating ambiguity, Left recursion, Left factoring.
TOP Down Parsing: Recursive descent parsing, Non-recursive predictive parsing, LL(1) grammars, Error recovery in predictive parsing.
Bottom up Parsing: Handle pruning, Shift-Reduce parsing, Conflicts during shifts- reduce parsing, SLR Parsing, Canonical LR (1) parsers, LALR parsers, Using ambiguous grammars, YACC tool.
At the end of the unit, Students will be able to:
  1. Describe the Role ofParser.(L2)
  2. Define ambiguity and how eliminatingambiguity(L1)
  3. Compare top down parsing and top downparsing.(L5)

UNIT-III

Syntax Directed Translation: Syntax Directed Definitions, Evaluation orders for SDD's,Application of SDT, SDT schemes

Intermediate Code Generation: Need for intermediate code, Types of intermediate code, Three address code, Quadruples, Triples, Type expressions, Type equivalence, Type checking, Translation of expressions, control flow statements, switch statement, procedures, back patching.

At the end of the unit, Students will be able to:

  1. List the Applications of SDT(L1)
  2. Categorize Types of intermediate code(L6)
  3. Define type checking and type expressions. (L1)

UNIT-IV

Run Time Storage Organization: Storage Organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Symbol table organization.

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Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, A Simple Code Generator.

At the end of the unit, Students will be able to:
1. How to create symbol table(L6)
2. Define Heap management(L1)

UNIT-V

Code Optimization: Principle source of Optimization, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Introduction to Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

At the end of the unit, Students will be able to:
1. How to Create flow graph(L6)
2. Construct Loops in flow graphs (L3)
3. Describe code optimization(L1)

Text Books:

1. ‒CompilersPrinciples, Techniques and Tools‖, Second Edition,AlfredV.Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman.Pearson

Reference Books:

1. CompilerConstruction‖,K.V.NSunitha, Pearson, 2013
2. EngineeringACompiler‖,SecondEdition,KeithD.Cooper&LindaTorczon,MK(Morgan Kaufmann)(ELSEVIER)
3. CompilersPrinciplesandPractice‖, ParagH. Dave, Himanshu B. Dave,PEARSON
4. CompilerDesign‖,SandeepSaxena,RajkumarSinghRathore,S.Chandpublication
5. Compiler Design‖, SantanuChattopadhyay., PHI
6. Principals of CompilerDesign‖, NadhniPrasad, Elsevier

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SubjectCode	TitleoftheSubject	L	T	P	C
19A60502	**Cryptography and network Security**	3	0	0	3

Course Objectives:
- Introduce the basic categories of threats to computers and networks
- Illustrate various cryptographic algorithms.
- Demonstrate public-key cryptosystem.
- Discuss the fundamental ideas of public-key cryptography.
- Explore Web security threats and protection mechanisms

Course Outcomes

CO1: Identify various type of vulnerabilities of a computer network

CO2: Outline various security algorithms

CO3: Design secure systems

CO4: Investigate the threats and identify the solutions for threats

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2		1	1		3							1	
CO2		1	2				1							3	
CO3				2		1	2							3	
CO4	1	3				2		1					1		

UNIT – I

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

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

Learning Outcomes

At the end of the unit, students will be able to:

1. Identify different types of Attacks (L3)
2. Interpret various cryptography techniques (L5)
3. Distinguish between cryptography and steganography (L4)

UNIT – II

Symmetric key Ciphers: Block Cipher principles&Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution

Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution

Learning Outcomes

At the end of the unit, students will be able to:
1. Differentiate symmetric and asymmetric ciphers (L4)
2. Explain the principles of public key cryptography (L2)
3. Select the appropriate cryptographic algorithm based on the requirements and applications.(L5)

UNIT – III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

Learning Outcomes

At the end of the unit, students will be able to:
1. Summarize authentication techniques (L2)
2. Apply Hash algorithm for generating Digital signatures (L3)

UNIT – IV

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.

Learning Outcomes

At the end of the unit, students will be able to:
1. Extend security for emails (L2)
2. Examine IP security mechanisms (L4)

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UNIT – V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

Learning Outcomes

At the end of the unit, students will be able to:
1. Design secure electronic transactions (L6)
2. Explain different types of Firewalls (L2)

Text Books:

1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson Education, 2011.
2. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Mc Graw Hill, 2010.
3. Bernard Menezes "Network Security and Cryptography", 1stEdition, CENGAGE Learning, 2010.

References:

1. C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, "Cryptography and Network Security",1st Edition, Wiley India Pvt Ltd, 2011.
2. ForouzanMukhopadhyay "Cryptography and Network Security", 2nd Edition , Mc Graw Hill, 2010.
3. Mark Stamp, Wiley India, "Information Security, Principles and Practice", 2nd Edition, Wiley, 2011.

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60503	**Machine Learning**	3	0	0	3

Course Objectives:

- Understand the basic theory underlying machine learning
- Formulate machine learning problems corresponding to different applications.
- Illustrate a range of machine learning algorithms along with their strengths and weaknesses
- Apply machine learning algorithms to solve problems of moderate complexity.
- Understand how Machine Learning imbibes the philosophy of Human learning.

Course Outcomes:
CO1: Identify machine learning techniques suitable for a givenproblem.
CO2: Solve the real world problems using various machine learningtechniques.
CO3: Apply Dimensionality reductiontechniques for data preprocessing.
CO4: Explain what is learning and why it is essential in the design of intelligent machines.
CO5: Implement Advanced learning models for language, vision, speech, decision making etc.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3		2	1		1						3		
CO2		3	1	2	1									2	
CO3	2		2	1	2							1	3	2	
CO4	2		3		1								2	3	
CO5		3	2	1					1	1		1	3	2	

UNIT I
Introduction: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.
Learning Outcomes:
1. Explore how to build computer programs that improve their performance at some task through experience. (L6).
2. Interpret Decision tree learning as practical methods for inductive inference. (L2)

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UNIT II
NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.

Learning Outcomes:
1. Appraise artificial neural networks as one of the most effective learning methods currently known to interpret complex real-world sensor data. (L5).
2. Illustrates the use of the genetic algorithm approach, and examine the nature of its hypothesis space search.(L2)

UNIT III
BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Learning Outcomes:

1. Illustrate the principles of Probability for classification as an important area of Machine Learning Algorithms. (L2)
2. Analyze sample complexity and computational complexity for several learning Problems (L4)

UNIT IV
INSTANCE BASED LEARNING: K- Nearest Neighbor Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

Learning Outcomes:

1. Infer that the Instance based algorithms can be used to overcome memory complexity and overfitting problems. (L2).

UNIT V
ADVANCED LEARNING : Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm –Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Learning Outcomes:
1. Infer that the combined methods outperform both purely inductive and purely analytical learning methods. (L2)
2. Recognize the importance of Reinforcement Learning in the industry.

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Text Books:
1. T.M. Mitchell, "Machine Learning", McGraw-Hill,1997.

Reference Books:

1. EthernAlpaydin, "Introduction to Machine Learning", MIT Press,2004.

2. Stephen Marsland, "Machine Learning -An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series,2014.

3. Andreas C. Müller and Sarah Guido "Introduction to Machine Learning with Python:A Guide for Data Scientists",Oreilly.

e-Resources:

Andrew Ng, "Machine Learning Yearning"https://www.deeplearning.ai/machine-learning- yearning/

Shai Shalev-Shwartz , Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms" , Cambridge University Press
https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60504	**Virtual Reality and Augmented reality (Professional Elective-II)**	3	0	0	3

Course Objectives:

1. Teach the tools and technologies used by professionals working in VR and AR
2. Train with the skills to quickly and confidently create your own applications using the industry's leading tools
3. Guide the student to strategically move into a career in the VR/AR field

Course Outcomes:

CO1. Recognize how to make your competition irrelevant (L2)
CO2. Create your own blue ocean with Augmented Reality (L6)
CO3. Construct your own new business or integrate AR with your current business with step by step process and projects (L6)
CO4. Extend your sales with strategic marketing plan (L3)
CO5. Build more brand value(L6)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3		2				2	2	3		
CO2			3		3		2							3	
CO3			3		3		2							3	2
CO4			2					2			2	2		2	
CO5			3		3		2						2	3	

UNIT-I
Computer generated worlds: what is augmented reality?, what is virtual reality?,
Understanding virtual space: defining visual space and content, defining position and orientation in three dimensions, navigation
The Mechanics of Sight: the visual path way, spatial vision, and Depth Cues.
Component Technologies of Head mounted Displays: Display fundamentals, related terminology and concepts, optical Architectures.

Learning outcomes:
1. Understand and define virtual space. (L2)
2. Understand the mechanics of sight like path way, depth, etc.,(L2)

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UNIT-II
Augmented Displays: Binocular augmenting displays, Monocular augmenting displays.
Fully immersive Displays: PC-Console driven displays, smartphone based displays, CAVES and Walls, Hemispheres and Domes.
The Mechanics of hearing: Defining sound, the auditory pathway, sound cues and localization, the vestibular system.
Audio displays: Conventional audio

Learning outcomes:
1. Design Augmented displays (L6)
2. Understand the mechanics of Sound(L2)

UNIT-III
The Mechanics of Feeling: The Science of feeling, Anatomy and Composition of the skin.
Tactile and force feedback Devices: Haptic illusions, tactile feedback devices, Force feedback devices.
Sensors for tracking Position, and orientation and motion: introduction to sensor technologies, optical trackers, beacon trackers,electromagnetic trackers, inertial sensors, acoustic sensors.
Devices to enable navigation and interaction: 2D vs 3D interaction and navigation, the importance of a manual interface, hand and gesture tracking, whole body tracking, gaming and entertainment interfaces, navigating with your mind.

Learning outcomes:
1. Understand the mechanics of Feeling.(L2)
2. Use sensors for tracking, orientation and motion.(L3)

UNIT-IV
Gaming and Entertainment: Virtual reality and the arts, gaming, immersive video/ cinematic virtual reality.
Architecture and Construction: Artificial spaces, architectural design: Manage group architectures, Construction management, real estate sales applications, architectural acoustics.
Science and engineering: Simulate and innovate, naval architecture and marine engineering, automotive engineering, aerospace engineering, nuclear engineering and manufacturing.
Health and medicine: advancing the field of medicine, training applications, treatment applications.

Learning outcomes:
1. Design and implementation of an immersive user experience (L6)
2. Apply for Science and engineering and health applications.(L3)

UNIT-V
Aerospace and Defence: Flight simulation and training, mission planning and rehearsal, dismounted soldier situational awareness, advanced cockpit avionics, space operations.
Education: Tangible skills education, theory, knowledge acquisition and concept formation.
Information control and big data visualization: What is big data?, big data analytics and human vision.

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Telerobotics and Telepresence: Defining Telerobotics and Telepresence, space applications and robonaut, undersea applications, Terrestrial and airborne applications.

Learning outcomes:
1. Design flight simulation models(L6)
2. Use for Big Data Visualization.(L3)

Text book:
1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.

References
Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented& Virtual Realities", O'REILLY.

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60505	**Distributed Systems**	3	0	0	3

Course Objectives:

To learn the fundamental principles of distributed systems, emphasizing on communication, process, naming, synchronization, consistency and replication, and fault tolerance in distributed systems.

Course Outcomes:
 CO1: Identify a distributed system that fulfils requirements with regards to key distributed systems properties.
CO2: Analyze various synchronous and asynchronous group communications in distributed systems.
CO3: Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing, voting etc.
CO4: Discover fault tolerance and recovery in distributed systems and algorithms for the same.
CO5: Develop the current popular distributed systems such as peer-to-peer (P2P) systems.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2		
CO2		3											3		
CO3	3			1	3	1									3
CO4					1	1					1		3		
CO5					3					1				3	

UNIT I

INTRODUCTION : Definition –Relation to computer system components –Motivation –Relation to parallel systems – Message-passing systems versus shared memory systems –Primitives for distributed communication –Synchronous versus asynchronous executions –Design issues and challenges. A model of distributed computations: A distributed program –A model of distributed executions –Models of communication networks –Global state – Cuts –Past and future cones of an event –Models of process communications. Logical Time: A framework for a system of logical clocks –Scalar time –Vector time – Physical clock synchronization: NTP.

