

UNIT -5 : Multiple Integrals (Multi variable Calculus)

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
3. Glyn James, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand, 2021

Prof. K. Seelabharani

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**B.Tech I Year II Semester****23ABS03 – CHEMISTRY**

	L	T	P	C
	3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, polymers, modern engineering materials.
- To introduce instrumental methods and to impart the concept of structure and bonding models.

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

CO.1: Compare the materials of construction for battery and electrochemical sensors.

CO.2: Explain the preparation, properties, and applications of thermoplastics & thermosetting plastics, elastomers & conducting polymers.

CO.3: Explain the principles of spectrometry, Chromatography in separation of solid and liquid mixtures.

CO.4: Apply the principle of Band diagrams in the application of conductors and semiconductors.

CO.5: Summarize and compare the concepts and applications of Instrumental methods

UNIT – I: Structure and Bonding Models

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2 , particle in one dimensional box, molecular orbital theory – bonding in homo and heteronuclear diatomic molecules – energy level diagrams of O₂, CO, and NO. π -molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT – II: Modern Engineering Materials

Band theory of solids, Conductors, Semiconductors and Insulators, Semiconductor devices (p-n junction diode as rectifier and transistors)

Superconductors: Introduction, Basic concept and Applications.

Super capacitors: Introduction, Basic concept, Classification and Applications.

Nanomaterials: Introduction, classification, properties and applications of Fullerenes, carbon nanotubes and Graphenes.

UNIT – III: Electrochemistry

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems. Potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Na-Air Battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells, Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT – IV: Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation, Poly dispersity Index (PDI).

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6 and carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

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

Biodegradable polymers - Polyglycolic Acid (PGA), Polylactic Acid (PLA).

UNIT – V:

Electromagnetic spectrum, Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy: electronic transition, Instrumentation.

IR spectroscopy: fundamental modes, selection rules and applications.

Raman Spectroscopy : Principle , Instrumentation and selection rules .

Chromatography: Basic Principle, Classification, HPLC: Principle, Instrumentation and applications.

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.
3. K. Sesha Maheswaramma, Mridula Chugh, "Engineering Chemistry", Pearson Publications Pvt., Ltd., 2019 (ISBN 978-93-895-8839-2).

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Text Book of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech I Year I Semester				
23AHS01 - COMMUNICATIVE ENGLISH				
(Common to all Branches)				
	L	T	P	C
	2	0	0	2
Course Objectives: The objectives of the course are to make the students learn about				
- The main objective of introducing this course, <i>Communicative English</i>, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. - It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. - This course helps the students to make them effective in speaking and writing skills and to make them industry ready.				
Course Outcomes: At the end of the course, the students will be able to				
- CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.. (L1) - CO2: Apply grammatical structures to formulate sentences and correct word forms. (L2) - CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. (L3) - CO4: Evaluate reading / listening texts and to write summaries based on globalcomprehension of these texts. (L4) - CO5: Create a coherent paragraph, essay, and resume. (L5)				
UNIT – 1				09 Hrs
Lesson: HUMAN VALUES: Gift of Magi (Short Story)				
Listening:	Identifying the topic, the context and specific pieces of information by listeningto 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 ofinformation.			
Writing:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.			
Grammar:	Parts of Speech, Basic Sentence Structures-forming questions			
Vocabulary:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.			
UNIT – II				09 Hrs
Lesson: NATURE: The Brook by Alfred Tennyson (Poem)				
Listening:	Answering a series of questions about main ideas and supporting ideas afterlistening to audio texts.			

Speaking:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary:	Homonyms, Homophones, Homographs.
UNIT – III	
Lesson: BIOGRAPHY: Elon Musk	
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, Note-making, paraphrasing.
Grammar:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary:	Compound words, Collocations.
UNIT – IV	
Lesson: INSPIRATION: The Toys of Peace by Saki	
Listening:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking:	Role plays for practice of conversational English in academic 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:	Letter Writing: Official Letters, Resumes.
Grammar:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary:	Words often confused, Jargons.
UNIT – V	
Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)	
Listening:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking:	Formal oral presentations on topics from academic contexts
Reading:	Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).

Vocabulary: Technical Jargons.

Text Books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, OrientBlack Swan, 2023 (Units 1,2 & 3).
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

Reference Books:

1. **Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020**
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Online Learning Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. www.eslpod.com/index.html
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech I Year I Semester				
<u>23ACME01 – BASIC CIVIL AND MECHANICAL ENGINEERING</u>				
(EEE & CSE)				
	L	T	P	C
	3	0	0	3
Part A – BASIC CIVIL ENGINEERING				
Course Objectives: The objectives of the course are to make the students learn about				
• Get familiarized with the scope and importance of Civil Engineering sub-divisions. • Introduce the preliminary concepts of surveying. • Acquire preliminary knowledge on Transportation and its importance in nation's economy. • Get familiarized with the importance of quality, conveyance and storage of water. • Introduction to basic civil engineering materials and construction techniques.				
Course Outcomes: At the end of the course, the students will be able to				
CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.				
CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.				
CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.				
CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.				
CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.				
UNIT – I:				8 Hrs
Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.				
UNIT – II:				10Hrs
Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.				
UNIT – III:				8 Hrs
Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.				
Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).				
Text Books:				
1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.				
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.				
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.				
Reference Books:				

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.	
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016	
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.	
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.	
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.	
PART B: BASIC MECHANICAL ENGINEERING	
Course Objectives: The objectives of the course are to make the students learn about	
• Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries. • Explain different engineering materials and different manufacturing processes. • Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.	
Course Outcomes: At the end of the course, the students will be able to	
CO1: Understand the different manufacturing processes.	
CO2: Explain the basics of thermal engineering and its applications.	
CO3: Describe the working of different mechanical power transmission systems and power plants.	
CO4: Describe the basics of robotics and its applications.	
UNIT – I:	8 Hrs
Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society-Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.	
Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.	
UNIT – II:	10Hrs
Manufacturing Processes: Principles of Casting, Forming, Machining, Joining processes Introduction to CNC machines, 3D Printing, and Smart manufacturing.	
Thermal Engineering – IC Engines, Otto cycle, Diesel cycle, 2-Stroke and 4-Stroke engines, SI & CI Engines, Working principle of Boilers, Refrigeration and Air-Conditioning cycles, Components of Electric and Hybrid Vehicles.	
UNIT – III:	8 Hrs
Power Plants – Working principle of Steam, Diesel, Hydro, Nuclear Power Plants.	
Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.	
Introduction to Robotics - Joints & links, configurations, and applications of robotics.	
(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)	
Text Books:	
1. An Introduction to Mechanical Engineering, Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.	
2. Elements of Mechanical Engineering, Dr.Sadhu Singh, S.Chand & Co Ltd.	
3. Basic Civil and Mechanical Engineering, P.Selvaraj, M.Periyaswamy and S.Selvakumar, Scitech Publications,	
Reference Books:	
1. Robotics, Appuu Kuttan KK, I.K. International Publishing House Pvt. Ltd.	
2. 3D Printing & Additive Manufacturing Technology, L. Jyothish Kumar, Pulak M Pandey, Springer publications	
3. Thermal Engineering, Mahesh M Rathore, Tata McGraw Hill Publications (India) Pvt. Ltd.	
4. Basic Civil and the Mechanical Engineering, G. Shanmugam and M.S.Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.	

L	T	P	C
3	0	0	3

INTRODUCTION TO PROGRAMMING

(Common to All branches of Engineering)

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- To encourage collaborative learning and teamwork in coding projects.

Course Outcomes: A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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

UNIT I Introduction to Programming and Problem Solving

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT II Control Structures

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.

UNIT III Arrays and Strings



Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT IV Pointers & User Defined Data types

Pointers, dereferencing and address operators, pointer and address arithmetic, **Dynamic memory allocation**, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT V Functions & File Handling

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, **Command line arguments**,

Basics of File Handling: why files, file opening and closing a data files, reading and writing a data file, processing data files.

Note: The syllabus is designed with C Language as the fundamental language of implementation.

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A ProblemSolving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**B.Tech I Year II Semester****23ABS04 – CHEMISTRY LAB**

	L	T	P	C
	0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

Verify the fundamental concepts with experiments

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

CO1: Determine the cell constant and conductance of solutions

CO2: Prepare advanced polymer Bakelite materials.

CO3: Verification of Lambert-Beer's law.

CO4: Analyze the IR spectra of some organic compounds.

CO5: Calculate strength of acid in Pb-Acid battery

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method.
2. Conductometric titration of strong acid vs. strong base.
3. Conductometric titration of weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emf.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Estimation of Ferrous Iron by Dichrometry.
8. Verification of Lambert-Beer's law.
9. Simultaneous estimation of Mn and Cr ions by spectrophotometry in water samples.
10. Identification of functional groups in organic compounds by IR Spectroscopy.
11. Preparation of nanomaterials by precipitation method.
12. Preparation of a polymer (Bakelite).

Reference Books:

1. "Vogel's Quantitative Chemical Analysis 6th Edition, Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**B.Tech I Year I Semester****23AHS02 - COMMUNICATIVE ENGLISH LAB****(Common to all Branches)**

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

- The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning.
- The students will get trained in basic communication skills and also make them ready to face job interviews.