Learning Outcomes:

1. Student able to understand fundamental concept in distributed computing environment(L1)

2. Student able to identify design issues and challenges of distributed systems(L2)

UNIT II

MESSAGE ORDERING & SNAPSHOTS 9 Message ordering and group communication: Message ordering paradigms –Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system –Group communication – Causal order (CO) - Total order. Global state and snapshot recording algorithms: Introduction –System model and definitions –Snapshot algorithms for FIFO channels

Learning Outcomes:

1. Student able to identify the message communication mechanism in distributing environment(L3)
2. Student able to understand global state and snapshot recording algorithms(L4)

UNIT III

DISTRIBUTED MUTEX & DEADLOCK 9 Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart-Agrawala algorithm – Maekawa's algorithm – Suzuki–Kasami's broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp's classification – Algorithms for the single resource model, the AND model and the OR model.

Learning Outcomes:

1. Student able to understand mutual exclusive algorithms in distributed systems(L5)
2. Student able to identify the deadlock detection (L6)
3. Student able to understand how to prevent the deadlock in distributed environment(L7)

UNIT IV

RECOVERY &CONSENSUS Checkpointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Coordinated checkpointing algorithm – Algorithm for asynchronous checkpointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure – free system – Agreement in synchronous systems with failures.

Learning Outcomes:

1. Student able to understand various failures in distributed environment (L4)
2. Student able to identify and recover from failures(L5)

UNIT V

P2P & DISTRIBUTED SHARED MEMORY Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry.

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Distributed shared memory: Abstraction and advantages – Memory consistency models –Shared memory Mutual Exclusion.

Learning Outcomes:

1. Student able to understand how memory is share in P2P & Distributed environment (L2)
2. Student able to understand memory consistency models and shared memory Mutual Exclusion(L6)

Text Books:

1. Kshemkalyani, Ajay D., and Mukesh Singhal. Distributed computing: principles, algorithms, and systems.Cambridge University Press, 2011.

2. George Coulouris, Jean Dollimore and Tim Kindberg, ―Distribute

SubjectCode	TitleoftheSubject	L	T	P	C
19A60506	**Design Patterns**	3	0	0	3

Course Objectives:

1. Understand design patterns and their underlying objects oriented concepts.
2. Learn the day-to-day problems faced by object-oriented designers and how design patterns solve them
3. Provide an interface for creating families of related objects without specifying their concrete classes.
4. To know the consequences of combining patterns on the overall quality of a system.

Course Outcomes:

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

CO1: Develop own way of working with design patterns. (L6).
CO2: Critique well-known design patterns (L5).
CO3: Distinguish different categories of design patterns (L4).
CO4: Apply common design patterns to incremental/iterative development (L3).
CO5: Identify appropriate patterns for solving a given problem (L3).

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		2				2		1			2	
CO2		3		2									1		
CO3															
CO4					1								1		
CO5		2											1		

UNIT-I

Introduction to Design Patterns

Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, Use of Design Patterns.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Develop design patterns in Small Talk MVC (L6).

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2. How to select and use a Design Pattern (L1).
3. Solve problems using design patterns (L3).

UNIT-II

Designing A Document Editor: A Case Study

Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation. Creational Patterns: Abstract Factory,Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

Learning Outcomes:
At the end of the unit, students will be able to:
1. Apply eight different patterns to Lexi's design. (L3).
2. Specify the kinds of objects to create new objects using prototype(L4).

UNIT-III

Structural Patterns-1: Adapter, Bridge, Composite.
Structural Patterns-2: Decorator, Facade, Flyweight, Proxy, Discuss of Structural Patterns.

Learning Outcomes:
At the end of the unit, students will be able to:
1. Understand structural patterns (L2).
2. Explain adapter, bridge and composite structural patterns (L2).
3. Create decorator, facade, flyweight and proxy structural patterns (L6).

UNIT-IV

Behavioral Patterns-1: Chain of Responsibility, Command, Interpreter, Iterator.
Behavioral Patterns-2: Mediator, Memento, Observer.

Learning Outcomes:
At the end of the unit, students will be able to:
1. Define behavioral patterns (L1).
2. Demonstrate object scope behavioral patterns (L2).
3. Justify description for different types of behavioral patterns (L5).

UNIT-V

Behavioral Patterns-2(cont'd): State, Strategy, Template Method, Visitor, and Discussion of Behavioral Patterns.
What to Expect from Design Patterns, a Brief History. The Pattern Community An Invitation, A Parting Thought.

Learning Outcomes:
At the end of the unit, students will be able to:

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1. Identify behavioural patterns (L6).
2. Justify different types of behavioural patterns (L5).
3. Determine community for patterns (L4).

Text Book:

1. Erich Gamma, "Design Patterns", Pearson Education.

Reference Books:

1. Mark Grand, "Pattern's in JAVA", Vol-I, Wiley DreamTech.
2. Mark Grand, "Pattern's in JAVA", Vol-II By, Wiley DreamTech.
3. Mark Grand, "JAVA Enterprise Design Patterns", Vol-III, Wiley DreamTech.
4. Buschmann& others, "Pattern Oriented Software Architecture", John Wiley & Sons.

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60507	**Game Design and Development** (Open Elective – II)	3	0	0	3

Course Objectives:

- Get familiarized with the various components in a game and game engine.
- Explore the leading open source game engine components.
- Elaborate on game physics.
- Introduce to the game animation.
- Expose to network-based gaming issues.

Course Outcomes:
Upon completion of the course, the students should be able to:

CO1: Design games for commercialization
CO2: Predict the trends in game development
CO3: Outline the process carried out in the Game Industry
CO4: Design Game Plan and production cycle
CO5: Dramatize the game playing environment

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		2									3	
CO2					3					1			3		
CO3	2	3												3	
CO4			3						1					3	
CO5					3		2				1				3

Unit – 1: Introduction to Game
What is a Game? The Birth of Games, The Rise of Arcade Games, The Crash and Recovery, The Console Wars, Online Games and Beyond.

The Game Industry: Game Industry Overview, Game Concept Basics, Pitch Documentation, pitching a Game to a Publisher, Managing the developer-Publisher Relationship, Legal Agreements, Licenses, Console Manufacturers Approval.

Roles on the Team: Production, Art, Engineering, Design, Quality Assurance Testing, Team Organization, Corporate.

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Learning Outcomes:

After completing this Unit, students will be able to

1. Demonstrate online games and beyond. [L2]
2. Outline the process carried out in the Game Industry [L2]
3. Inspect the roles on the Team[L4]

Unit – 2: Teams
Project Leadership, Picking Leads, Team Building, Team Buy-in and Motivation.

Effective Communication: Written Communication, Oral Communication, Nonverbal Communication, Establishing Communication Norms, Communication Challenges.

Game Production Overview: Production Cycle, Preproduction, Production, Testing, Postproduction.

Learning Outcomes:

After completing this Unit, students will be able to

1. Build a team and pick a leader. [L6]
2. Develop Effective communication. [L3]
3. Outline the Game Production cycle [L2]

Unit – 3: Game Concept
Introduction, Beginning the Process, Defining the Concept, Game Programming Basics, Prototyping, Risk Analysis, Pitch Idea, Project Kickoff.

Characters, setting, and Story: Story Development, Gameplay, Characters, Setting, Dialogue, Cinematics, Story Documentation.

Game Requirements: Define Game Features, Define Milestones and Deliverables, Evaluate Technology, Define Tools and Pipeline, Documentation, Approval, Game Requirements Outline

Learning Outcomes:

After completing this Unit, students will be able to

1. Design a game. [L6]
2. Demonstrate the game play. [L2]
3. Identify the Game requirements [L3]

Unit – 4 :Game Design
Dependencies, Schedules, Budgets, Staffing, Outsourcing, Middleware, Game Plan Outline.
Production Cycle: Design Production Cycle, Art Production Cycle, Engineering Production Cycle, Working Together.

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Voiceover and Music: Planning for Voiceover, choosing a Sound Studio, Casting Actors, Recording Voiceover, Voiceover Checklist, Planning for Music, Working with a Composer, Licensing Music.

Learning Outcomes:

After completing this Unit, students will be able to

1. Outline the Game plan. [L2]
2. Define the production cycle. [L1]
3. Make use of voiceover and music in game development. [L3]

Unit – 5 :Localization
Creating International Content, Localization-Friendly Code, Level of Localization, Localization Plan, Testing, Localization Checklist.

Testing and Code Releasing: Testing Schedule, Test Plans, Testing Pipeline, Testing Cycle, External Testing, Determining Code Release, Code Release Checklist, Gold Masters, Postmortems.

Marketing and Public Relations: Software Age Ratings, Working with Marketing, Packaging, Demos, Marketing Assets, Game Builds, Working with Public Relations, Asset Deliverable Checklist.

Learning Outcomes:

After completing this Unit, students will be able to

1. Explain the importance of localization. [L2]
2. Summarize Testing and code releasing [L2]
3. Illustrate Marketing and public relations. [L2]

Text Book:

1. Heather Maxwell Chandler, and Rafael Chandler, "Fundamentals of Game Development", Jones& Bartlett Learning, 2011.

References:
1. Flint Dille and John ZuurPlatten, The Ultimate guide to Video Game Writing, Loan Eagle publisher, 2008.
2. Adams, Fundamentals of Game Design, 3rd edition, Pearson Education India, 2015.

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60508	**Mobile Application Development** (Open Elective – II)	3	0	0	3

Course Objectives:

- Facilitate students to understand android SDK
- Help students to gain a basic understanding of Android application development
- Inculcate working knowledge of Android Studio development tool

Course Outcomes:

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

CO1: Identify various concepts of mobile programming that make it unique from programming for other platforms
CO2: Evaluate mobile applications on their design pros and cons.
CO3: Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
CO4: Develop mobile applications for the Android operating system that use basic and advanced phone features.
CO5: Demonstrate the deployment of applications to the Android marketplace for distribution.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3						1							
CO2		2											2		
CO3			2	3	2			2					3	3	
CO4			3		2	2		3							
CO5									3						

UNIT-I: Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Make use of the Android platform (L3)
2. Create and Run Android project using SDK (L6)
3. Define the Anatomy of Android Application. (L1)

UNIT-II: Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions

Learning Outcomes:

At the end of the unit, students will be able to:
1. Explain the terminology used in Android applications (L2)
2. Develop first level Android applications that can accept information from the users (L3)
3. Illustrate the Android Manifest File and its common settings (L2)

UNIT-III: Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Design Android application screen with various elements for improving users experience(L6)
2. Develop Android application with animations (L6)

UNIT-IV: Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Demonstrate Testing and publishing of their developed Android applications in the internet. (L2)
2. Explain how to manage Application resources in a hierarchy (L2)

UNIT V: Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Develop top end applications that work with data storing and sharing facility.(L6)
2. Interpret and Develop applications based on customer perspective(L5)
3. Utilize various Android API's for improving users experience(L3)

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Text Books:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", PearsonEducation, 2nd ed. (2011)

REFERENCE BOOKS:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60509	**Soft Computing** (Open Elective – II)	3	0	0	3

Course Objectives:

- Understand Soft Computing concepts, technologies, and applications
- Introduce and use the concepts of Genetic algorithm and its applications to soft computing using some applications.
- familiarize with concepts of Fuzzy techniques , Hybrid and Soft computing techniques

Course Outcomes:
   CO1:   Apply soft computing techniques and their roles in building intelligent machines
   CO2: Recognize the feasibility of applying a soft computing methodology for a particular problem.
   CO3: Implement basic Genetic algorithms
   CO4: Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
   CO5: Effectively use Hybrid and Soft computing techniques to evaluate approaches of given problem.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3										3	3	
CO2	2	3	3			2							1	2	
CO3	2	2	3	3									2	3	
CO4	1	1	1										1		
CO5	3	2	2		1										

UNIT–I: INTRODUCTIONTO SOFT COMPUTING AND SUPERVISED LEARNING NETWORKS

Introduction to Soft Computing: Neural networks, Application scope of neural networks, Fuzzy logic, Genetic algorithm, Hybrid systems, Softcomputing.

Artificial Neural Networks: Fundamentals, Basic Models, Terminologies, Linear Separability, Hebb network.

Supervised Learning Networks: Perceptron Networks- Theory, Perceptron learning rule, Architecture, Flowchart for training process, Perceptron training algorithm for single and multiple output classes, Perceptron network testing algorithm; Back-Propagation Network - Theory, Architecture, Flow chart for training process, Training algorithm, Learning factors of back-propagation network, Testing algorithm for back-propagation network.

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Learning Outcomes:

At the end of the unit, students will be able to:
- Explain how an agent can formulate an Training algorithms. (L2)
- Solve the problems by systematically using Training Algorithm (L2)
- Derive new representations of Back-propagation Techniques (L5)

UNIT–II: UNSUPERVISED LEARNING NETWORKS

Fixed weight competitive nets – Maxnet, Mexican Hat Net, Hamming network; Kohonenself-organizing feature maps – Theory, Architecture, Flowchart, Training algorithm; Learning vector quantization – Theory, Architecture, Flowchart, Training algorithm, Variants; Counter propagation networks – Theory, Full counter propagation Net, Forward-only counter propagation Net; Adaptive resonance theory network – Fundamental architecture, Fundamental operating principle, Fundamental algorithm.

Learning Outcomes:

At the end of the unit, students will be able to:

- Examine how to organize feature maps. (L5)
- Develop programs using Fundamental Algoritm. (L6)
- Analyze Adaptive resonance theory network. (L4)

UNIT–III: GENETIC ALGORITHMS

Genetic algorithms- Biological background, Traditional optimization and search techniques, Genetic algorithm and search space, Genetic algorithms vs. traditional algorithms, Basic terminologies in genetic algorithm, Simple GA, General genetic algorithm, Operators in genetic algorithm, Stopping condition for genetic algorithm flow, Constraints in genetic algorithm, Problem solving using genetic algorithm, Adaptive genetic algorithms, Hybrid genetic algorithms, Advantages and limitations of genetic algorithm, Applications of genetic algorithm.

Learning Outcomes:

At the end of the unit, students will be able to:

- Develop a program that uses Basic terminologies in genetic algorithm. (L6)
- Explain the techniques that provide robust Hybrid genetic algorithms.(L2)
- Apply of genetic algorithm in realtime environment.

UNIT–IV: FUZZY LOGIC

Introduction to fuzzy logic, Classical sets, Fuzzy sets, Membership function – Features, Fuzzification, Methods of membership value assignments; Fuzzy arithmetic and measures–Fuzzy arithmetic, Extension principle, Fuzzy measures, Measures of fuzziness, Fuzzy integrals; Fuzzy rule base and

approximation reasoning -Truth values and tables in fuzzy logic, Fuzzy propositions, Formation of rules, Compound rules, Aggregation of fuzzy rules, Fuzzy reasoning,Fuzzy inference systems, Overview of fuzzy expert system; Fuzzy decision making, Fuzzy logic control systems.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain the role of fuzzy logic in various applications. (L2)
- List the Formation of rules in fuzzy logic. (L1)
-

UNIT–V: HYBRID SOFT COMPUTING TECHNIQUES AND APPLICATIONS

Hybrid Soft Computing Techniques: Genetic neuro hybrid systems, Genetic fuzzy hybrid and fuzzy genetic hybrid systems.

Applications of Soft Computing: Optimization of traveling salesman problem using genetic algorithm approach, Genetic algorithm-based internet search technique, Soft computing-based hybrid fuzzy controllers, Soft computing-based rocket engine control.

Learning Outcomes:

At the end of the unit, students will be able to:

- Apply Optimization of travelling salesman problem using genetic algorithm approach (L3)
- Design Intelligent Agents (L6)
- Summarize Soft computing-based hybrid fuzzy controllers (L5)

Text Book(S):

1. S. N. Sivanandam and S. N. Deepa, Principles of Soft Computing, Wiley, 3rd Edition, 2019.

Reference Books:

1. S. Rajasekaran and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms:Synthesis and Applications, PHI Learning Private Ltd, 2011.
2. Udit Chakraborty, Samir Roy, Soft Computing: Neuro-Fuzzy and Genetic Algorithms, Pearson, 2013.
3. Saroj Kaushik, Sunita Tewari, Soft Computing: Fundamentals, Techniques and Applications, McGraw Hill, 2018.

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A65401	**Managerial Economics and Financial Analysis (Humanities Elective – I)**	3	0	0	3

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting

- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost

- To know the various types of Market Structures & pricing methods and its strategies

- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.

Course Outcomes:
CO1: Define the concepts related to Managerial Economics, financial accounting and management.

CO2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets

CO3: Apply the concepts of production, cost and revenues for effective business decisions

CO4: Analyze how to invest their capital and maximize returns

CO5: Evaluate the capital budgeting techniques

Mapping of CO's with PO's and PSO's

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1											3		1		
CO 2											2				
CO 3											3				
CO 4								2							
CO 5											3				

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UNIT-I:Managerial Economics

Introduction – Nature, meaning, significance, functions and advantages. Demand‑Concept, Function, Law of Demand – DemandElasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

Learning Outcomes:

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

1. State the Nature of Managerial Economics and its importance

2. Understand the concept of demand andits determinants

3. Analyze the Elasticity and degree of elasticity

4. Evaluate demand forecasting methods

5. Design the process of demand estimation for different types of demand

UNIT-II: Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination– Shortrun and longrun Production Function- Isoquants andIsocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale.Cost&Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) -Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes:

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

1. Define the production function, Input-Output relationship and different cost concepts

2. Apply the least-cost combination of inputs

3. Analyze the behavior of various cost concepts

4. Evaluate BEA for real time business decisions

5. Develop profit appropriation for different levels of business activity

UNIT-III: Business Organizations and Markets

Introduction – Nature, meaning, significance, functions and advantages.Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises.Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly-Monopolistic Competition–Oligopoly- Price-Output Determination - Pricing Methods and Strategies.

Learning Outcomes:

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

1. Explain the structure of markets, features of different markets and forms of business organizations

2. Apply the price output relationship in different markets

3. Analyze the optimum output levels to maximize profit in different markets

4. Evaluate price-output relationship to optimize cost,revenue and profit

UNIT- IV:Capital Budgeting

Introduction – Nature, meaning, significance, functions and advantages. Typesof Working Capital,Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals,Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

Learning Outcomes:

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

1. Explain the concept of capital budgeting and its importance in business

2. Contrast and compare different investment appraisal methods

3. Analyze the process of selection of investment alternatives using different appraisal methods

4. Evaluate methods of capital budgeting for investment decision making and for maximizing returns

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5. Design different investment appraisals and make wise investments

UNIT-V: Financial Accounting and Analysis

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).*Financial Analysis -* Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Learning Outcomes:

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

1. Discuss the concept,convention and significance of accounting

2. Apply the fundamental knowledge of accounting while posting the journal entries

3. Analyze the process and preparation of final accounts and financial ratios

4. Evaluate the financial performance of an enterprise by using financial statements

Text Books:

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.

2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

References:

1. Ahuja Hl Managerial economics Schand,3/e,2013

2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.

3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.

4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage,201

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A65402	**Business Ethics and Corporate Governance (Humanities Elective – I)**	3	0	0	3

Course Objective:
- To make the student understand the principles of business ethics

- To enable them in knowing the ethics in management

- To facilitate the student's role in corporate culture

- To impart knowledge about the fair-trade practices

CO1: Define the Ethics and Types of Ethics.

CO2: Understand business ethics and ethical practices in management

CO3: Understand the role of ethics in management

CO4: Apply the knowledge in cross cultural ethics

CO5: Analyze   law and ethics

Mapping of CO's with PO's and PSO's

- To encourage the student in creating

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1								3					1		3
CO 2								3							3

knowingabout the corporate governance

Course Outcomes:

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CO 3							2							3
CO 4					1									
CO 5										2				

UNIT-I: ETHICS

Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior - Value systems - Business Ethics,Types, Characteristics, Factors, Contradictions and Ethical Practices inManagement-
Corporate Social Responsibility – Issues of Management – Crisis Management.

Learning Outcomes:
After completion of this unit student will
1. Understand the meaning of loyalty and ethical Behavior
2. Explain various types of Ethics
3. Analyze the corporate social responsibility of management

UNIT-II: ETHICS IN MANAGEMENT

Introduction Ethics in production, finance, ,Human Resource Managementand,Marketing,Management -

Technology Ethics and Professional ethics - The Ethical Value System – Universalism, Utilitarianism,

Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and

Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:
After completion of this unit student will
1. Understand the meaning of Marketing Ethics
2. Compare and contrast technical ethics and professional ethics
3. Develop ethical values

UNIT-III: CORPORATE CULTURE

Introduction, Meaning, definition, Nature, Scope, Functions and significance– Cross cultural issues in

Ethics - - Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive –

flexibility and purity of mind. The Ethical Value System – Universalism, Utilitarianism, Distributive

Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics –

Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:
After completion of this unit student will
1. Define UniversalismUtilitarianism, Distributive
2. Understand the corporate culture in business
3. Analyze Ethical Value System Ethical Values in different Cultures

UNIT- IV: LEGAL FRAME WORK

Law and Ethics, Agencies enforcing Ethical Business Behavior, Legal Impact– Environmental Protection,

Fair Trade Practices, legal Compliances, Safeguarding Health and wellbeing of Customers.

Learning Outcomes:
After completion of this unit student will
1. Understand Law and Ethics
2. Analyze Different fair-trade practices
3. Make use of Environmental Protection andFair-Trade Practices

UNIT -V: CORPORATE GOVERNANCE

Introduction, meaning – scope Nature - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate social responsibility. of BODs composition, Cadbury Committee - various committees -   reports - Benefits and Limitations.

Learning Outcomes:
After completion of this unit student will
1. Understand corporate governance code
2. Analyze role ofauditors, board of directors and shareholders in corporate governance
3. Implementing corporatesocialresponsibility in India.

Text books.

1. Murthy CSV: Business Ethics and Corporate Governance, HPH

2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH.

Reference books

1. Dr. K. Nirmala, KarunakaraReaddy : Business Ethics and Corporate Governance, HPH

2. H.R.Machiraju: Corporate Governance

3. K. Venkataramana, Corporate Governance, SHBP.

 4. N.M.Khandelwal : Indian Ethos and Values for Managers

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A65403	**Entrepreneurship and Incubation** (Humanities Elective – I)	3	0	0	3

Course Objective:
- To make the student understand about Entrepreneurship

- To enable the student in knowing various sources of generating new ideas in setting up of new enterprise

- To facilitate the student in knowing various sources of finance in starting up of a business

- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs

- To encourage the student in creating and designing business plans

Course Outcomes:

CO1: Define the Concepts related to the Entrepreneurship and Incubators

CO2: Understand the concept of Entrepreneurship and challenges in the world of competition.

CO3: Apply the Knowledge in generating ideas for New Ventures.

CO4: Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.

CO5: Evaluate the role of central government and state government in promoting Entrepreneurship.

Mapping of CO's with PO's and PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1													2		

CO2			2											
CO3										3				
CO4					1									
CO5									2	2				

UNIT-I: Entrepreneurship
Introduction-Nature, meaning, significance, functions and advantages. concept, characteristics-knowledge and skills requirement - process - Factors supporting entrepreneurship - Differences between Entrepreneur and Entrepreneur - entrepreneurial mindset and personality - Recent trends.

Learning Outcomes

At the end if the Unit, the learners will be able to
1. Understand the concept of Entrepreneur and Entrepreneurship in India
2. Analyze recent trends in Entrepreneurship across the globe
3. Develop a creative mind set and personality in starting a business.

UNIT-II: Women Entrepreneurship
Introduction – Nature, meaning, significance, functions and advantages. Growth of women entrepreneurship in India. - Issues & Challenges - Entrepreneurial motivations.Entrepreneurship Development and Government. Role, of Central and State Government - incentives, subsidies and grants – Export-oriented Units - Fiscal and Tax concessions.

Learning Outcomes

At the end of the Unit, the learners will be able to
1. Understand the role of government in promoting women entrepreneurship
2. Analyze the role of export-oriented units
3. Evaluate   the tax concessions available for Women entrepreneurs
         .

UNIT-III:Product Development
Introduction – Nature, meaning, significance, functions and advantages. Startup Initiatives - Generating business/ Service idea – Sources and methods –Identifying opportunities - Feasibility study - Market feasibility, technical/operational feasibility, Financial feasibility. Developing business plan, Preparing project report, Presenting business plan to investors.

Learning Outcomes

At the end if the Unit, the learners will be able to
1. Analyze the sources of new methods in generating business idea
2. Evaluate market feasibility, financial feasibility and technical feasibility

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3. Design and draw business plans in project preparation and prepare project reports

UNIT-IV: Startups
Introduction – Nature, meaning, significance, functions and advantages. Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence theType/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure -Value proposition

Learning Outcomes

At the end of the Unit, the learners will be able to:
1. Understand the importance of business incubation
2. Apply brilliant ideas in the process of business incubation
3. Analyze the process of business incubation/incubators.
4. Design their own business incubation/incubators as viable-business unit.

UNIT-V: Finance
Introduction – Nature, meaning, significance, functions and advantages. Sources - Long term and Short term - Institutional Finance – Commercial Banks, SFC's and NBFC's in India, Role in small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions supporting entrepreneurship development.