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

- CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. (L1)
- CO2: Apply communication skills through various language learning activities. (L2)
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. (L3)
- CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. (L4)
- CO5: Create effective Course Objectives: (L5)

UNIT – 1**09 Hrs****List of Topics:**

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Text Books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3).
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press. 2018.
2. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed), Kindle, 2013.
3. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India, 2016.
4. Hewing's, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

Online Learning Resources:**Suggested Software:**

- Walden Infotech
- Young India Films

Web Resources:**Spoken English:**

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>
8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgIVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ije5Xwp_IA

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech I Year I Semester				
<u>23AME02 – ENGINEERING WORKSHOP</u>				
<u>(CSE & EEE)</u>				
	L	T	P	C
	0	0	3	1.5
Course Objectives: The objectives of the course are to make the students learn about				
To familiarize students with wood working, sheet metal operations, fitting operations and electrical house wiring skills, foundry operations, welding work and plumbing operations.				
Course Outcomes: At the end of the course, the students will be able to				
CO1: Identify workshop tools and their operational capabilities.				
CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.				
CO3: Apply fitting operations in various applications.				
CO4: Apply basic electrical engineering knowledge for House Wiring Practice.				
CO5: Identify plumbing practice tools and apply plumbing operations.				
SYLLABUS				
Demonstration: Safety practices and precautions to be observed in workshop. Wood Working: Familiarity with different types of woods and tools used in wood working and make following joints. - Half – Lap joint - Mortise and Tenon joint - Corner Dovetail joint - Job on Wood working lathe Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets. - Tapered tray - Conical funnel - Brazing - Non metal sheet cutting and joining of glass, fibre glass and ceramic - Riveting joint of two sheets/ Plates. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises. - V-fit - Dovetail fit - Semi-circular fit - Bicycle tire puncture and change of two-wheeler tyre Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. - Parallel and series - Two-way switch - Godown lighting - Tube light - Three phase motor - Soldering of wires Foundry Trade: a) Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns b) Job on 3D printing Machine. Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint. Plumbing: Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.				
Text Books:				
- Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. - Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edition. 2015.				

3. Workshop practice manual by K. Venkat Reddy, 6th Edition, BS Publications, 2022.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

Online Learning Resources:

- <https://www.youtube.com/watch?v=PkjpmPLNKZs>
- <http://www.digimat.in/nptel/courses/video/112107145/L01.html>
- <chrome-extension://kdpelmjpfafjppnhbloffcjpeomlnpah/https://mrcet.com/downloads/hs/EWS-ITWS%20%20LAB%20MANUAL.pdf>
- <https://www.youtube.com/watch?v=m9l1tVXyFp8>

murli
Head
Mechanical Engineering Department
JNTUA College of Engineering
PULIVENDULA - 516 332

L	T	P	C
0	0	3	1.5

COMPUTER PROGRAMMING LAB

(Common to All branches of Engineering)

Course Objectives:

The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

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

UNIT I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

- i) Sum and average of 3 numbers
- ii) Conversion of Fahrenheit to Celsius and vice versa
- iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object

UNIT II

WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

- i) Evaluate the following expressions.
 - a. $A+B*C+(D*E) + F*G$
 - b. $A/B*C-B+A*D/3$
 - c. $A+++B---A$
 - d. $J= (i++) + (++i)$
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

- i) Write a C program to find the max and min of four numbers using if-else.



- ii) Write a C program to generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Write a C program to simulate a calculator using switch case.
- v) Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Compute sine and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers.

UNIT III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1D array.
- iii) The reverse of a 1D integer array
- iv) Find 2's complement of the given binary number.
- v) Eliminate duplicate elements in an array.

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

- i) Addition of two matrices
- ii) Multiplication two matrices



- iii) Sort array elements using bubble sort
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

- i) Write a C program to find the sum of a 1D array using malloc()
- ii) Write a C program to find the total, average of n students using structures
- iii) Enter n students data using calloc() and display failed students list
- iv) Read student name and marks from the command line and display the student details along with the total.
- v) Write a C program to implement realloc()

WEEK 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists

Lab10 : Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

- i) Create and display a singly linked list using self-referential structure.
- ii) Demonstrate the differences between structures and unions using a C program.
- iii) Write a C program to shift/rotate using bitfields.
- iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.
- iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the lcm of two numbers.
- iii) Write a recursive function to find the factorial of a number.
- iv) Write a C Program to implement Ackermann function using recursion.
- v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.
- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

- i) Write a C program to write and read text into a file.
- ii) Write a C program to write and read text into a binary file using fread() and fwrite()
- iii) Copy the contents of one file to another file.
- iv) Write a C program to merge two files into the third file using command-line arguments.
- v) Find no. of lines, words and characters in a file



vi) Write a C program to print last n characters of a given file.

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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23ABS06 - HEALTH AND WELLNESS, YOGA AND SPORTS

(Common to all branches)

L	T	P	C
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Course Objectives:

1. The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life.
2. It mainly enhances the essential traits required for the development of the personality.

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

CO1: Understand the importance of yoga and sports for Physical fitness and sound health. (L1)

CO2: Demonstrate an understanding of health-related fitness components. (L2)

CO3: Compare and contrast various activities that help enhance their health. (L3)

CO4: Assess current personal fitness levels. (L4)

CO5: Develop Positive Personality. (L5)

UNIT – 1:**4 Hrs**

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

- i) Organizing health awareness programmes in community.
- ii) Preparation of health profile.
- iii) **Preparation of chart for balance diet for all age groups.**

UNIT – II**4 Hrs**

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar.

UNIT – III**4 Hrs**

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

1. Gordon Edlin, Eric Golanty, Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022.
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice.
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993.
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014.
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, Inc.2014.

General Guidelines:

- 1) Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
- 2) Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
- 3) Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

I B.Tech - II Sem (R23)

L T P C
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Differential Equations and Vector calculus
 (Common to All Branches of Engineering)

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and vector calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES	
CO1	Solve the linear differential equations related to various engineering fields
CO2	Solve the differential equations reducible to linear, and finds the relevant applications.
CO3	Identify solution methods for partial differential equations that model physical processes
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence
CO5	Estimate the work done against a field, circulation and flux using vector calculus and also to establish the relations between them using vector integral theorems.

UNIT –I: Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits

UNIT –II: Linear differential equations of higher order (Constant Coefficients)

Definitions: homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian. Linear Differential Equations of second Higher Order with constant coefficients with RHS terms of the type e^{ax+b} , $\sin(ax+b)$, $\cos(ax+b)$, polynomials in x, $e^{ax}V(x)$, $xV(x)$ where $V(x)$ is a function of x, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III: Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of PDE of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT-IV: Vector differentiation

Scalar and vector point functions, vector differential operator Del, Del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT –V: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.
3. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson

Ch

Prof. K. Selvarajasee

ENGINEERING PHYSICS
(Common for all branches of Engineering)

L T P C
3 0 0 3

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction. (L3)

CO2: Familiarize with the basics of crystals and their structures. (L1)

CO3: Explain fundamentals of quantum mechanics and apply to one dimensional motion of particles. (L2)

CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials. (L2)

CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids. (L2)

CO6: Identify the type of semiconductor using Hall effect. (L4)

Syllabus

UNIT I: Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II: Quantum Mechanics and Free electron theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT III: Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT IV: Dielectric and Magnetic Materials

Prof. K. Selvaraj

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant - Frequency dependence of polarization - dielectric loss, applications of dielectric materials.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials, applications of magnetic materials.

UNIT V: Semiconductors and Superconductors

Semiconductors: Formation of energy bands - classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers - Electrical conductivity - Fermi level - Extrinsic semiconductors: density of charge carriers - dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents - Einstein's equation - Hall effect and its applications.

Superconductors: Introduction - Properties of superconductors - Meissner effect - Type I and type II superconductors - BCS theory - Josephson effects (AC and DC) - High T_c superconductors - Applications of superconductors.

Learning Resources:

Textbooks:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: <https://www.loc.gov/rr/scitech/selected-internet/physics.html>

Prof. K. Selvaraj

B.Tech I Year I Semester

23ABEE01 – BASIC ELECTRICAL & ELECTRONICS ENGINEERING

L	T	P	C
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Course Objectives: The objectives of the course are to make the students learn about

- To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field.

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

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

CO4: Analyze different electrical circuits, performance of machines and measuring instruments.

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I:

DC & AC Circuits DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems. **AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT – II:

Machines and Measuring Instruments Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines. **Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT – III:

Energy Resources, Electricity Bill & Safety Measures Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation. **Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merit and demerits. **Personal safety measures:** Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Department of Electronics and Communication Engineering

Text books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition

Online Learning Resources:

1. <https://nptel.ac.in/courses/108105053>
2. <https://nptel.ac.in/courses/108108076>

PART B: BASIC ELECTRONICS ENGINEERING

Course objectives:

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

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

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.

CO2: Explain the characteristics of diodes and transistors.

CO3: Familiarize with the number systems, codes, Boolean algebra and logic gates.

CO4: Understand the working mechanism of different combinational, sequential circuits and their role in the digital systems.

UNIT – I:

SEMICONDUCTOR DEVICES: Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT – II:

BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION: Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

Department of Electronics and Communication Engineering

UNIT – III:

DIGITAL ELECTRONICS: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Text Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4 th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

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ENGINEERING GRAPHICS

(Common to All Branches of Engineering)

Course Objectives: The students completing the course are expected to:

- Understand the basic principles and conventions of engineering drawing use engineering instruments and draw engineering curves.
- Use orthographic projections and make the students to draw the projections of lines and planes inclined to both the planes.
- Draw the projections of the solids in different positions with respect to the reference planes.
- Understand the importance of sectioning and concept of development of surfaces and draw different sections and development of surfaces of solids.
- Represent and convert isometric views to orthographic views and vice versa.