Learning Outcomes

At the end of the Unit, the learners will be able to
1. Understand the various sources of finance in Starting the new venture
2. Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
3. Evaluate the need and importance of MSMEs in the growth of country

Text Books

 1.   D F Kuratko and T V Rao, **Entrepreneurship** - A South-Asian Perspective –
 Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
 2 .Nandan H, Fundamentals of Entrepreneurship, PHI, 2013

References

1.Vasant Desai,Small Scale Industries and Entrepreneurship, Himalaya
Publishing 2012.
2. Rajeev Roy Entrepreneurship, 2nd Edition, Oxford, 2012.
3.B.JanakiramandM.Rizwana‖ Entrepreneurship Development: Text &
Cases, Excel Books, 2011.
4.Stuart Read, Effectual Entrepreneurship, Routledge, 2013.

E-Resources

1. Entrepreneurship-Through-the-Lens-of-enture Capital

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2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship

3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd

4. http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

SubjectCode	TitleoftheSubject	L	T	P	C
19A60510	**Network Security Lab & Compiler Design Lab**	0	0	3	1.5

Course Objective:
- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms.
- To know the concept of data transfer between nodes.
- To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
- To implement front end of the compiler by means of generating Intermediate codes.

Course Outcomes:
CO1: Analyze performance of various communication protocols.
CO2: Compare routing algorithms
CO3: Apply mathematical foundations to solve computational problems in computer networking
CO4: Design Lexical analyzer for given language using C and LEX tools.
CO5: Generate machine code from the intermediate code forms

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3		3		2						1	3	
CO2		2	3								2			3	
CO3	2			3					2				1	3	
CO4	1	1	3										1		
CO5	2	2	3		1										

List of Experiments:

1. Working with Sniffers for monitoring network communication (Ethereal)
2. Understanding of cryptographic algorithms and implementation of the same in C or C++
3. Using openssl for web server - browser communication
4. Using GNU PGP
5. Performance evaluation of various cryptographic algorithms
6. Using IPTABLES on Linux and setting the filtering rules
7. Configuring S/MIME for e-mail communication
8. Understanding the buffer overflow and format string attacks
9. Using NMAP for ports monitoring
10. Implementation of proxy based security protocols in C or C++ with features like confidentiality, integrity and authentication

Following are some of the web links, which help to solve the above assignments

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http://linuxcommand.org/man_pages/openssl1.html
http://www.openssl.org/docs/apps/openssl.html
http://www.queen.clara.net/pgp/art3.html
http://www.ccs.ornl.gov/~hongo/main/resources/contrib/gpg-howto/gpg-howto.html
https://netfiles.uiuc.edu/ehowes/www/gpg/gpg-com-0.htm
http://www.ethereal.com/docs/user-guide/

Compiler Design Lab

List of Experiments:

1. Write a program to search for a given pattern in a set of files. It should support regular expressions. It should work similar to grep and fgrep of Linux environment.

2. Write programs to implement DFA and NFA.(Input : DFA or NFAand a string and Output : Verification of any given string for acceptance.)

3. Design a PDA for any given CNF. Simulate the processing of a string using the PDA and show the parse tree.

4. Design a Lexical analyzer for identifying different types of tokens used in C language. Note: The reserved keywords such as if, else, class, structetc must be reported as invalid identifiers. C allows identifier names to begin with underscore character too.

 5. Program to recognize the identifiers, if and switch statements of C using a lexical analyzer generator tool.

6. Consider the following grammar:
$$S \to ABC$$
$$A \to abA \mid ab$$
$$B \to b \mid BC$$
$$C \to c \mid cC$$
Design any shift reduced parser which accepts a string and tells whether the string is accepted by above grammar or not.

7. YACC program that reads the input expression and convert it to post fix expression.

References:
1. Compiler Design using FLEX and YACC‖, Das, PHI. 2. ―Compiler Design in C‖, Holub, PHI.

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III B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A60511	**Machine Learning Lab**	0	0	2	1

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

The students should be able to:

CO1: Understand the implementation procedures for the machine learning algorithms.
CO2: Design Java/Python programs for various Learning algorithms.
CO3: Apply appropriate data sets to the Machine Learning algorithms.
CO4: Identify and apply Machine Learning algorithms to solve real world problems.

Description (if any):
1. The programs can be implemented in either JAVA or Python
2. For problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3		3	1		1						2	3	
CO2		3	3	2	1								1	2	
CO3	2	1	2	1	3	1				2		1	3	2	
CO4	1	3	3	1	1					1			2	3	

Experiments:

1. Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

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4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

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

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

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

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

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

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

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SubjectCode	TitleoftheSubject	L	T	P	C
		3	0	0	0

Course Objectives:

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report

Course Outcomes:

CO1: Define the basic concepts and its methodologies

CO2: Understand the concept of sampling, research design etc.

CO3: Demonstrate the knowledge of research processes

CO4: Analyze the importance of research articles in their academic discipline

CO5: Select appropriate testing tools used in research

CO6: Design a research paper without any ethical issues

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	1	2									1		1
CO2		1	1	1											
CO3															
CO4															

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CO5														
CO6						2								

UNIT I
Introduction to Research
Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Learning Outcomes:

After completion of this unit student will

1. Understand the concept of research and its process

2. Explain various types of research

3. Know the steps involved in research design

4. Understand the different research approaches

UNIT II:

Sampling Design

Steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Learning Outcomes:

After completion of this unit student will

1. Understand the concept of sampling and sampling design

2. Explain various techniques in measurement and scaling

3. Learn various methods of data collection

4. Design survey questionnaires for different kinds of research

5. Analyze the questionnaires

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UNIT III
Correlation and Regression Analysis
Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Learning Outcomes:

After completion of this unit student will

1. Know the association of two variables

2. Understand the importance of correlation and regression

3. Compare and contrast correlation and regression

4. Learn various types of correlation

5. Apply the knowledge of C&R Analysis to get the results

UNIT IV
Statistical Inference
Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Learning Outcomes:

After completion of this unit student will

1. Know the statistical inference

2. Understand the hypothesis testing procedure

3. Compare and contrast Parametric and Non-parametric Tests

4. Understand the use of chi-square test in investigating the distribution of categorical variables

5. Analyze the significance of variance and covariance

UNIT V
Report Writing and Professional Ethics
Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Learning Outcomes:

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After completion of this unit student will

1. Learn about report writing

2. Understand how to write research paper

3. Explain various techniques of interpretation

4. Understand the importance of professional ethics in research

5. Design a scientific paper to present in the conferences/seminars

Text books:
1. Research Methodology: Methods and Techniques – C.R.Kothari, 2nd Edition, New Age International Publishers.
2. Research Methodology: A Step by Step Guide for Beginners- Ranjit Kumar, Sage Publications

References:
1. Research Methodology and Statistical Tools – P.Narayana Reddy and G.V.R.K.Acharyulu, 1st Edition,ExcelBooks,New Delhi.
2. Business Research Methods–Donald R. Cooper & Pamela S Schindler, 9/e,

3. S C Gupta, Fundamentals of Statistics,7th Edition Himalaya Publications

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70501	**Data Analytics**				

Course Objectives

- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages this is used in day to day analytics cycle
- To discuss the overall process of how data analytics is applied

Course Outcomes:

CO1: Students are able to understand the basic programming and can perform calculations for given input and produce output.
CO2: Students are able to work with different data sets and with binary and image files.
CO3: Students are able to analyze different frames and environments and apply different functions for vector inputs to make the work easier.
CO4: Students are able to design different graphics using different parameters for better visualization.
CO5: Students are able to create a data model by analyzing the relationships between different variables.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3					2		3	3	2	
CO2			3		3				1	2	2	3	2	3	2
CO3	2	3	3	2	3	3			2	2	2	2	3	2	
CO4			3	3	3	2			3		2	3	3	3	
CO5	3		3		3	3				2	3	2	2	3	2

Unit -1

Introduction to R: Introduction to R, Calculating Environment, Basic Programming, Input and Output, Functions, Data Structures, String handling.

Learning Outcomes:

At the end of the unit, students will be able to do:

1. Apply basic concepts and perform the calculation easily.(L3)
2. Analyze different functions and data structures.(L4)

3. Apply different string functions in order to handle them.(L3)

Unit – 2

Data Importing and Exporting: Reading Data from Files, Data Normalization, Relational Databases, Merging, Combining and subletting datasets, working with Binary and Image Files, Installing Packages.

Learning Outcomes:

At the end of the unit, students will be able to do:

1. Apply relational databases. (L3)
2. Build the datasets by merging, combining and subletting the data. (L6)
3. Work with Binary and Image files. (L3)
4. Install different Packages.(L6)

Unit 3

Data Analysis: Data Types, Matrices, Data Frames, Importing and exporting Data, apply, lapply, sapply, mapply, split and tapply functions, ddply.

Learning Outcomes:

At the end of the unit, students will be able to do:

1. Identify different data types. (L3)
2. Develop the matrices and data frames. (L6)
3. Apply different functions for vector inputs. (L3)

Unit -4

Data Visualization: Exploring Data, Scatter Plots, Line Graphs, Bar Graphs, Histograms, Box Plots,Pie charts, points, Using Color in plots, Facets, Summarized Data Distributions.

Learning Outcomes:

At the end of the unit, students will be able to do:

1. Create different graphs like Line graphs, Bar graphs, Scatter plots, Histograms, Box plots. (L6)
2. Design a graph using different colors and points. (L6)
3. Summarize the data distribution.(L2)

Unit -5

Probability and Statistics: Data Description, Probability, Distributions -Discrete and

Continuous Distributions, Sample Distributions, Hypothesis testing, Regression Models – Linear

and Multiple Regression models.privacy, security, ethics, A look back at Data Science, Next-generation data scientists.

Learning Outcomes:

At the end of the unit, students will be able to do:

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1. Define Probability and distributions.(L1)
2. Apply the data model by analyzing the relationships between different variables.(L3)
3. Understand privacy, security and ethics in Data science.(L2)

Text Books:

1. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
2. A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge University Press, 2007
3. Data Manipulation with R, Jaynal Abedin and Kishor Kumar Das, Second Edition, Packt publishing, BIRMINGHAM – MUMBAI.
4. Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons, Inc, 2012

Reference Books:

1. Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010
2. Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun, Cambridge University Press, 2010
3. Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015
4. Introduction to Probability and Statistics Using R, G. jay Kerns, First Edition, 2011
5. The Art of Data Science- A Guide for anyone Who Works with Data – Roger D. Peng and Elizabeth Matsui, Leanpub Publications, 2014

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70502	**Internet of Things**				

Course Objectives:

- Introduce the fundamental concepts of IoT and physical computing
- Expose the student to a variety of embedded boards and IoT Platforms
- Create a basic understanding of the communication protocols in IoT communications.
- Familiarize the student with application program interfaces for IoT.
- Enable students to create simple IoT applications.

Course outcomes:

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

CO1: Choose the sensors and actuators for an IoT application

CO2: Select protocols for a specific IoT application

CO3: Utilize the cloud platform and APIs for IoT applications

CO4: Experiment with embedded boards for creating IoT prototypes

CO5: Design a solution for a given IoT application

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2								3	2	
CO2			3		2			2		1			3		
CO3	3												3		
CO4		2	3	2	2			2				1	3	2	
CO5		2	3	1									3	2	

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UNIT I

Overview of IoT:

The Internet of Things: An Overview, The Flavour of the Internet of Things, The "Internet" of "Things", The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.

Learning Outcomes:

After completing this Unit, students will be able to

1. Explain IoT architecture. [L2]
2. Interpret the design principles that govern connected devices [L2]
3. Summarize the roles of various organizations for IoT [L2]
4. Interpret the significance of Prototyping [L2]

UNIT II

Embedded Devices:

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

Learning Outcomes:

After completing this Unit, students will be able to

1. Explain the basics of microcontrollers [L2]
2. Outline the architecture of Arduino [L2]
3. Develop simple applications using Arduino [L3]
4. Outline the architecture of Raspberry Pi [L2]
5. Develop simple applications using Raspberry Pi [L3]
6. Select a platform for a particular embedded computing application [L3]

UNIT III

Communication in the IoT:

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Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components:

Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

Learning Outcomes:

After completing this Unit, students will be able to

1. Interpret different protocols and compare them [L2]
2. Select which protocol can be used for a specific application [L3]
3. Utilize the Internet communication protocols for IoT applications [L3]
4. Select IoT APIs for an application [L3]
5. Design and develop a solution for a given application using APIs [L6]
6. Test for errors in the application [L4]

UNIT IV

Business Models: A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups.

Manufacturing: What are you producing,Designing kits, Designing printed circuit boards.

Learning Outcomes:

After completing this Unit, students will be able to

1. Plan the business model [L6]
2. Predict the market value [L6]
3. Build the product [L6]

UNIT V

Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.

Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions.

Learning Outcomes:

After completing this Unit, students will be able to

1. Outline the manufacturing techniques [L2]
2. Adapt the Ethics of the IoT[L6]

Text Book:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

Reference Books:

1. ArshdeepBahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Reference sites:

1. https://www.arduino.cc/
2. https://www.raspberrypi.org/

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70503	**Service Oriented Architecture (Professional Elective-III)**				

Course Objectives:

- Understand SOA and evolution of SOA.
- Understand web services and primitive, contemporary SOA.
- Understand various service layers.
- Understand service-oriented analysis and design based on guidelines.

Course Outcomes:

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

CO1: Comprehend the need for SOA and its systematic evolution
CO2: Apply SOA technologies to enterprise domain
CO3: Design and analyze various SOA patterns and techniques
CO4: Compare and evaluate best strategies and practices of SOA

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2		1		1	2		1	1	1	3	3	
CO2	1	2	2	3	3	1			2	1			3	2	
CO3		2	3	2	1	1				1		1	3	2	
CO4	2	1	1	3					2				2	3	

UNIT I: Introducing SOA: Fundamental SOA, Common Characteristics of Contemporary SOA, Common Tangible Benefits of SOA, Common Pitfalls of Adopting SOA.
The Evolution of SOA: An SOA Timeline, The Continuing Evolution of SOA, The Roots of SOA.
Learning Outcomes:

At the end of the Unit, student should be able to:

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1. Understand the fundamentals of SOA (L2).
2. Demonstrate the characteristics of Contemporary SOA (L3).
3. Explore of Evolution of SOA (L4).

UNIT II: Web Services and Primitive SOA: The Web Services Frame Work, Services, Service Descriptions, Messaging.

Web Services and Contemporary SOA (Part I-Activity management and Composition): Message Exchange Patterns, Service Activity, Coordination, Atomic Transactions, Orchestration and Choreography.

Web Services and Contemporary SOA (Part-II-Advanced Messaging, Metadata and Security): Addressing, Reliable Messaging, Correlation, Policies, Metadata exchange, Security.

Learning Outcomes:

At the end of the Unit, student should be able to:

1. Understand the framework of Web services (L2).
2. Manage various activities in web services and contemporary SOA (L1).
3. Analyze various security issues and policies in web services and Contemporary SOA (L4).

UNIT III : Principles of Service-Orientation: Service–Orientation and the Enterprise, Anatomy of SOA, Common Principles of Service–Orientation, Interrelation between Principles of Service- Orientation, Service Orientation and Object Orientation, Native Web Services Support for Principles of Service-Orientation.

Service Layers: Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

Learning Outcomes:

At the end of the Unit, student should be able to:

1. Understand the Anatomy of SOA (L2).
2. Demonstrate the interrelation between principles of service orientation (L3).
3. Explore the service layer configuration scenarios (L4).

UNIT IV:

SOA Delivery Strategies:SOA Delivery Lifecycle Phases, The Top-Down Strategy, The Bottom-up Strategy, The Agile Strategy.

Service Oriented Design (Part I-Introduction): Introduction to Service-Oriented Design, WSDL Related XML Schema Language Basics, WSDL Language Basics, Service Interface Design Tools.

Service Oriented Design (Part II-SOA Composition Guidelines): SOA Composing Steps, Considerations for Choosing Service Layers, Considerations for Positioning Core SOA Standards, Considerations for Choosing SOA Extensions.

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Learning Outcomes:

At the end of the Unit, student should be able to:

1. Analyze SOA delivery Lifecycle phases (L4).
2. Explore the benefits of Business Centric SOA (L4).
3. Understand the service interface design tools (L2).

UNIT V: Service Oriented Design (Part III- Service Design): Service Design Overview, Entity-Centric Business Service Design, Application Service Design, Task-Centric Business Service Design, Service Design Guidelines.
Service Oriented Design (Part IV-Business Process Design): WS-BPEL Language Basics, WS-Coordination Overview, Service Oriented Business Process Design.

Learning Outcomes:

At the end of the Unit, student should be able to:

1. Differentiate the various business service designs (L2).
2. Understand the WS-BPEL Language basics (L2).
3. Explore the service oriented business process design (L4).

Text Books:

1. Service-Oriented Architecture-Concepts, Technology, and Design, Thomas Erl, Pearson Education, 2006.
2. Understanding SOA with Web Services, Eric Newcomer, Greg Lomow, Pearson Education, 2005.

Reference Books:

1. The Definitive guide to SOA, Jeff Davies & others, Apress,Dreamtech.
2. Java SOA Cook book, E.Hewitt,SPD.
3. SOA in Practice, N.M.Josuttis,SPD.
4. Applied SOA, M.Rosen and others, Wiley India pvt.Ltd.
5. Java Web Services Architecture, J.Mc Govern, and others, Morgan Kaufmann Publishers,Elsevier.
6. SOA for Enterprise Applications, Shankar.K, Wiley IndiaEdition.
7. SOA-Based Enterprise Integration, W.Roshen,TMH.
8. SOA Security, K.RamaRao, C.Prasad, dreamtech press.

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IV B.TECH–I SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A70504	**High Performance Computing (Professional Elective – III)**	3	0	0	3

Course Objectives:

- Understand the role of HPC in science and engineering.
- Use HPC platforms and parallel programming models.
- Able to measure, analyze and assess the performance of HPC applications and their supporting hardware.
- Able to administration, scheduling, code portability and data management in an HPC environment, with particular reference to Grid Computing.
- analyze the suitability of different HPC solutions to common problems found in Computational Science

Course Outcomes:

CO1: Understand and Analyses the high performance, Grid and Cluster Computing.
CO2: Analyses the Parallel Computer Architectures, Cluster Computer and its Architecture
CO3: Design an algorithm for Load Sharing and Balancing.
CO4: Create, select, and apply appropriate techniques, resources of Heterogeneous Computing Systems
CO5: Understand the impact of the professional engineering solutions of Cloud Computing.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2		2				1		3	1	
CO2		3		2										3	
CO3	2		3	2			1			2				3	
CO4					3	2		2			2		3	2	

CO 5		2	2			2	3	2					3	2	

Unit I:

Introduction: Introduction to high performance computing, Requirement for high performance computing, need of high performance computing, grid computing, cluster computing

Learning Outcomes:

At the end of the unit, students will be able to:
1. Study about high performance computing (L2)
2. Know about requirements for high performance computing (L1)
3. Understand grid and cluster computing (L2)

Unit –II:

Cluster Computing: Introduction to Cluster Computing, Scalable Parallel Computer Architectures, Cluster Computer and its Architecture, Classifications, Components for Clusters, Cluster Middleware and Single System Image, Resource Management and Scheduling, Programming Environments and Tools, Applications, Representative Cluster Systems, Heterogeneous Clusters, Security, Resource Sharing, Locality, Dependability, Cluster Architectures, Detecting and Masking Faults, Recovering from Faults, Condor, Evolution of Meta computing.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Understand the Cluster, Parallel computer architectures (L2).
2. Identify the application of Cluster Systems (L3).
3. Detecting and Masking Faults, Recovering from Faults (L2).

Unit- III :

Load Sharing and Balancing: Evolution, Job and Resource Management Systems, State-of-the Art in RMS and Job, Rigid Jobs with Process Migration, Communication-Based Scheduling, Batch Scheduling, Fault Tolerance, Scheduling Problem for Network Computing, Algorithm ISH, MCP and ETF, Dynamic Load Balancing, Mapping and Scheduling, Task Granularity and Partitioning, Static and Dynamic Scheduling

Learning Outcomes:

At the end of the unit, students will be able to:
1. Analyses the Load Sharing and Balancing (L4)

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2. Understand the Static and Dynamic Scheduling(L2)

Unit – IV:

Grid Computing: Introduction to Grid Computing, Virtual Organizations, Architecture, Applications, Computational, Data, Desktop and Enterprise Grids, Data-intensive Applications, High-Performance Commodity Computing, High-Performance Schedulers, Grid Middleware: Connectivity, Resource and Collective 10 Layer, Globus Toolkit, GSI, GRAM, LDAP, GridFTP, GIIS, Heterogeneous Computing Systems, Mapping Heuristics: Immediate and Batch Mode, Immediate: MCT, MET, Switching Algorithm, KPB and OLB, Batch: Min-Min, Max-Min, Sufferage, Duplex, GA, SA, GSA, Tabu and A*, Expected Time to Compute Matrix, Makespan, Heterogeneity: Consistent, Inconsistent and Partially-Consistent, QoS Guided Min-Min, Selective Algorithm, Grid Computing Security, Introduction to GridSim, Architecture, Grid Resource Broker, Grid Referral Service

Learning Outcomes:

At the end of the unit, students will be able to:
1. Understand the Architecture, Applications, Computational, Data, Desktop and Enterprise Grids(L2)
2. Analyses the Switching Algorithms(L4)

Unit – V:

Cloud Computing: Introduction to Cloud Computing, Types: Deployment and Service Models, Characteristics, Applications, Service-Level Agreement, Virtualization, High-Throughput Computing: Task Computing and Task-based Application Models, Market-Based Management of Clouds, EnergyEfficient and Green Cloud Computing Architecture, Resource Allocation, Leases, Task Scheduling: RR, CLS and CMMS, Workflow Scheduling, Montage, Epigenomics, SIPHT, LIGO, CyberShake, Task Consolidation, Introduction to CloudSim, Cloudlet, Virtual Machine and its Provisioning, Time and Space-shared Provisioning.

Learning Outcomes:

At the end of the unit, students will be able to:
1. Understand the cloud computing Service Models, Characteristics, Applications(L2)
2. Analyses the Application Models, Market-Based Management of Clouds(L4)

Text Books:
1. High Performance Cluster Computing: Architectures and Systems, Volume 1 by Raj kumarBuyya.

Reference Books:

1. Grid and Cluster Computing byPrabhu , PHI Publication
2. Building Linux Clusters by David H.M, Willey Publication

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70505	**Block Chain Technologies (Professional Elective – III)**				

Course Objectives:

- Understand the philosophy of Block chain and the cutting edge technology behind its functions
- Illustrate how to setup Ethereum tools
- Explain the key vocabulary and concepts used in Block chain for Business

Course outcomes:
CO1: Upon completion of the course, the students should be able to:
Student able to Identify, and analyze complex engineering problems in Block chain
CO2: Student able to apply appropriate techniques, resources, and modern engineering and IT tools to Ethereum development
CO3: Student able toApply the knowledge ofsmart contracts and Distinguish setting up and interacting with a contract using Geth client and Mist Wallet
CO4: Student able to analyze complexSmart contract examples and patterns and Develop Decentralized applications
CO5: Use research-based knowledge and research methods including design of experiments Block chain Network.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3												
CO2	2		3		3	2					1		3		
CO3	3			3		2	2				2			3	
CO4		3	2	3	2					2				2	
CO5	2	3		3		2	1				2				1

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UNIT-I
Blockchain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges.
Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates
Learning Outcomes:

After completing this Unit, students will be able to

1. Outline the benefits and challenges of Block chain(L2)
2. Design the Blockchain applications(L6)

UNIT-II
Setting up Ethereum development tools: Ethereum clients,Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle.
Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.
Learning Outcomes:

After completing this Unit, students will be able to

1. Illustrate the use of Ethereum development tools(L2)
2. Create Ethereum accounts and work with them (L6)

UNIT-III
Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet
Learning Outcomes:

After completing this Unit, students will be able to

1. Make use of of smart contracts(L3)
2. Distinguish setting up and interacting with a contract using Geth client and Mist Wallet.(L4)

UNIT-IV
Smart contracts (continued): Smart contract examples, Smart contract patterns.
Decentralized Applications: implementing Dapps, case studies,
Learning Outcomes:

After completing this Unit, students will be able to

1. Illustrate the Smart contract examples and patterns(L2)
2. Develop Decentralized applications.(L6)

UNIT-V
Mining: Concensus on Blockchain network, mining, Block validation, state storage in Ethereum.
Learning Outcomes:

After completing this Unit, students will be able to

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1. Define Concensus on Blockchain network(L1)
2. Demonstrate State Storage in Ethereum(L2)

Text book:
1. Arshadeepbahga, Vijay madisetti, "Blockchain Applications A hands-on approach", VPT 2017.
2. *Chandramouli Subramanian*, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universty Press, 2021

References:

1. Imran Bashir, "Mastering Block chain" Packt Publishing Ltd, March 2017.
2. Melanie swan, "Block chain blueprint for a new economy", O'REILLY

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IV B.TECH–I SEMESTER (R19)
Mobile Computing

(Open Elective – III)   **L-T-P-C: 3-0-0-3**

SubjectCode	TitleoftheSubject	L	T	P	C
19A70506	Mobile Computing				

Course Objectives:
- Understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popular GSM protocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.
- To understand the ad hoc networks and related concepts.