Course Outcomes: On completion of the course, the student should be able to:

- Understand the principles of engineering drawing, including engineering curves, orthographic and isometric projections.
- Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
- Understand and apply concepts of sectional views to represent and draw the details of solids in different positions and to draw their sectional views.
- Gain a clear understanding of the principles behind development of surfaces and to draw how to unfold basic geometric shapes into flat patterns.
- Develop the ability to draw isometric views and orthographic views and should be able to convert isometric views to orthographic views and vice versa.

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: Construction of Ellipse, Parabola and Hyperbola by general, Cycloids, Involute, Normal and tangent to Curves.

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

UNIT II

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: Regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III

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

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

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

Handwritten signature: *venkatesh*
Head
 Mechanical Engineering Department,
 JNTUA College of Engineering,
 BIII IVENDULA - 516 390.

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

Textbook:

1. Engineering Drawing, N.D.Bhatt and Panchal, Charotar Publishing House, 2016.
2. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
3. Engineering Drawing + AUTO CAD, K.Venugopal and V.Prabhu Raja, 6th Edition, New Age International Publisher.

Reference Books:

1. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
2. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

✓ *Venugopal* Head
Mechanical Engineering Department,
JNTUA College of Engineering,
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B.Tech I Year II Semester

(23ACS04) DATA STRUCTURES

(Common to CSE, IT & allied branches)

Course Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues, and apply them appropriately to solve data management challenges.

CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1									2	1	
CO2	2	2	2	1									2	1	
CO3	2	2	2	1									2	1	
CO4	2	2	2	1									2	2	
CO5	2	2	1	1									2	1	
CO6	2	1	1	1									2	2	

UNIT I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deque: Introduction to deque (double-ended queue), Operations on deque and their applications.

UNIT V

Graphs: Introduction, Graph Terminology, Directed Graphs, and Representation of Graphs.

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

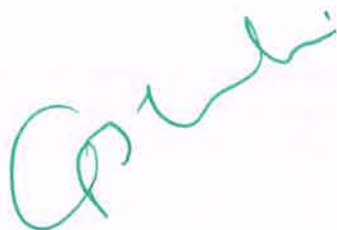
Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick



L	T	P	C
0	0	2	1

IT WORKSHOP

(Common to all branches of Engineering)

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
- To teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:

CO1: Perform Hardware troubleshooting.

CO2: Understand Hardware components and inter dependencies.

CO3: Safeguard computer systems from viruses/worms.

CO4: Document/ Presentation preparation.

CO5: Perform calculations using spreadsheets.

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

PC Hardware & Software Installation

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

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

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



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

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

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

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

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

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

LaTeX and WORD

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

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

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

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



EXCEL

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

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

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

LOOKUP/VLOOKUP

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"



GitHub: Basic Git Workflow, Installation & Setup of Git, Commits & Working with branches, GitHub Basics, Setting up Remote Repository, Fork and Pull Requests, Syncing Local and Remote Repositories.

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

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ENGINEERING PHYSICS LAB
(Common for all branches of Engineering)

L T P C
0 0 2 1

Course Objectives: To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The students will be able to

- Operate optical instruments like travelling microscope and spectrometer. (L3)
- Estimate the wavelengths of different colors using diffraction grating. (L3)
- Plot the intensity of the magnetic field of circular coil carrying current with distance. (L2)
- Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively. (L3)
- Calculate the band gap of a given semiconductor. (L4)
- Identify the type of semiconductor using Hall effect. (L3)

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

References:

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

Web resources

1. www.vlab.co.in
2. <https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>

Prof. K. Selenkumar

B.Tech I Year I Semester

23ABEE02- ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

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

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.

CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.

CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

Activities:

- Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
 - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
- Familiarization of Measuring Instruments like Voltmeters, Ammeters, Multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
 - Provide some exercises so that measuring instruments are learned to be used by the students.
- Components:
 - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding package, symbol, cost etc.
 - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB**List of experiments:**

- Verification of KCL and KVL
- Verification of Superposition theorem
- Measurement of Resistance using Wheat stone bridge
- Magnetization Characteristics of DC shunt Generator
- Measurement of Power and Power factor using Single-phase wattmeter
- Measurement of Earth Resistance using Megger
- Calculation of Electrical Energy for Domestic Premises

Reference Books:

- Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
- Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnaga

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives: The objectives of the course are to make the students learn about

- To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

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

- CO1:** Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

List of Experiments:

- Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
- Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
- Implementation of half wave and full wave rectifiers
- Plot Input & Output characteristics of BJT in CE and CB configurations
- Frequency response of CE amplifier.
- Simulation of RC coupled amplifier with the design supplied
- Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
- Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Reference Books:

- R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
- R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
- R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

L	T	P	C
0	0	3	1.5

B.Tech I Year II Semester

(23ACS05) DATA STRUCTURES LAB (Common to CSE, IT & allied branches)

Course Objectives:

The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues and apply them appropriately to solve data management challenges.

CO5: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

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

List of Experiments:

Exercise 1: Array Manipulation

- Write a program to reverse an array.
- C Programs to implement the Searching Techniques – Linear & Binary Search
- C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

- i) Implement a singly linked list and perform insertion and deletion operations.
- ii) Develop a program to reverse a linked list iteratively and recursively.
- iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

- i) Create a program to detect and remove duplicates from a linked list.
- ii) Implement a linked list to represent polynomials and perform addition.
- iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

- i) Implement a doubly linked list and perform various operations to understand its properties and applications.
- ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

- i) Implement a stack using arrays and linked lists.
- ii) Write a program to evaluate a postfix expression using a stack.
- iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

- i) Implement a queue using arrays and linked lists.
- ii) Develop a program to simulate a simple printer queue system.
- iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

- i) Use a stack to evaluate an infix expression and convert it to postfix.
- ii) Create a program to determine whether a given string is a palindrome or not.
- iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree

- i) Implementing a BST using Linked List.
- ii) Traversing of BST.

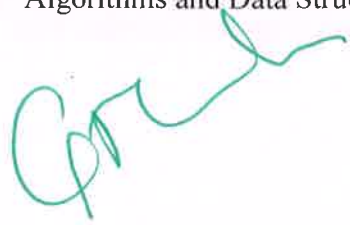
Exercise 9: Hashing

- i) Implement a hash table with collision resolution techniques.
- ii) Write a program to implement a simple cache using hashing.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
- 

2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein

Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.

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23ABS07 - NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

(Common to all branches)

L	T	P	C
0	0	1	0.5

Course Objectives:

- The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

Course Outcomes: After completion of the course the students will be able to**CO1:** Understand the importance of discipline, character and service motto. (L1)**CO2:** Solve some societal issues by applying acquired knowledge, facts, and techniques. (L2)**CO3:** Explore human relationships by analyzing social problems. (L3)**CO4:** Determine to extend their help for the fellow beings and downtrodden people. (L4)**CO5:** Develop leadership skills and civic responsibilities. (L5)**UNIT – 1: Orientation****04
Hrs**

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II: Nature & Care**04
Hrs****Activities:**

- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III: Community Service**04 Hrs****Activities:**

- Conducting One Day Special Camp in a village contacting village-area leaders- Surveyin the village, identification of problems- helping them to solve via media- authorities-experts-etc.

2. Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS.
3. Conducting consumer Awareness. Explaining various legal provisions etc.
4. Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
5. Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
2. Vol;I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6).
3. *Red Book - National Cadet Corps – Standing Instructions Vol I & II*, Directorate General of NCC, Ministry of Defence, New Delhi
4. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
5. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
6. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

- Institutes must assign slots in the Timetable for the activities.
- Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

II Year B.Tech. CSE – I Semester

L	T	P	C
3	0	0	3

DISCRETE MATHEMATICS

Course Outcomes:

After successful completion of this course, the students should be able to:

COs	Statements	Blooms level
CO1	Apply mathematical logic to solve problems.	L2, L3
CO2	Understand the concepts and perform the operations related to sets, relations and functions. Gain the conceptual background needed and identify structures of algebraic nature.	L3, L5
CO3	Apply basic counting techniques to solve combinatorial problems.	L3
CO4	Formulate problems and solve recurrence relations.	L2, L3
CO5	Apply Graph Theory in solving computer science problems	L3, L5

UNIT I: Mathematical Logic

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

UNIT II: Set theory

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT III: Elementary Combinatorics

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

UNITIV: Recurrence Relations

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions and the method of Characteristic roots.

UNIT V: Graphs

Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

Prof. K. Sudeep

Textbooks:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.

Online Learning Resources:

1. <http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf>

Prof. K. Sela Reddy

II Year B.Tech.CSE–I Semester

L	T	P	C
3	0	0	3

(23ACS31) DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Objectives: The main objective of the course is to

- provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
- Describe memory hierarchy concepts
- Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

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

- Differentiate between combinational and sequential circuits based on their characteristics and functionalities. (L2)
- Demonstrate an understanding of computer functional units. (L2)
- Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems. (L3)
- Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability. (L3)
- Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)
- Design Sequential and Combinational Circuits (L6)

UNIT-I:

Data Representation: Binary Numbers, Fixed Point Representation, Floating Point Representation, Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions, K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT-II:

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von-Neumann Architecture

UNIT-III:

Computer Arithmetic : 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

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT–IV:

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT–V:

Input /Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

Textbooks:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill, 2023.
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education, 2018.
3. Computer Organization and Architecture, William Stallings, 11th Edition, Pearson, 2022.