Course Outcomes:
CO1: Explain the basics of mobile telecommunication system
CO2: Choose the required functionality at each layer for given application
CO3: Identify solution for each functionality at each layer
CO4: Choose simulator tools and design Ad hoc networks
CO5: Develop a mobile application.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					2								3		
CO2		2							2				1		
CO3			3				2		2						
CO4			3		3									3	
CO5			3											2	

UNIT I

Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA-FDMA- CDMA
Learning Outcomes:

At the end of the Unit student able to
1. Depict the evolvement in the techniques using timelines(L2)
2. Analyze the problem definition and select a suitable multiplexing strategy(L4)
3. Discuss on mobile applications – Need, Quality of living(L6)

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UNIT II
Mobile Telecommunication System : Introduction to Cellular Systems – GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS – Architecture – Handover – Security
Learning Outcomes:

At the end of the Unit student able to
1. Understanding the elements, its function and signals of GSM required to establish a call(L2)
2. Identify the different techniques for sending voice and data(L3)
3. Analyze the GPRS- UMTS Architecture (L4)

UNIT III

Mobile Network Layer - Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security.
Learning Outcomes:

At the end of the Unit student able to
1. Comparison of wired and wireless networks in IP layer(L4)
2. Analyze the different routing protocols and discuss the efficiency(L5)
3. Examine the working of DHCP(L4)
4. Prioritize the application wide QoS requirements(L5)

UNIT IV

Mobile Transport And Application Layers - Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML
Learning Outcomes:

At the end of the Unit student able to
1. Understand the characteristic features of WAP and limitation of WAP(L2)
2. Demonstrate the development in WAP(L2)
3. Categorize the navigational elements of WML Task Elements, template Elements(L4)
4. Analyze the WTA architecture and services(L4)

UNIT V

Mobile Platforms And Applications- Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues
Learning Outcomes:
At the end of the Unit student able to:
1. Understand the different Mobile devices operating systems requirements and constraints(L2)
2. Compare the different software developments kits of mobile devices(L4)

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3. Examine the security issues of mobile payments (L4)

Textbook:

1. Jochen Schiller, "Mobile Communications", PHI, Second Edition, 2003.

2. Prasant Kumar Pattnaik, Rajib mall, "Fundamentals of Mobile Computing", PHI Learning Pvt.Ltd, New Delhi-2012

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70507	**No SQL Databases** **(Open Elective – III)**				

Course objectives:

- To understand the need of NoSQL databases.
- To understand the features of different types of NoSQL databases.
- To understand the characteristics of NoSQL databases.
- To understand the usage of NoSQL using Mongodb.
- To understand the usage of NoSQL using HBASE.
- To understand the usage of NoSQL using Apache Cassandra.
- To understand the usage of NoSQL using Riak.

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

CO1: Understand the need of NoSQL.
CO2: Examine the features of document database.

CO3: Adapt the knowledge of column oriented NoSQL databases using HBASE and Apache Cassandra.
CO4: Demonstrate map reduce on databases.
CO5: Adapt the knowledge of key-value databases.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3						1						3		
CO2		3												2	
CO3					2										
CO4		3		2			2						3		
CO5			3	2	3				2	2		2		3	

Unit-I:

Introduction: Overview, and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points

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Learning Outcomes:

At the end of the unit student should be able to learn:

1. Identify the need of NoSQL (L3).

2. Define the types of NoSQL (L1).

3. Demonstrate the cluster attacks (L2).

Unit-II

NoSQL Key/Value databases using MongoDB, Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure

Learning Outcomes:

At the end of the unit student should be able to learn:

1. Define document database (L1).

2. Examine the features of document database (L4).

3. Adapt the knowledge of the document databases (L1).

4. Adapt the knowledge of MongoDB (L1).

Unit-III

Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use

Learning Outcomes:

At the end of the unit student should be able to learn:

1. Demonstrate the different column-oriented NoSQL databases and their usage (L2)

2. Adapt the knowledge of column oriented NoSQL databases using HBASE and Apache Cassandra (L1).

3. Examine the features of Column-Family databases (L4).

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Unit-IV:

Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication

Learning Outcomes:

At the end of the unit student should be able to learn:

1. Define and combine sharding and replication (L1).

2. Demonstrate mapreduce on databases (L2).

3. Justify different distribution models (L5).

Unit-V:

NoSQL Key/Value databases using Riak, Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets

Learning Outcomes:

At the end of the unit student should be able to learn:

1. Define key/value databases (L1).

2. Demonstrate the store and query features of Riak (L2).

3. Adapt the knowledge of key-value databases (L1).

4. Experiment operations on sets (L3).

Textbook

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence: Sadalage, P. & Fowler Pearson Education

Reference:

1. Next Generation Databases: NoSQL, New SQL and Big data by GUY Harrison.

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IV B.TECH–I SEMESTER (R19)
L-T-P-C: 3-0-0-3

SubjectCode	TitleoftheSubject	L	T	P	C
19A70508	**Data Visualization Techniques (Open Elective – III)**				

Course Objectives:

- Focuses on the key factors used in data visualization, including chart primitives, graphical perception and techniques for exploring the visual data spectrum.
- Focuses on basics of data visualization to building a table and styling table using data table's library.
- An understanding of the key techniques and theory used in visualization, including data models, graphical perception and techniques for visual encoding and interaction.
- Understand why visualization is an important part of data analysis.
- Understand the type of data impacts the type of visualization.

Course Outcomes:

CO1: Study the key factors of Data Visualization and List various applications of Data visualization.
CO2: Students will be able to use web technology to create visualizationsCO3: Students will ability to apply computer science principles relating to data representation, retrieval, programming and analysis.
CO4: Apply existing techniques from scalar, volume, multidimensional, textual, graph-based, tree-based, and temporal visualization to actual problems and data
CO5: Create interactive and animated charts and understand how to add a play button to the page

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2			1					1					
CO2		2	2										2	3	
CO3		3	3	2	1										
CO4		2	2		1								3		
CO5			2		3								1	2	1

UNIT-I

INTRODUCTION TO DATA VISUALIZATION: Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar).

EXPLORING THE VISUAL DATA SPECTRUM: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, and Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Info graphics), Making use of HTML5 CANVAS, Integrating SVG.

Learning Outcomes:

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

1. Define data visualization (L1)
2. Identify key factors for data visualization. (L4)
3. Create chart primitives (charts, bar charts, pie charts and area charts) (L6)

UNIT-II
BASICS OF DATA VISUALIZATION – TABLES: Reading Data from Standard text files(.txt, .csv, XML), Displaying JSON content, Outputting Basic Table Data(Building a table, Using Semantic Table, Configuring the columns), Assuring Maximum readability(Styling your table, Increasing readability, Adding dynamic Highlighting), Including computations, Using data tables library, relating data table to a chart.

Learning Outcomes:

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

1. How to read data from text files (.txt,.csv,.XML) (L1)
2. Build a table and add styles to table. (L2)
3. Select data tables library to create a table.(L5)

UNIT-III
VISUALIZING DATA PROGRAMMATICALLY: Creating HTML5 CANVAS Charts

(HTML5 Canvas basics, linear interpolations, A simple column Chart, Adding animations), Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations).

Learning Outcomes:

At the end of this unit, students will be able to:
1. Understand the basics of HTML5 canvas
2. Draw a simple column chart and add animations.
3. Understand the Google charts API basics and prepare Google charts

UNIT-IV

INTRODUCTION TO D3.JS: Getting setup with D3, Making selections, changing selection's attribute (attr()), D3 strives to be declarative, Changing methods, appending new elements, Putting all together, Selecting multiple elements with d3.selectall(), Building Bar charts with selections

 Data-joins; Conceptual overview of data joins, Enter and binding data, using a data join to make a Bar chart, Using anonymous functions to access bound data, finishing the rest of chart, storing data in objects.

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Sizing charts and Axes (Linear scales, using smart margin conventions, adding axes, Ordinal scales and axes)

Loading and filtering External data : Building a graphic that uses all of the population distribution data, Data formats you can use with D3, Creating a server to upload your data, D3'sfunction for loading data, Dealing with Asynchronous requests, Loading and formatting Large Data Sets.

Learning Outcomes:

At the end of this unit, students will be able to:
1. Understand the different concepts in D3.JS
2. Create bar chart using data join
3. Learn how to loading and filtering external data

UNIT-V
MAKING CHARTS INTERACTIVE AND ANIMATED: Data joins, updates and exits, interactive buttons, Updating charts, Adding transactions, using keys

ADDING A PLAY BUTTON: wrapping the update phase in a function, Adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence.

Learning Outcomes:

At the end of this unit, students will be able to:
1. Prepare charts and add different features to the charts. (L3)
2. Learn how to add a play button to the page (L2)
3. Explain how the user interrupt the play in a page. (L5)

Text Books:

1. Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", WROX.
2. Ritchie S. King, "Visual story telling with D3" Pearson.

References:

1. A Julie Steele and Noah Iliinsky, Designing Data Visualizations: Representing Informational Relationships, O'Relly.
2. Andy Kirk, Data Visualization: A Successful Design Process, PAKT.
   Scott Murray, Interactive Data Visualization for Web, O'Relly

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IV B.TECH–I SEMESTER (R19)
L-T-P-C: 3-0-0-3

SubjectCode	TitleoftheSubject	L	T	P	C
19A75401	**Management Science (Humanities Elective – II)**				

Course Objectives:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.

- To make the students understand the role of management in Production

- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training &Development, job evaluation and Merit rating concepts

- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management

- To make the students aware of the contemporary issues in management

Course Outcomes:

CO1: Define the Management, and its Functions

CO2: Understand the concepts & principles of management and designs of organization in a practical world

CO3: Apply the knowledge of Work-study principles & Quality Control techniques in industry

CO4: Analyze the concepts of HRM in Recruitment, Selection and Training & Development.

CO5: Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.

Mapping of CO's with PO's and PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1											3		3		
CO2											2				1
CO3									1		2				
CO4											3				
CO5									1		3				

UNIT-I: INTRODUCTION TO MANAGEMENT

Management- Concept and meaning-Nature-Functions-Management as a Science and Art and both. Schools of Management Thought-Taylor's Scientific Theory-Henry Fayol's principles-Elton Mayo's Human relations-Systems Theory- **Organizational Designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization-Social responsibilities of Management.

Learning Outcomes: At the end if the Unit, the learners will be able to

1. Understand the concept of management and organization
2. Analyze the organization chart & structure for an enterprise.
3. Apply the concepts & principles of management in real life industry.
4. Evaluate and interpret the theories and the modern organization theory.

UNIT-II: OPERATIONS MANAGEMENT

Principles and Types of Plant Layout-Methods of Production (Job, batch and Mass Production), Work Study-Statistical Quality Control- Deming 's contribution to Quality. **Materials Management -** Objectives- Inventory-Functions - Types, Inventory Techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management- **Marketing Management -**Concept- Meaning - Nature-Functions of Marketing - Marketing Mix- Channels of Distribution -Advertisement and Sales Promotion- Marketing Strategies based on Product Life Cycle.

Learning Outcomes: At the end of the Unit, the learners will be able to

1. Understand the core concepts of Management Science and Operations Management
2. Apply the knowledge of Quality Control, Work-study principles in real life industry.
3. Analyze Marketing Mix Strategies for an enterprise
4. Evaluate Materials departments &Determine EOQ
5. Create and design advertising and sales promotion

UNIT-III: HUMAN RESOURCES MANAGEMENT (HRM)

HRM- Evolution of HRM - Definition and Meaning – Nature-Managerial and Operative functions--Job Analysis - Human Resource Planning (HRP)–Process of Recruitment&Selection - Training and Development-Performance Appraisal-Methods of Performance Appraisal – Placement-Employee Induction-Wage and Salary Administration.

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Learning Outcomes: At the end if the Unit, the learners will

1. Understand the concepts of HRM in Recruitment, Selection, Training& Development
2. Apply Managerial and operative Functions
3. Analyze the need of training
4. Evaluate performance appraisal
5. Design the basic structure of salaries and wages

UNIT-IV: STRATEGIC& PROJECT MANAGEMENT

Strategy Definition& Meaning-Vision - Mission- Goals- Corporate PlanningProcess- Environmental Scanning- Steps in Strategy Formulation and Implementation-SWOT Analysis
Project Management- Network Analysis- ProgrammeEvaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost Analysis - Project Crashing (Simple problems).