Reference Books:

1. Computer Systems Architecture, M. Morris Mano, 3rd Edition, Pearson, 2017.
2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004.
3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson, 2003.

Online Learning Resources:

<https://nptel.ac.in/courses/106/103/106103068/>



II Year B.Tech.CSE–I Semester

L	T	P	C
3	0	0	3

(23ACS32) ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS

Course Objectives: The main objective of the course is to

- provide knowledge on advance data structures frequently used in Computer Science domain
- Develop skills in algorithm design techniques popularly used
- Understand the use of various data structures in the algorithm design

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

- Illustrate the working of the advanced tree data structures and their applications (L2)
- Understand the Graph data structure, traversals and apply them in various contexts. (L2)
- Use various data structures in the design of algorithms (L3)
- Recommend appropriate data structures based on the problem being solved (L5)
- Analyze algorithms with respect to space and time complexities (L4)
- Design new algorithms (L6)

UNIT-I:

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.

AVL Trees – Creation, Insertion, Deletion operations and Applications
B-Trees – Creation, Insertion, Deletion operations and Applications,
Trees, B+ - Creation, Insertion, Deletion operations and Applications.

UNIT-II:

Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications
Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications
Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

UNIT- III:

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths
Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths – General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

UNIT-IV:

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem
Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

UNIT-V:

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

Textbooks:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis, Sahni, Sartaj; Mehta, Dinesh 2nd Edition Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran 2nd Edition University Press

Reference Books:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 1995
5. Algorithms + Data Structures & Programs, N. Wirth, PHI
6. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta, Galgotia Pub.
7. Data structures in Java, Thomas Standish, Pearson Education Asia

Online Learning Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. <http://peterindia.net/Algorithms.html>
3. Abdul Bari, 1. Introduction to Algorithms (youtube.com)



II Year B.Tech.CSE—I Semester

L	T	P	C
3	0	0	3

(23ACS33) OBJECT-ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives: The learning objectives of this course are to:

- Identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- Understand how to design applications with threads in Java
- Understand how to use Java API for program development

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

- Analyze problems, design solutions using OOP principles, and implement them efficiently in Java. (L4)
- Design and implement classes to model real-world entities, with a focus on attributes, behaviors, and relationships between objects (L4)
- Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch. (L3)
- Apply Competence in handling exceptions and errors to write robust and fault-tolerant code. (L3)
- Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX. (L3)
- Choose appropriate data structure of Java to solve a problem (L6)

UNIT I: Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (--) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?;, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement. Strings, Collections.

UNIT II: Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III: Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array

to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV: Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java (Text Book 2)

UNIT V: String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Text Books:

1. JAVA onestep ahead, Anitha Seth, B.L. Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.
4. The complete java reference seventh edition, Indian Edition

References Books:

1. The complete Reference Java, 11th edition, Herbert Schildt, TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

II Year B.Tech.CSE-I Semester

L	T	P	C
0	0	3	1.5

(23ACS37) ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB

Course Objectives: The objective of the course is to

- acquire practical skills in constructing and managing Data structures
- apply the popular algorithm design methods in problem-solving scenarios

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

- Design and develop programs to solve real world problems with the popular algorithm design methods. (L5)
- Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs. (L2)
- Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications. (L5)
- Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems. (L3)
- Compare the performance of different of algorithm design strategies (L4)
- Design algorithms to new real world problems (L6)

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum costs spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Sales person problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

Sample Programs:

1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for a given graph, when graph is represented by
 - a) Adjacency Matrix
 - b) Adjacency Lists
5. Write a program for finding the bi-connected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.

8. Implement Job sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.
13. Case Studies

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2nd Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill

Online Learning Resources:

1. <http://cse01-iiith.vlabs.ac.in/>
2. <http://peterindia.net/Algorithms.html>



II Year B.Tech.CSE–I Semester

L	T	P	C
0	0	3	1.5

(23ACS38) OBJECT-ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Objectives: The aim of this course is to

- Practice object-oriented programming in the Java programming language
- Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
- Illustrate inheritance, Exception handling mechanism, JDBC connectivity
- Construct Threads, Event Handling, implement packages, JavaFX GUI

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

- Demonstrate a solid understanding of Java syntax, including datatypes, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling. (L2)
- Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively. (L3)
- Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes. (L2)
- Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges. (L3)
- Proficiently construct graphical user interface (GUI) applications using JavaFX (L4)
- Develop new programs for solving typical computer science problems (L6)

Experiments covering the Topics:

- Object Oriented Programming fundamentals-datatypes, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

Sample Experiments:**Exercise-1:**

- Write a JAVA program to display default value of all primitive datatype of JAVA
- Write a java program that display the roots of a quadratic equation $ax^2 + bx = 0$. Calculate the discriminant D and based on value of D, describe the nature of root.

Exercise-2

- Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- Write a JAVA program to sort for an element in a given list of elements using bubble sort
- Write a JAVA program using StringBuffer to delete, remove character.

Exercise-3

- Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
- Write a JAVA program to implement method overloading.
- Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading.

Exercise-4

- Write a JAVA program to implement Single Inheritance
- Write a JAVA program to implement multiple level Inheritance
- Write a JAVA program for abstract class to find areas of different shapes

Exercise-5

- Write a JAVA program to give example for “super” keyword.
- Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
- Write a JAVA program that implements Runtime polymorphism

Exercise-6

- Write a JAVA program that describes exception handling mechanism
- Write a JAVA program illustrating Multiple catch clauses
 - Write a JAVA program for creation of Java Built-in Exceptions
 - Write a JAVA program for creation of User Defined Exception

Exercise-7

- Write a JAVA program that creates threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds, (Repeat the same by implementing Runnable)
- Write a program illustrating **isAlive()** and **join()**
- Write a program illustrating Daemon Threads.
- Write a JAVA program Producer Consumer Problem

Exercise-8

- Write a JAVA program that imports and uses the user-defined packages
- Without writing any code, build a GUI that displays text in a label and image in an ImageView (use JavaFX)
- Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise-9

11. Case studies/Mini Project

Exercise-9

- Write a Java program that connects to a database using JDBC
- Write a Java program to connect to a database using JDBC and insert values into it.
- Write a Java program to connect to a database using JDBC and delete values from it

Textbooks:

- JAVA One Step Ahead, Anitha Seth, B.L. Juneja, Oxford.
- Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
- JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

- The Complete Reference Java, 11th edition, Herbert Schildt, TMH
- Introduction to Java programming, 7th Edition, Y. Daniel Liang, Pearson

Online Resources:

- <https://nptel.ac.in/courses/106/105/106105191/>
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

II Year B.Tech.CSE-I Semester

L	T	P	C
0	1	2	2

**(23ACS49) PYTHON PROGRAMMING
(SKILL ENHANCEMENT COURSE)**

Course Objectives: The main objectives of the course are to

- Introduce core programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

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

- Classify data structures of Python (L4)
- Apply Python programming concepts to solve a variety of computational problems (L3)
- Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)
- Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas (L2)
- Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)
- Propose new solution to computational problems (L6)

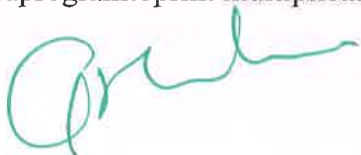
UNIT-I: History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three numbers.
2. Write a program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following operators in Python with suitable examples.
 - i) Arithmetic Operators
 - ii) Relational Operators
 - iii) Assignment Operators
 - iv) Logical Operators
 - v) Bitwise Operators
 - vi) Ternary Operator
 - vii) Membership Operators
 - viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.



UNIT-II: Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. **Lists:** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
 - i. Addition
 - ii. Insertion
 - iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III: Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozen set.

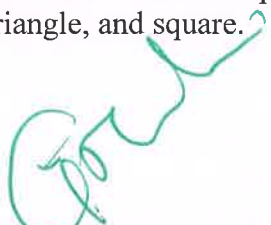
Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

UNIT-IV: Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

<Sample Experiments:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
 19. Python program to print each line of a file in reverse order.
 20. Python program to compute the number of characters, words and lines in a file.
 21. Write a program to create, display, append, insert and reverse the order of the items in the array.
 22. Write a program to add, transpose and multiply two matrices.
 23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.
- 

UNIT-V: Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array() function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
 - a) Apply head() function to the pandas data frame
 - b) Perform various data selection operations on DataFrame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. <https://www.coursera.org/learn/python-for-applied-data-science-ai>
2. <https://www.coursera.org/learn/python?specialization=python#syllabus>



II Year B.Tech.CSE–I Semester

L	T	P	C
2	0	0	0

(23AMC31) ENVIRONMENTAL SCIENCE

Course Objectives:

- 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

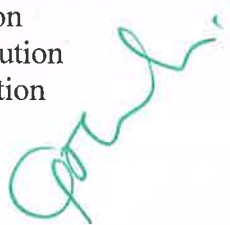
Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem.
- 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-spots 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.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of:

- Air Pollution.
 - Water pollution
 - Soil pollution
 - Marine pollution
 - Noise pollution
- 

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, McGraw Hill Education.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview



II Year B.Tech.CSE–II Semester

L	T	P	C
3	0	0	3

(23ACS41) OPERATING SYSTEMS

Course Objectives: The main objectives of the course is to make student

- Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
- Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- Illustrate different conditions for deadlock and their possible solutions.

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

- Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication. (L1)
- Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection. (L2)
- Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. (L3)
- Illustrate different conditions for deadlock and their possible solutions. (L2)
- Analyze the memory management and its allocation policies. (L4)

UNIT-I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems **System Structures:** Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT-II

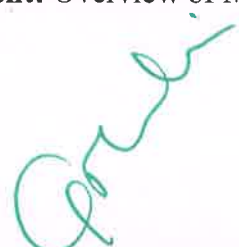
Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication. **Threads and Concurrency:** Multithreading models, Thread libraries, Threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT-III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization. **Deadlocks:** system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT-IV

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping. **Virtual Memory Management:** Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing. **Storage Management:** Overview of Mass Storage Structure, HDD Scheduling.



UNIT-V

File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing. **Protection:** Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

Textbooks:

1. Operating System Concepts, Silberschatz A, Galvin PB, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum AS, 4th Edition, Pearson, 2016

Reference Books:

1. Operating Systems - Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D. M. Dhamdhere, 3rd Edition, McGraw-Hill, 2013

Online Learning Resources:

1. <https://nptel.ac.in/courses/106/106/106106144/>
2. <http://peterindia.net/OperatingSystems.html>



II Year B.Tech.CSE–II Semester

L	T	P	C
3	0	0	3

(23ACS42) DATABASE MANAGEMENT SYSTEMS

Course Objectives: The main objective of the course is to

- Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
- Introduce the concepts of basic SQL as a universal Database language
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

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

- Understand the basic concepts of database management systems (L2)
- Analyze a given database application scenario to use ER model for conceptual design of the database (L4)
- Utilize SQL proficiently to address diverse query challenges (L3).
- Employ normalization methods to enhance database structure (L3)
- Assess and implement transaction processing, concurrency control and database recovery protocols in databases. (L4)

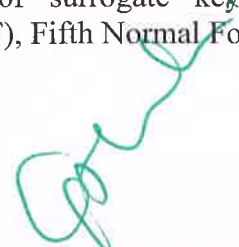
UNIT I: Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

Unit II: Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT III: SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion). Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view (updatable and non-updatable), relational set operations.

UNIT IV: Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF), MVD, Fourth normal form (4NF), Fifth Normal Form (5NF).



UNIT V: Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+ Trees, Hash Based Indexing, order, collision.

Textbooks:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts, 5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

Reference Books:

1. Introduction to Database Systems, 8th edition, C.J. Date, Pearson.
2. Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Web-Resources:

1. <https://nptel.ac.in/courses/106/105/106105175/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview



II Year B.Tech.CSE(AI)–II Semester

L	T	P	C
3	0	0	3

(23ACS43) SOFTWARE ENGINEERING

Course Objectives: The objectives of this course are to introduce

- Software lifecycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.

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

- Perform various lifecycle activities like Analysis, Design, Implementation, Testing and Maintenance (L3)
- Analyse various software engineering models and apply methods for design and development of software projects. (L4)
- Develop system designs using appropriate techniques. (L3)
- Understand various testing techniques for a software project. (L2)
- Apply standards, CASE tools and techniques for engineering software projects (L3)

UNIT I:

Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT II:

Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

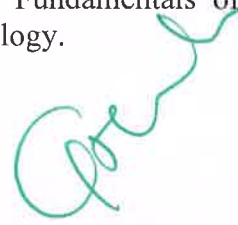
UNIT III:

Software Design: Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design.

Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)

Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.



UNITIV:

Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000. SEI Capability maturity model. Few other important quality standards, and Six Sigma.

UNITV:

Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software lifecycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

Text Books:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.

Reference Books:

1. Software Engineering, Ian Sommerville, 10th Edition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

e-Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105182/>
- 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
- 3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview



II Year B.Tech.CSE–II Semester

L	T	P	C
0	0	3	1.5

(23ACS47) OPERATING SYSTEMS LAB

Course Objectives: The main objectives of the course are to

- Provide insights into system calls, file systems, semaphores,
- Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
- Implement Bankers Algorithm to Avoid the Dead Lock

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

1. Trace different CPU Scheduling algorithms (L2).
2. Implement Bankers Algorithm to Avoid the Dead Lock (L3).
3. Evaluate Page replacement algorithms (L5).
4. Illustrate the file organization techniques (L4).
5. Illustrate Interprocess Communication and concurrent execution of threads (L4)

Experiments covering the Topics:

- UNIX fundamentals, commands & system calls
- CPU Scheduling algorithms, thread processing
- IPC, semaphores, monitors, deadlocks
- Page replacement algorithms, file allocation strategies
- Memory allocation strategies

Sample Experiments:

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls
fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms
a) FCFS b) SJFC c) Priority d) Round Robin
5. Control the number of ports opened by the operating system with
a) Semaphore b) Monitors.
6. Write a program to illustrate concurrent execution of threads using pthreads library.
7. Write a program to solve producer-consumer problem using Semaphores.
8. Implement the following memory allocation methods for fixed partition
a) First fit b) Worst fit c) Best fit
9. Simulate the following page replacement algorithms
a) FIFO b) LRU c) LFU
10. Simulate Paging Technique of memory management.
11. Implement Bankers Algorithm for Dead Lock avoidance and prevention
12. Simulate the following file allocation strategies
a) Sequential b) Indexed c) Linked
13. Case Studies

Reference Books:

1. Operating System Concepts, Silberschatz A, Galvin PB, Gagne G, 10th Edition, Wiley, 2018.
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2. Modern Operating Systems, Tanenbaum AS, 4th Edition, Pearson, 2016
3. Operating Systems-Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
4. Operating Systems: A Concept Based Approach, D. M. Dhamdhere, 3rd Edition, McGraw-Hill, 2013

Online Learning Resources:

1. <https://www.cse.iitb.ac.in/~mythili/os/>
2. <http://peterindia.net/OperatingSystems.html>

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II Year B.Tech.CSE–II Semester

L	T	P	C
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(23ACS48) DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives: This Course will enable students to

- Populate and query a database using SQL DDL/DML Commands
- Declare and enforce integrity constraints on a database
- Writing Queries using advanced concepts of SQL
- Programming PL/SQL including procedures, functions, cursors and triggers.

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

- Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment (L3)
- Constructing and execute queries to manipulate and retrieve data from databases. (L3)
- Develop application programs using PL/SQL. (L3)
- Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality (L4)
- Establish database connectivity through JDBC (Java Database Connectivity) (L3)

Experiments covering the topics:

- DDL, DML, DCL commands
- Queries, nested queries, built-in functions,
- PL/SQL programming-control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity- ODBC/JDBC

Sample Experiments:

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
5.
 - i. Create a simple PL/SQL program which includes declaration section, executable section and exception-Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
 - ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT-IN Exceptions, USER defined Exceptions, RAISE-APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers
12. Create a table and perform the search operation on table using indexing and non-indexing techniques.
13. Write a Java program that connects to a database using JDBC
14. Write a Java program to connect to a database using JDBC and insert values into it
15. Write a Java program to connect to a database using JDBC and delete values from it
16. Case Studies

Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3. Rick FVanderLans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007



II Year B.Tech.CSE–II Semester

L	T	P	C
0	1	2	2

(23ACS46) FULL STACK DEVELOPMENT–1
(Skill Enhancement Course)

Course Objectives: The main objectives of the course are to

- Make use of HTML elements and their attributes for designing static webpages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes:

- CO1: Design Websites. (L6)
- CO2: Apply Styling to web pages. (L4)
- CO3: Make Web pages interactive. (L6)
- CO4: Design Forms for applications. (L6)
- CO5: Choose Control Structure based on the logic to be implemented. (L3)
- CO6: Understand HTML tags, Attributes and CSS properties (L2)

Experiments covering the Topics:

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript-internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events
- Node.js

Sample Experiments:

1. Lists, Links and Images

- a. Write a HTML program, to explain the working of lists.
Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.
- b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.
- c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.
- d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

2. HTML Tables, Forms and Frames

- Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

- Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).
- Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select> & <option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).
- Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts in either direction. (Note: first frame image, second frame paragraph, third frame ☐ hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

3. HTML5 and Cascading Style Sheets, Types of CSS

- a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, tags.
- b. Write a HTML program, to embed audio and video into HTML webpage.
- c. Write a program to apply different types (or level of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

4. Selector forms

- a. Write a program to apply different types of selector forms
 - Simple selector (element, id, class, group, universal)
 - Combinator selector (descendant, child, adjacent sibling, general sibling)
 - Pseudo-class selector
 - Pseudo-element selector
 - Attribute selector

5. CSS with Color, Background, Font, Text and CSS Box Model

- a. Write a program to demonstrate the various ways you can reference a color in CSS.
- b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.
- c. Write a program using the following terms related to CSS font and text:
 - i. font-size ii. font-weight iii. font-style
 - iv. text-decoration v. text-transformation vi. text-alignment
- d. Write a program, to explain the importance of CSS Box model using
 - i. Content ii. Border iii. Margin iv. padding

6. Applying JavaScript - internal and external, I/O, Type Conversion

- a. Write a program to embed internal and external JavaScript in a webpage.
- b. Write a program to explain the different ways for displaying output.
- c. Write a program to explain the different ways for taking input.
- d. Create a webpage which uses prompt dialog box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7. JavaScript Pre-defined and User-defined Objects

- a. Write a program using document object properties and methods.
- b. Write a program using window object properties and methods.
- c. Write a program using array object properties and methods.
- d. Write a program using math object properties and methods.