Learning Outcomes: At the end of the Unit, the learners will be able to
1. Understand Mission, Objectives, Goals & strategies for an enterprise
2. Apply SWOT Analysis to strengthen the project
3. Analyze Strategy formulation and implementation
4. Evaluate PERT and CPM Techniques
5. Creative in completing the projects within given time

UNIT -V: Contemporary Issues In Management

The concept of Management Information System (MIS)- Materials Requirement Planning (MRP)- Customer Relations Management (CRM)- Total Quality Management (TQM)- Six Sigma Concept- Supply Chain Management (SCM)- Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

Learning Outcomes: At the end if the Unit, the learners will be able to
1. Understand modern management techniques
2. Apply Knowledge in Understanding in modern
3. Analyze CRM,MRP,TQM
4. Evaluate Six Sigma concept and SCM

Text Books:
1. A.R Aryasri, Management Science, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.

References:

1. Koontz &Weihrich, Essentials of Management, 6/e, TMH, 2005.
2. Thomas N.Duening& John M.Ivancevich, ManagementPrinciples and Guidelines,Biztantra.
3. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
4. Samuel C.Certo, Modern Management, 9/e, PHI, 2005

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IV B.TECH–I SEMESTER (R19)
L-T-P-C: 3-0-0-3

SubjectCode	TitleoftheSubject	L	T	P	C
19A75402	**Organizational Behavior (Humanities Elective – II)**				

Course Objective:

- To enable student's comprehension of organizational behaviour
- To offer knowledge to students onself-motivation, leadership and management
- To facilitate them to become powerful leaders
- To Impart knowledge about group dynamics
- To make them understand the importance of change and development

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

CO1: Define the Organizational Behavior, its nature and scope.

CO2: Understand the nature and concept of Organizational behaviour

CO3: Apply theories of motivation to analyze the performance problems

CO4: Analyze the different theories of leadership

CO5: Evaluate group dynamics

Mapping of CO's with PO's and PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1											1				1
CO2											3				1
CO3											3				
CO4											2				
CO5											3				

Unit-I: Introduction

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective - Understanding Individual Behavior –Attitude -Perception - Learning – Personality.

Learning Outcomes: -After completion of this unit student will

1. Understand the concept of Organizational Behavior
2. Contrast and compare Individual& Group Behavior and attitude
3. Evaluate personality types

Unit-II: Motivation and Leading

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Theories of Motivation- Maslow'sHierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theoryof expectancy - McClelland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory – Locke's goal setting theory– Alderfer'sERG theory - Leadership–research,theories, traits - LeadersVs Managers.

Learning Outcomes: -After completion of this unit student will
1. Understand the concept of Motivation
2. Analyze the Theories of motivation
3. Explain how employees are motivated according to Maslow's Needs Hierarchy

Unit-III: Organizational Culture

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader- Women and Corporate leadership.

Learning Outcomes: -After completion of this unit student will

1. Understand the concept of Leadership
2. Contrast and compare Trait theory and Managerial Grid
3. Distinguish the difference between Transactional and Transformational Leadership
4. Evaluate the qualities of good leaders

Unit-IV: Group Dynamics

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decisionmaking - Team building - Conflict in the organization– Conflict resolution

Learning Outcomes: -After completion of this unit student will
1. Understand the concept of Group Dynamics
2. Contrast and compare Group behavior and group development
3. Evaluate how to resolve conflicts in the organization

Unit-V: Organizational Change and Development

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Learning Outcomes: -After completion of this unit student will
1. Understand the importance of organizational change and development
2. Apply change management in the organization
3. Analyze work stress management
4. Evaluate Managerial implications of organization

Text Books:

1. Luthans, Fred, OrganisationalBehaviour, McGraw-Hill, 12 Th edition 2011 2. P Subba Rao, OrganisationalBehaviour,Himalya Publishing House 2017

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References

1. McShane,Organizational Behaviour, TMH 2009
2. Nelson, OrganisationalBehaviour, Thomson, 2009.
3. Robbins, P.Stephen, Timothy A. Judge, OrganisationalBehaviour, Pearson 2009.
Aswathappa, OrganisationalBehaviour,Himalaya, 2009

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IV B.TECH–I SEMESTER (R19)
L-T-P-C: 3-0-0-3

SubjectCode	TitleoftheSubject	L	T	P	C
19A75403	**Business Environment (Humanities Elective – II)**				

Course Objective:

- To make the student understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets

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

CO1: Define Business Environment and its Importance.
CO2: Understand various types of business environment.
CO3: Apply the knowledge of Money markets in future investment
CO4: Analyze   India's Trade Policy
CO5: Evaluate fiscal and monitory policy

Mapping of CO's with PO's and PSO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							1				3		3		
CO2											2				
CO3											3				
CO4								2							
CO5											3				

Unit-I: Overview of Business Environment

Introduction – meaning Nature,Scope,significance, functions and advantages. Types- Internal & External, Micro and Macro.Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis& Characteristics of business.

Learning Outcomes: -After completion of this unit student will

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1. Understand the concept of Business environment
2. Classify various types of business environment
3. Evaluate the environmental analysis in business
4. Discuss the Characteristics of Business.

Unit-II: Fiscal Policy

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Public debt - Development activities financed by publicexpenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI - Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

Learning Outcomes: -After completion of this unit student will

1. Understand the concept of public revenue and public Expenditure
2. Identify the functions of RBI and its role
3. Analyze the Monitory policy in India
4. Know the recent trends and the role of Finance Commission in the development of our country
5. Differentiate between Fiscal and Monitory Policy

Unit-III: India's Trade Policy

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes: -After completion of this unit student will

 1. Understand the role ofIndian international trade
2. Understand and explain the need for Export and EXIM Policies
3. Analyze causes for Disequilibrium and correction measure
4. Differentiate between Bilateral and Multilateral Trade Agreements

UNIT-IV: World Trade Organization

Introduction – Nature, meaning, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round –TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes: -After completion of this unit student will

1. Understand the role of WTO in trade
2. Analyze Agreements on trade by WTO
3. Understand the Dispute Settlenent Mechanism
4. Compare and contrast the Dumping and Anti-dumping Measures.

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Unit-V: Money Markets and Capital Markets

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI – Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes: -After completion of this unit student will

1. Understand the components of Indian financial system
2. Know the structure of Money markets and Capital markets
3. Analyze the Stock Markets
4. Apply the knowledge in future investments
5. Understand the role of SEBI in investor protection.

Text Books:

1. Francis Cherunilam (2009), International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH2016

Reference Books:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70509	**Data Analytics Lab**				

Course Objective:

- Install and use R Programming to perform basic programming and use the calculating environment in R.
- Illustrate the use of functions and data structures by object-oriented programming for solving real world problems.
- Define different Graphics parameters for designing different types of graphs for better visualization.
- Understand, analyze and interpret correlation and regression to analyze the underlying relationships between different variables.

Course Outcomes:

CO1: Students are able to understand the basic programming and can perform calculations for given input and produce output

CO2: Students are able to apply the functions and data structures for solving real world problems

CO3: Students are able to analyze different frames and environments for object oriented programming

CO4: Students are able to design different graphics using different parameters for better visualization

CO5: Students are able to create a data model by analyzing the relationships between different variables

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3		3			2	2	2	3	3	3	2	2
CO2	2	3		2	3	3				3	3	3	3	3	2
CO3		3	2		3			2	2		3		2	3	
CO4			3		3						3		2	3	
CO5			3	3	3			2	2		3	3	3	3	

List of Experiments:

1. R Environment Setup & R as calculating environment

2. R Basic programming, Input and output

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3. Programming with functions & Sophisticated Data structures

4. Better Graphics using Graphics parameters

5. Frames and environments & Object –oriented Programming

6. Numerical Accuracy and program efficiency

7. Probability & Statistics: The law of Total probability

8. Simulation: Monte Carlo Integration – Hit and miss method

9. Data Modeling: Linear and Multiple Regression Models

Case Study: Consider the data set of Ozone levels in United States for the year 2014 and do the following analysis

- ✔ Formulate your questions

- ✔ Read in your data

- ✔ Check the packaging

- ✔ Look at the top and the bottom of your data

- ✔ Check your "n" s

- ✔ Validate with at least one external data source

- ✔ Make a plot

- ✔ Follow up

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IV B.TECH–I SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A70510	**Internet of Things Lab**				

Course Objectives:

- Understand the definition and significance of the Internet of Things
- Discuss the architecture, operation, and business benefits of an IoT solution
- Examine the potential business opportunities that IoT can uncover
- Explore the relationship between IoT, cloud computing, and big data
- Identify how IoT differs from traditional data collection systems

Course outcomes:

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

CO1: Choose the sensors and actuators for an IoT application

CO2: Select protocols for a specific IoT application

CO3: Utilize the cloud platform and APIs for IoT application

CO4: Experiment with embedded boards for creating IoT prototypes

CO5: Design a solution for a given IoT application

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	2				3								3	3	
CO 2			3		3			2		3			3	3	
CO 3	2	3			3								3	3	
CO 4		3	3	1	3			2	3	3	1	1	3	3	
CO 5		3	3	1	3								3	3	

Mapping of Cos with Pos and PSOs

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List of Experiments:

1. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication)
   Note: The client and server should be connected to same local area network.

5. Create any cloud platform account, explore IoT services and register a thing on the platform.
6. Push sensor data to cloud.
7. Control an actuator through cloud.
8. Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
9. Create a mobile app to control an actuator.
10. Design an IoT based air pollution control system which monitors the air pollution by measuring carbon monoxide, ammonia, etc and gives alarm or sends message when the pollution level is more than permitted range.
11. Design an IoT based system which measures the physical and chemical properties of the water and displays the measured values.
12. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).
13. Design a business model canvas for a digital display

Text Book:

2. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012.
3. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011

Reference Books:

3. ArshdeepBahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
4. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Reference sites:

https://www.arduino.cc/

https://www.raspberrypi.org

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IV B.TECH–II SEMESTER (R19)
Software Project Management
(Professional Elective – IV)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A80501	Software Project Management				

Course Objectives:

- Teach the specific roles within a software organization as related to project and process management.
- Describe the principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management).
- Introduce the basic infrastructure competences (e.g., process modelling and measurement).
- Explain the basic steps of project planning, project management, quality assurance, and process management and their relationships.

Course Outcomes:

CO1: Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
CO2: Compare and differentiate organization structures and project structures
CO3: Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		3		2		3	1	2	2	2	3	2
CO2	2			2	2		3	1	1		2		2	1	1
CO3		1		2	3	2	2	2	2	2	3	1	2	3	3

UNIT I
Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.
Learning Outcomes:

1. Understand basic steps to build a software. (L2).
2. Estimate the cost of software by using cost estimation models (L5).
3. Compute the size of software by using SLOC and function points (L3).

UNIT II

Improving Software Economics: Reducing Software product size, improving software processes,

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improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.
Learning Outcomes:

1. Analyze software estimation and to reduce the size of software (L4).
2. Illustrate the principles for improving the team effectiveness (L2).
3. Estimate costs and schedules, and overall productivity using a smaller team (L5).
4. Choose the practices for conventional software engineering(L1).
5. Understand Principles of modern software management (L2).

UNIT III
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.
Learning Outcomes:
1. Select life cycle model based on requirements, users (L3).
2. Can organizedistinct sets of artifacts (L3).
3. Develop and justify the artifacts for the product(L6).

UNIT IV
Work Flows of the process: Software process workflows, Inter Trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments.
Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation: Automation Building Blocks, the Project Environment
Learning Outcomes:
1. Organize the hierarchy for work breakdown structures (L3).
2. Select general guidelines for iterations in planning process (L3).
3. Discuss default roles in software line of business organization (L6).
4. Identify discrete states for project environment artifacts (L3).

UNIT V
Project Control and Process instrumentation: The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates, Example.
Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions.
Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)
Learning Outcomes:
1. Determine quality of software products using software metrics (L4).
2. Measure change traffic over time (L5).
3. Apply software economics for modern projects (L3).
4. Analyze the command center processing (L4).

Text Books:

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1. Software Project Management, Walker Royce, Pearson Education.
2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition,TataMc-Graw Hill**.**

Reference Books:

1. Applied Software Project Management, Andrew Stellman& Jennifer Greene, O"Reilly, 2006.
2. Head First PMP, Jennifer Greene & Andrew Stellman, O"Reilly,2007.
3. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition,Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004**.**
5. The art of Project management, Scott Berkun, O"Reilly, 2005.
6. Software Project Management in Practice, PankajJalote, Pearson Education,2002.