- e. Write a program using string object properties and methods.
- f. Write a program using regex object properties and methods.
- g. Write a program using date object properties and methods.
- h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

8. JavaScript Conditional Statements and Loops

- a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
- b. Write a program to display weekdays using switch case.
- c. Write a program to print 1 to 10 numbers using for, while and do-while loops.
- d. Write a program to print data in object using for-in, for-each and for-of loops.
- e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e., $1^3 + 5^3 + 3^3 = 153$]
- f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1-10's, 1-2's & 1-1's)

9. Javascript Functions and Events

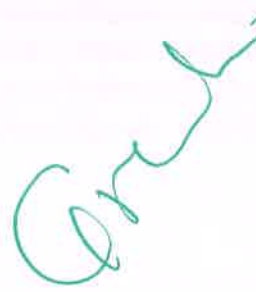
- a. Design appropriate functions should be called to display
 - Factorial of that number
 - Fibonacci series up to that number
 - Prime numbers up to that number
 - Is it palindrome or not
- b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
 - 11. Factorial of that number
 - 12. Fibonacci series up to that number
 - 13. Prime numbers up to that number
 - 14. Is it palindrome or not
- c. Write a program to validate the following fields in a registration page
 - i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
 - ii. Mobile (only numbers and length 10 digits)
 - iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

10. Case Studies

Textbooks:

1. Programming the World Wide Web, 7th Edition, Robert W. Sebesta, Pearson, 2013.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, Apress, O'Reilly.

Web Links:

1. <https://www.w3schools.com/html>
 2. <https://www.w3schools.com/css>
 3. <https://www.w3schools.com/js/>
 4. <https://www.w3schools.com/nodejs>
 5. <https://www.w3schools.com/typescript>
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II Year B.Tech.CSE–II Semester

L	T	P	C
1	0	2	2

(23AMC41) DESIGN THINKING FOR INNOVATION**Course Objectives:**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:

- Define the concepts related to design thinking. (L1, L2)
- Explain the fundamentals of Design Thinking and innovation (L1, L2)
- Apply the design thinking techniques for solving problems in various sectors. (L3)
- Analyse to work in a multidisciplinary environment (L4)
- Evaluate the value of creativity (L5)
- Formulate specific problem statements of real-time issues (L3, L6)

UNIT I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs-

Design thinking for Startups-Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, HarperCollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

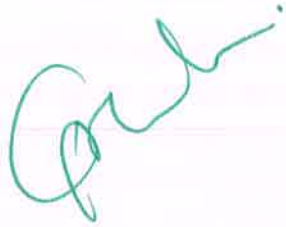
1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shruti N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritina Holden, Jill Butter.
4. Chesbrough, H, The Era of Open Innovation- 2013

Online Learning Resources:

<https://nptel.ac.in/courses/110/106/110106124/>

<https://nptel.ac.in/courses/109/104/109104109/>

https://swayam.gov.in/nd1_noc19_mg60/preview



II Year B.Tech. CSE – II Semester

L	T	P	C
3	0	0	3

PROBABILITY & STATISTICS

Course Outcomes:

After successful completion of this course, the students should be able to:

COs	Statements	Blooms level
CO1	Acquire knowledge in finding the analysis of the data quantitatively or Categorically and various statistical elementary tools.	L2, L3
CO2	Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.	L3, L5
CO3	Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.	L3
CO4	Analyze to test various hypotheses included in theory and types of errors for large samples.	L2, L3
CO5	Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real life problems.	L3, L5

UNIT I: Descriptive statistics:

Introduction to Statistics - Basic concepts of Population and Sample - **Organization and Description of data:** Frequency distributions, graphs of Frequency distributions, stem and leaf displays – **Descriptive Measures:** Sample mean, sample median, sample variance, coefficient of variation – Quartiles and Percentiles – calculation of mean and variance from grouped data – **Regression:** Linear Regression (Line of Regression of Y on X and X on Y), regression coefficients, properties of regression coefficients. **Correlation:** Spearman's Rank correlation coefficient.

UNIT II: Probability and Random variables.

Probability: sample spaces and events, counting. Probability, axioms of Probability, some elementary theorems, conditional probability, general multiplication rule of probability, rule of total probability and Baye's theorem.

Random variables: Definition of random variable, **Discrete random variable:** probability mass function and discrete distribution function. **Continuous random variable:** probability density function and continuous distribution function. **Mathematical Expectation:** mean and variance for discrete and continuous random variables.

UNIT III: Probability distributions

Discrete probability distributions: Binomial distribution, Poisson distribution, The Poisson approximation to the binomial distribution. Mean & variance and related problems.

Continuous probability distributions: Normal distribution - Properties and related problems. The normal Approximation to the binomial distribution.

UNIT IV: Tests of Significance for Large Samples

Introduction to types of sampling, parameters and statistics, sampling distribution of a statistic, standard error. **Tests of significance:** Null and alternative hypothesis, Errors in sampling, critical region and level of significance, one tail and two-tailed tests, critical values, Procedure for testing of hypothesis, **Tests of Significance for Large Samples:** Test of significance for single proportion, Test of significance for difference of proportions, Test of significance for single mean, Test of significance for difference of means.

Prof. K. Sela Reddy

UNIT V: Tests of Significance for Small Samples:

Student t-distribution – Applications of t-distribution: t-test for single mean, t- test for difference of means and paired t-test for difference of means. F-distribution – Applications of F-distribution: F-test for equality of two population variances. Chi-square distribution - Applications of Chi- square distribution: Goodness of fit test, test of independence of attributes – contingency tables, Yate's correction for 2 x 2 contingency tables.

Textbooks:

1. Miller and Freund, Probability and Statistics for Engineers, Eighth edition, Pearson, 2011
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition (9th reprint).

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
2. S. Ross, a First Course in Probability, Pearson Education India, 2002.
3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview

Prof K. Sela Maheswara

II Year B.Tech.CSE–II Semester

L	T	P	C
2	0	0	2

(23AHS03A) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To inculcate the basic knowledge of microeconomics 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 structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

- Define the concepts related to Managerial Economics, financial accounting and management (L2)
- Understand the fundamentalsof Economics viz., Demand, Production, cost, revenue and markets (L2)
- Apply the Concept of Production cost and revenues for effective Business decision (L3)
- Analyze how to invest their capital and maximize returns (L4)
- Evaluate the capital budgeting techniques. (L5)
- Develop the accounting statements and evaluate the financial performance of business entity (L5)

UNIT-I Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand- Demand Elasticity- Types– Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT-II Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT-III Business Organizations and Markets

Introduction – 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

UNIT-IV Capital Budgeting

Introduction – Nature, meaning, significance. Types of 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

- 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 Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

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..

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson Education
3. S. Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K. Raghavan Nambiar, "Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E. Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M. Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R. Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.



II Year B.Tech.CSE–II Semester

L	T	P	C
2	0	0	2

(23AHS03B) ORGANISATIONAL BEHAVIOUR

Course Objectives:

- To enable student's comprehension of organizational behavior
- To offer knowledge to students on self-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:

- Define the Organizational Behaviour, its nature and scope. (L2)
- Understand the nature and concept of Organizational behaviour (L2)
- Apply theories of motivation to analyse the performance problems (L3)
- Analyse the different theories of leadership (L4)
- Evaluate group dynamics (L5)
- Develop a powerful leader (L5)

UNIT-I Introduction to Organizational Behavior

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective - Understanding Individual Behaviour – Attitude - Perception - Learning – Personality.

UNIT- II Motivation and Leading

Theories of Motivation- Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Clelland's theory of needs – Mc Gregor's theory X and theory Y – Adam's equity theory.

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.

UNIT- IV Group Dynamics

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization – Conflict resolution

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

Textbooks:

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12th edition.
2. P SubbaRan, Organisational Behaviour, Himalya Publishing House.
3. Reference Books:
4. McShane, Organizational Behaviour, TMH
5. Nelson, Organisational Behaviour, Thomson.
6. Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson.

Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT- V Financial Accounting and Analysis

Introduction-Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja H I Managerial Economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
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.

Online Learning Resources:

<https://www.slideshare.net/123ps/managerial-economics-ppt>
<https://www.slideshare.net/rossanz/production-and-cost-45827016>
<https://www.slideshare.net/darkyla/business-organizations-19917607>
<https://www.slideshare.net/balarajbl/market-and-classification-of-market>
<https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>
<https://www.slideshare.net/ashu1983/financial-accounting>



II Year B.Tech.CSE–II Semester

L	T	P	C
2	0	0	2

(23AHS03C) BUSINESS ENVIRONMENT

Course Objectives:

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monetary 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 Outcomes:

- Define Business Environment and its Importance. (L2)
- Understand various types of business environment. (L2)
- Apply the knowledge of Money markets in future investment (L3)
- Analyse India's Trade Policy (L4)
- Evaluate fiscal and monetary policy (L5)
- Develop a personal synthesis and approach for identifying business opportunities (L5)

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.

UNIT-II Fiscal & Monetary Policy

Introduction– Nature, meaning, significance, functions and advantages. Public Revenues- Public Expenditure - 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.

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.

UNIT-IV World Trade Organization

Introduction– Nature, significance, functions and advantages. Organization and Structure- Role and functions of WTO in promoting world trade- GATT- Agreements in the Uruguay Round – TRIPS, TRIMS - Disputes Settlement Mechanism- Dumping and Anti-dumping Measures.

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, Introduction to international finance.

7. Aswathappa, Organisational Behaviour, Himalaya.

Online Learning Resources:

1. <https://www.slideshare.net/Knight1040/organizational-culture9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714> <https://www.slideshare.net/harshrastogi1/group-dynamics-159412405>
2. <https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951>



COMMUNITY SERVICE PROJECT

.....Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

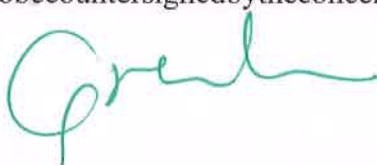
Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

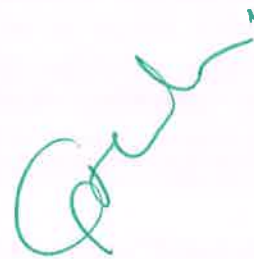
- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.



- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Projects should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a two-fold one –
 - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
 - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
 - Agriculture
 - Health
 - Marketing and Cooperation
 - Animal Husbandry
 - Horticulture
 - Fisheries
 - Sericulture
 - Revenue and Survey
 - Natural Disaster Management
 - Irrigation
 - Law & Order
 - Excise and Prohibition
 - Mines and Geology
 - Energy
 - Internet
 - Free Electricity
 - Drinking Water



EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"

- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
 - Valuable human resources needed to achieve community goals.
 - New energy, enthusiasm and perspectives applied to community work.
 - Enhanced community-university relations.
- 

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reportings should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aquaculture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional healthcare methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Healthcare awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases



35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ratio in schooling level-observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality/Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programs

1. Awareness on RTI
2. Health intervention programmes



3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like—
 - i. Agriculture
 - ii. Health
 - iii. Marketing and Cooperation
 - iv. Animal Husbandry
 - v. Horticulture
 - vi. Fisheries
 - vii. Sericulture
 - viii. Revenue and Survey
 - ix. Natural Disaster Management
 - x. Irrigation
 - xi. Law & Order
 - xii. Excise and Prohibition
 - xiii. Mines and Geology
 - xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)



- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook needs to be maintained by the student batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.



III B.Tech I Semester

	ARTIFICIAL INTELLIGENCE COMMON TO CSE,IT,CSD, CSE (DS), CSE(IOT), CSE(CS)	L	T	P	C
		3	0	0	3

Course Objectives:

This course is designed to:

- Introduce Artificial Intelligence
- Teach about the machine learning environment
- Present the searching Technique for Problem Solving
- Introduce Natural Language Processing and Robotics

Course Outcomes:

After completion of the course, students will be able to

- Apply searching techniques for solving a problem
- Design Intelligent Agents
- Develop Natural Language Interface for Machines
- Design mini robots
- Summarize past, present and future of Artificial Intelligence.

UNIT-I**Introduction****Lecture 9Hrs**

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.

UNIT-II**Solving Problems by searching****Lecture 9 Hrs**

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 Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

UNIT-III**Reinforcement Learning & Natural Language Processing****Lecture 8Hrs**

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.

UNIT-IV**Natural Language for Communication****Lecture 8 Hrs**

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.

UNIT-V**Robotics****Lecture 10Hrs**

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.

Textbooks:

1. Stuart J. Russell, Peter Norvig, —Artificial Intelligence A Modern Approach, 3rd Edition, Pearson Education, 2019.

Reference Books:

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): 3039.

Online Learning Resources:

<http://peterindia.net/AILinks.html>

<http://nptel.ac.in/courses/106106139/>

<https://nptel.ac.in/courses/106/105/106105152/>



III B.Tech I Semester

	COMPUTER NETWORKS Common to CSE,IT,CSD,CSE(AI),CSE(AI&ML), AI&DS,CSE(IOT),CSE(CS)	L	T	P	C
		3	0	0	3

Course Objectives:

The course is designed to

- Understand 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:

After completion of the course, students will be able to

- Identify the software and hardware components of a computer network
- Design software for a computer network
- Develop new routing, and congestion control algorithms
- Assess critically the existing routing protocols
- Explain the functionality of each layer of a computer network
- Choose the appropriate transport protocol based on the application requirements

UNIT-I: Computer Networks and the Internet

Lecture 8Hrs

What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks(Textbook 2), Reference Models, Example Networks, Guided Transmission Media, Wireless Transmission (Textbook 1)

UNIT-II :The Data Link Layer, Access Networks, and LANs

Lecture 10Hrs

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols (Textbook 1)

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 (Textbook 2)

UNIT-III : The Network Layer

Lecture 8Hrs

Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1)

UNIT -IV : The Transport Layer

Lecture 9Hrs

Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1)

UNIT-V : Principles of Network Applications

Lecture 8Hrs

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 (Textbook 2)

Textbooks:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 6th Edition, PEARSON.
2. James F. Kurose, Keith W. Ross, —Computer Networking: A Top-Down Approachl, 6th edition, Pearson, 2019.
3. James F.Kurose, keith W. Ross, Computer Networks, 8th Edition, PEARSON.

Reference Books:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akthar, —Networks for Computer Scientists and Engineersl, Oxford Publishers, 2016.

Online Learning Resources:

1. <https://nptel.ac.in/courses/106105183/25>
2. <http://www.nptelvideos.in/2012/11/computer-networks.html>
3. <https://nptel.ac.in/courses/106105183/3>



III B.Tech I Semester

	AUTOMATA THEORY AND COMPILER DESIGN	L	T	P	C
		3	0	0	3

Course Objectives:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Contexts free Languages, PDA and TM
- To study the various phases in the design of a compiler
- To understand the design of top-down and bottom-up parsers
- To understand syntax directed translation schemes
- To learn to develop algorithms to generate code for a target machine

Course Outcomes:

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

- Ability to design, develop, and implement a compiler for any language
- Able to use LEX and YACC tools for developing a scanner and a parser
- Able to design and implement LL and LR parsers
- Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity
- Ability to design algorithms to generate machine code

UNIT-I

Formal Language and Regular Expressions : Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.

UNIT-II

Context Free grammars and parsing : Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

UNIT-III

Semantics : Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT-IV

Run time storage : Storage organization, storage allocation strategies scope access to local names, parameters, language facilities for dynamics storage allocation.

Code optimization : Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

UNIT-V

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

TEXT BOOKS:

- 1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008.
- 2) Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCES:

- 1) Louden: —Compiler Construction, Principles & Practicel, 1st Edition, Thomson Press, 2006.
- 2) Tremblay J P, Sorenson G P: —The Theory & Practice of Compiler writingl, 1st Edition, BSP publication, 2010.
- 3) Theory of Computation, V. Kulkarni, Oxford University Press, 2013

e-Resources:

- 1) <https://nptel.ac.in/courses/106/104/106104028/>
- 2) <https://nptel.ac.in/courses/106/104/106104123/>



III B.Tech I Semester

	INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS	L	T	P	C
		3	0	0	3

Course Objectives (COBJ):

- Introduce fundamental quantum concepts like superposition and entanglement.
- Understand theoretical structure of qubits and quantum information.
- Explore conceptual challenges in building quantum computers.
- Explain principles of quantum communication and computing.
- Examine real-world applications and the future of quantum technologies.

Course Outcomes (CO):

- Explain core quantum principles in a non-mathematical manner.
- Compare classical and quantum information systems.
- Identify theoretical issues in building quantum computers.
- Discuss quantum communication and computing concepts.
- Recognize applications, industry trends, and career paths in quantum technology.

Unit 1: Introduction to Quantum Theory and Technologies

The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, Why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China

Unit 2: Theoretical Structure of Quantum Information Systems

What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (non-engineering view), Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role

Unit 3: Building a Quantum Computer – Theoretical Challenges and Requirements

What is required to build a quantum computer (conceptual overview)?, Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers:

Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison), Superconducting circuits, Trapped ions, Photonics, Vision vs reality: what's working and what remains elusive, The role of quantum software in managing theoretical complexities

Unit 4: Quantum Communication and Computing – Theoretical Perspective

Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD), Role of Entanglement in Communication, The Idea of the Quantum Internet – Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once), Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential

Unit 5: Applications, Use Cases, and the Quantum Future

Real-world application domains: Healthcare (drug discovery), Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, PsiQuantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race

Textbooks:

1. Michael A. Nielsen, Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
3. Chris Bernhardt, *Quantum Computing for Everyone*, MIT Press, 2019.

Reference Books:

1. David McMahon, *Quantum Computing Explained*, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, *An Introduction to Quantum Computing*, Oxford University Press, 2007.
3. Scott Aaronson, *Quantum Computing Since Democritus*, Cambridge University Press, 2013.
4. Alastair I.M. Rae, *Quantum Physics: A Beginner's Guide*, Oneworld Publications, Revised Edition, 2005.
5. Eleanor G. Rieffel, Wolfgang H. Polak, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
6. Leonard Susskind, Art Friedman, *Quantum Mechanics: The Theoretical Minimum*, Basic Books, 2014.
7. Bruce Rosenblum, Fred Kuttner, *Quantum Enigma: Physics Encounters Consciousness*, Oxford University Press, 2nd Edition, 2011.
8. Giuliano Benenti, Giulio Casati, Giuliano Strini, *Principles of Quantum Computation and Information, Volume I: Basic Concepts*, World Scientific Publishing, 2004.