IV B.TECH–II SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A80502	**Cloud Computing (Professional Elective-IV)**				

Course Objectives:

This course is designed to:

1. Define cloud services and models
2. Demonstrate design the architecture for new cloud application.
3. Explain how to re-architect the existing application for the cloud.

Course Outcomes:

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

CO1: Outline the procedure for Cloud deployment
CO2: Distinguish different cloud service models and deployment models
CO3: Compare different cloud services
CO4: Design applications for an organization which use cloud environment.
CO5: Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

Mapping of Cos with Pos and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1															
CO 2							3							2	
CO 3							3							2	
CO 4			3		3										3
CO 5							1				2		2		

Unit-I: Introduction to Cloud Computing, Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud based services and Applications, Cloud Concepts and Technologies, Virtualization, Load Balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined networking, Network function virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing.

Learning Outcomes
At the end of the unit, students will be able to:

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1. Outline the Cloud characteristics and models.(L2)
2. Classify different models, different technologies in cloud.(L2)

Unit-II: Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private Cloud Software, Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster Setup.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Summarize the Services and Platform of cloud.(L2)
2. Demonstrate Hadoop Cluster Setup. (L2)

Unit-III: CloudApplication Design: Design Considerations, Reference Architectures, Cloud Application Design Methodologies, Data Storage Approaches,

Multimedia Cloud: Introduction, Case Study: Live Video Streaming App, Streaming Protocols, Case Study: Video Transcoding APP.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Design and build cloud applications.(L6)
2. Describe the multimedia cloud. (L2)

Unit-IV: Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure, Python for MapReduce, Python Packages of Interest, Python Web Application Framework – Django, Designing a RESTful Web API.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Select different cloud services from different vendors (L2)
2. Utilize Python language to access cloud services (L3)

Unit-V: Cloud Application Development in Python, Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App, Cloud Application Benchmarking and Tuning, Cloud Security, Cloud Computing for Education.

Learning Outcomes:

At the end of the unit, students will be able to:

1. Investigate different Cloud applications. (L4)
2. Design cloud applications using Python. (L6)

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Textbooks:

1. ArshadeepBhaga, Vijay Madisetti, "Cloud Computing AHandson Approach", Universities Press, 2018.

References:

1. Chris Hay, Brian Prince, "Azure in Action" Manning Publications [ISBN: 9781935182481],2010.
2. Henry Li, "Introducing Windows Azure" Apress; 1 edition [ISBN: 978-14302-2469-3],2009.
3. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, "Developing Applications for the Cloud on the Microsoft Windows Azure Platform" Microsoft Press; 1 edition [ISBN: 9780735656062],2010.
4. Eugene Ciurana, "Developing with Google App Engine" Apress; 1 edition [ISBN: 978-1430218319],2009.

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IV B.TECH–II SEMESTER (R19)

SubjectCode	TitleoftheSubject	L	T	P	C
19A80503	**Deep Learning (Professional Elective –IV)**				

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

Course Objectives:
- Demonstrate the major technology trends driving DeepLearning
- Build, train and apply fully connected deep neuralnetworks
- Implement efficient (vectorized) neuralnetworks
- Analyze the key parameters and hyper parameters in a neural network'sarchitecture

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

CO1: Apply linear algebra and probability theory in the deep learning applications

CO2: Elaborate the challenges and motivations to Deep learning

CO3: Differentiate the architectures of deep neuralnetwork

CO4: Build a convolution neuralnetwork

CO5: Build and train RNN andLSTMs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	1	3										1	3	
CO 2	2	2	3			2							1	3	
CO 3	2	2	3	3									1	3	
CO 4	1	1	3										1		
CO 5	2	2	3		1										

Mapping of Cos with Pos and PSOs

UNIT I
Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes'

Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Understand linear algebra in the deep learning context (L2)
2. Utilize probability and information theory in machine/deep learning applications (L3)

UNIT II

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Illustrate machine learning basics leads to deep learning(L2)
2. Contrast super and unsupervised learning(L2)

UNIT III

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: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Evaluate Regularization Problems for Deep learning (L5)
2. Apply optimization for Training Deep Learning models (L3)

UNIT IV

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Appraise Basic Convolution Functions (L5)
2. Develop Efficient Convolution Algorithms (L3)

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UNIT V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Illustrate Recurrent and Recursive Neural Networks (L2)
2. Apply Auto encoders and Deep Generative Models (L3)

Text Books:
1. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning", MIT Press,2016.
2. Josh Patterson and Adam Gibson, "Deep learning: A practitioner's approach", O'Reilly Media, First Edition,2017.

Reference Books:
1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers,2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O'Reilly, Shroff Publishers,2019.

E-Resources:

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf

IV B.TECH–II SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A80504	**Digital Marketing** **(Open Elective – IV**)				

Course Objectives:

- To provide foundation in the key concepts on digital marketing
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Understand the major digital marketing channels - online advertising: Digital display, mobile, search engine, and social media
- Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Learn how to measure digital marketing and content efforts

Course Outcomes:

CO1: Analyze the confluence of marketing, operations, and human resources in real-time delivery

CO2: Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities

CO3: Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks

CO4: Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked

CO5: Interpret the traditional marketing mix within the context of a changing and extended range of digital strategies and tactics.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3										2		3
CO2		3	3			2		2			3	2	2	3	3
CO3		3		2	3	2	1			1			2	3	3
CO4		3	3				1	2	1		3	2	2		3
CO5		3	3	3		2					3		2		3

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Unit-I

An Introduction To Digital Marketing - People Power, Market Research Versus Market Reality, What Are The 3i Principles?
Search Engine Optimization: An Introduction, Positioning, Search Behavior, Stage 1: Goals, Stage 2: On-Page Optimization, Stage 3: Off-Page Optimization, Stage 4: Analyze
Learning Outcomes:
At the end of the unit, students will be able to:

1. Understand the objective of New Marketing Environment (L2)
2. Define various components of Online Marketing Environment (L1)
3. Analyse the search engine for the purpose of marketing (L4)

Unit-II

Pay Per Click- An Introduction, Stage 1: Goals, Stage 2: Setup, Stage 3: Manage, Stage 4: Analyze
Digital Display Advertising- An Introduction, Display Advertising: An Industry Overview, Stage 1: Define, Stage 2 : Format, Stage 3: Configure, Stage 4: Analyze
Learning Outcomes:
At the end of the unit, students will be able to:

1. Understand the Digital Advertising principles(L2)
2. Analyze online marketing communities(L4)
3. Construct the Working of web marketing (L3)

Unit-III

Email Marketing: An Introduction, Stage 1: Data—Email Marketing Process, Stage 2: Design and Content, Stage 3: Delivery, Stage 4: Discovery
Social Media Marketing (Part I): Introduction, Stage 1: Goals, Stage 2: Channels
Learning Outcomes:
At the end of the unit, students will be able to:

1. Understand the Online Customer Expectations(L2)
2. Analysing Social media Communities(L4)
3. Develop the Website Designing. (L6)

Unit-IV

Social Media Marketing (Part II): An Introduction, Stage 3:Implementation, Stage 4: Analyze, Laws and Guidelines
Mobile Marketing: An Introduction, Stage 1: Opportunity, Stage 2: Optimize, Stage 3: Advertise, Stage 4: Analyze, Building a multichannel marketing strategy, Case Study: Kiip
Learning Outcomes:
At the end of the unit, students will be able to:

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1. Develop Social media Communities(L4)
2. Identify mobile market Advertising strategies(L3)
3. Develop mobile marketing channels(L3)

Unit-V

Analytics: An Introduction, Stage1: Goals, Stage 2: Setup, Stage 3: Monitor, Stage 4: Analyze
Strategy and Planning-An Introduction, Stage 1: Approach, Stage 2: Audience, Stage 3: Activities, Stage 4: Analysis

Learning Outcomes:
At the end of the unit, students will be able to:

1. Identify web analytics market strategies(L3)
2. Analyze the analytics principles(L4)
3. Analyze various Marketing planning activities(L4)

Text Books:

1. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns by Ian Dodson, Wiley Publisher.

B.Tech (R19 Regulation)
IV B.TECH–II SEMESTER (R19)

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A80505	**Natural Language Processing (Open Elective – IV)**				

Course Objectives:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Explore machine learning techniques used in NLP.

Course Outcomes:
Upon completion of the course, the students should be able to:

CO1: Build NLP applications using Python.
CO2: Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy.
CO3: Explain the fundamentals of CFG and parsers and mechanisms in ATN's.
CO4: ApplySemantic Interpretation and Language Modeling
CO5: Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	2				2							2	
CO2	3	3		3			1					2	3	1	
CO3	3		3		3				2				3		
CO4	3									2			3		
CO5		2	3		3				3						

UNIT I:
Introduction to Natural language
The Study of Language, Applications of NLP, Evaluating Language Understanding Systems,
Different Levels of Language Analysis, Representations and Understanding, Organization of
Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.
Learning Outcomes:
At the end of the module, students will be able to:
1. Classify various NLP Applications (L2)
2. Apply the logic by using Python Programming(L3)
3. List the AI Languages (L1)
4. Outline the Linguistic Background (L2)

Unit II:
Grammars and Parsing
Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars,

Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannon game, Entropy and Cross Entropy.

Learning Outcomes:

At the end of the module, students will be able to:

1. Demonstrate the Top- Down and Bottom-Up Parsing techniques (L2)
2. Apply Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3).
3. Develop game playing strategies using Shannon game. (L3)

UNIT III:

Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

Learning Outcomes:

At the end of the module, students will be able to:

1. Classify Grammars for Natural Language (L2)
2. Explain Hold Mechanisms in ATNs. (L2)
3. Explain Human Preferences in Parsing. (L2)

UNIT IV:

Semantic Interpretation

Semantic &Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modeling

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language
Model Adaption, Types of Language Models, Language-Specific Modeling Problems,
Multilingual and Crosslingual Language Modeling.

Learning Outcomes:

At the end of the module, students will be able to:

1. Distinguish Language model Evaluation (L4)
2. List the types of Language Models (L1)

UNIT V:

Machine Translation

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

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Learning Outcomes:
At the end of the module, students will be able to:
1. Apply Machine Translation techniques. (L3)
2. Elaborate Multilingual Information Retrieval and Multilingual Automatic Summarization. (L6)

Text Books:
1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications : From Theory To Practice-Daniel M.Bikel and ImedZitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, AksharBharathi,Vineetchaitanya,Prentice –Hall of India.

References Books:
1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

After completing this Unit, students will be able to

1. Adapt legal issues and ethics in computer security. [L6]
2. Elaborate on the Emerging topics. [L6]

Text Books:
1. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5thedition.
2. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons,1996

Reference Books:
1. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill,2013.
2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology,2011.

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

SubjectCode	TitleoftheSubject	L	T	P	C
19A80506	**Cyber Security** **(Open Elective – IV)**				

Course Objectives:

- Understand essential building blocks andbasic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

Course Outcomes:

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

CO1: Illustrate the broad set of technical, social & political aspects of Cyber Securityand security management methods to maintain securityprotection

CO2: Assess the vulnerabilities and threats posed by criminals, terrorist and nation statesto nationalinfrastructure

CO3: Identify the nature of secure software development and operatingsystems

CO4: Demonstrate the role security management in cyber security defence

CO5: Adapt the legal and social issues at play in developingsolutions.

Mapping of Cos with Pos and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2				3	2	3	2	2		3	2	3	2
CO2		2	2		3	3		2	3			3		2	3
CO3		3		2	3			3	2	2	3		3	2	
CO4			3		3			3			3	2		3	3
CO5					2	3	3	3	2			3		2	3

UNIT I
Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography. Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware,Countermeasures.
Learning Outcomes:

After completing this Unit, students will be able to

1. Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
2. Interpret the design of the malicious code [L2]

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UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

1. Outline the attacks on browser, Web and email. [L2]
2. Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management .Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

1. Identify the network security threats and attacks. [L3]
2. Design the Counter measures to defend the network security attacks. [L6]
3. Analyze the security tools and techniques for Cloud computing [L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed. Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

1. Interpret the need for Privacy and its impacts of Emerging Technologies. [L2]
2. Explain how to handle incidents and deal with Disaster. [L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

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After completing this Unit, students will be able to

1. Adapt legal issues and ethics in computer security. [L6]
2. Elaborate on the Emerging topics. [L6]

Text Books:
1. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5thedition.
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2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology,2011.