Good

9. **K.B. Whaley et al.**, *Quantum Technologies and Industrial Applications: European Roadmap and Strategy Document*, Quantum Flagship, European Commission, 2020.
10. **Department of Science & Technology (DST), Government of India**, *National Mission on Quantum Technologies & Applications – Official Reports and Whitepapers*, MeitY/DST Publications, 2020 onward.

Online Learning Resources:

- IBM Quantum Experience and Qiskit Tutorials
- Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley
- edX – The Quantum Internet and Quantum Computers
- YouTube – Quantum Computing for the Determined by Michael Nielsen
- Qiskit Textbook – IBM Quantum

Gruli

III B.Tech I Semester

	OBJECT ORIENTED ANALYSIS AND DESIGN (Professional Elective –I)	L	T	P	C
		3	0	0	3

Course Objectives:

1. Describe the activities in the different phases of the object-oriented development lifecycle.
2. Understand the concepts of object-oriented model with the E-R and EER models.
3. Model a real-world application by using UML diagram.
4. Design architectural modelling.
5. Describing an application of UML.

Course Outcomes:

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

1. The importance of modelling in UML.
2. Compare and contrast the object-oriented model with the E-R and EER models.
3. Design use case diagram. Design an application using deployment diagram.
4. Apply UML diagrams to build library application.

UNIT – I**9 Hrs**

Introduction to UML: Importance of modelling, principles of modelling, object-oriented modelling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT – II**9 Hrs**

Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

UNIT – III**9 Hrs**

Basic Behavioural Modelling-I: Interactions, Interaction diagrams.

Basic Behavioural Modelling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT – IV**9 Hrs**

Advanced Behavioral Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT – V**9 Hrs**

Patterns and Frameworks, Artifact Diagrams. Case Study: The Unified Library application.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modelling Language User Guide, Pearson Education 2nd Edition.
2. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

Reference Books:

1. Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modelling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TMH.
5. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.



III B.Tech I Semester

	Quantum Computing and Algorithm Development Using Qiskit	L	T	P	C
		3	0	0	3

Course Objectives:

The goal of this course is to provide an in-depth understanding of quantum computing concepts and how to implement quantum algorithms using Qiskit, a popular quantum computing framework by IBM.

Unit 1: Introduction to Quantum Computing

Classical vs Quantum Computing: Basic comparison of classical computers and quantum computers. **Quantum**

Mechanics Basics: Qubits and superposition, Quantum entanglement and Bloch Sphere.

Quantum Gates: Introduction to basic quantum gates (Pauli-X, Hadamard, CNOT, etc.).

Quantum Circuits: How quantum circuits are built using quantum gates.

Goal: Student will learn the fundamental concepts of quantum computing and how they differ from classical computing.

Unit 2: Qiskit Basics

Setting up Qiskit: Installation, setup, and introduction to the Qiskit environment.

Qiskit Components: Qiskit Terra, Qiskit Aer, Qiskit Ignis, Introduction to quantum circuits in Qiskit.

Basic Quantum Operations: Implementing simple quantum gates (Hadamard, Pauli, etc.), Quantum states and measurements in Qiskit.

Simulating Circuits: Running quantum circuits on simulators.

Goal: Familiarize students with the Qiskit framework and how to build, simulate, and run quantum programs on real quantum hardware.

Unit 3: Advanced Quantum Gates and Algorithms

Advanced Quantum Gates: Phase gates, Toffoli gates, Swap gates, etc.

Quantum Algorithms: Deutsch-Jozsa algorithm, Grover's Search algorithm, Shor's Factoring algorithm.

Quantum Circuit Optimization: Techniques for optimizing quantum circuits, Reducing gate depth.

Goal: Students Dive deeper into advanced quantum gates, quantum operations, and introduce basic quantum algorithms.

Unit 4: Quantum Error Correction and Noise

Quantum Error Correction: The necessity of error correction in quantum computing, Introduction to surface codes and stabilizer codes.

Quantum Noise and Decoherence: Understanding noise in quantum systems, Techniques to mitigate noise using Qiskit Aer.

Noisy Intermediate-Scale Quantum (NISQ) Era: Challenges and strategies in noisy quantum devices.

Goal: Students understand the challenges of noise and errors in quantum computations and explore methods to mitigate them.

Unit 5: Implementing Real-World Quantum Applications

Quantum Cryptography: Quantum key distribution (QKD), BB84 protocol.

Quantum Machine Learning: Introduction to Quantum Machine Learning (QML) using Qiskit, Quantum neural networks and variational algorithms.

Running on IBM Quantum Hardware: Accessing IBM Quantum cloud resources, Running programs on real quantum hardware via Qiskit.

Goal: Students apply learned concepts to implement real-world applications using quantum computing.

Textbooks:

1. "Quantum Computation and Quantum Information" by Michael A. Nielsen and Isaac L. Chuang.
2. "Quantum Computing for Everyone" by Chris Bernhardt.
3. "Learn Quantum Computation using Qiskit" by Raj and Sandeep Joshi.

III B.Tech I Semester

	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To comprehend the architecture, operation, and configurations of the 8086 microprocessors.
2. To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. To learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

Course Outcomes:

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

1. Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.
2. Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. Know the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. Learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

UNIT-I

8086 Architecture: Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II

8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDs, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT-IV

Microcontroller - Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT-V

Interfacing Microcontroller - Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

Textbooks:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition, 1994.
2. K M Bhurchandi, A K Ray, Advanced Microprocessors and Peripherals, 3rd edition, McGraw Hill Education, 2017.
3. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd edition, Pearson, 2012.

References:

1. Ramesh S Gaonkar, Microprocessor Architecture Programming and Applications with the 8085, 6th edition, Penram International Publishing, 2013.
2. Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.



III B.Tech I Semester

	DATA WAREHOUSING & DATA MINING	L	T	P	C
		3	0	0	3

Course Objective:

- 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:

- Design a Data warehouse system and perform business analysis with OLAP tools (L6).
- Apply suitable pre-processing and visualization techniques for data analysis (L3)
- Apply frequent pattern and association rule mining techniques for data analysis (L3)
- Design appropriate classification and clustering techniques for data analysis (L6)
- Infer knowledge from raw data (L4)

UNIT- I:**Lecture 9Hr**

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.

UNIT- II:**Lecture 9Hrs**

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.

UNIT- III:**Lecture 8 Hrs**

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.

UNIT- IV:**Lecture 9Hrs**

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.

UNIT- V: WEKA TOOL

Lecture 8Hrs

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.

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.



III B.Tech I Semester

	FULL STACK DEVELOPMENT – II (Skill Enhancement Course)	L	T	P	C
		0	1	2	2

Course Objectives: The main objectives of the course are to

- Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages
- Building robust & responsive User Interfaces using popular JavaScript library **React.js**.
- Building robust backend APIs using **Express.js**
- Establishing the connection between frontend (React) User interfaces and backend APIs (Express) with Data Bases(My SQL)

Course Out comes:

- CO1: Building fast and interactive UIs
- CO2: Applying Declarative approach for developing web apps
- CO3: Understanding ES6 features to embrace modern JavaScript
- CO4: Building reliable APIs with Express.js

Experiments covering the Topics:

- Introduction to DOM (Document Object Model), Ecma Script (ES6) standards and features like Arrow functions, Spread operator, Rest operator, Type coercion, Type hoisting, String literals, Array and Object Destructuring.
- Basics of React.js like React Components, JSX, Conditional rendering Differences between Real DOM and Virtual DOM.
- Important React.js concepts like React hooks, Props, React forms, Fetch API, Iterative rendering using JavaScript map() function.
- JavaScript runtime environment node.js and its uses, Express.js and Routing, Micro-Services architecture and MVC architecture, database connectivity using (My SQL)
- Introduction to My SQL, setting up MySQL and configuring, Databases, My SQL queries, subqueries, creating My SQL driver for database connectivity to Express.js server.

Sample Experiments:

1. Introduction to Modern JavaScript and DOM

- Write a JavaScript program to link JavaScript file with the HTML page
- Write a JavaScript program to select the elements in HTML page using selectors
- Write a JavaScript program to implement the event listeners
- Write a JavaScript program to handle the click events for the HTML button elements
- Write a JavaScript program to With three types of functions
 - Function declaration
 - Function definition
 - Arrow functions

2. Basics of React.js

- a. Write a React program to implement a counter button using react class components
 - b. Write a React program to implement a counter button using react functional components
 - c. Write a React program to handle the button click events in functional component
 - d. Write a React program to conditionally render a component in the browser
 - e. Write a React program to display text using String literals
- 3. Important concepts of React. js**
- a. Write a React program to implement a counter button using React use State hook
 - b. Write a React program to fetch the data from an API using React use Effect hook
 - c. Write a React program with two react components sharing data using Props.
 - d. Write a React program to implement the forms in react
 - e. Write a React program to implement the iterative rendering using map() function.
- 4. Introduction to Node. js and Express. js**
- a. Write a program to implement the 'hello world' message in the route through the browser using Express
 - b. Write a program to develop a small website with multiple routes using Express. js
 - c. Write a program to print the 'hello world' in the browser console using Express. js
 - d. Write a program to implement the CRUD operations using Express. js
 - e. Write a program to establish the connection between API and Database using Express – My SQL driver
- 5. Introduction to My SQL**
- a. Write a program to create a Database and table inside that database using My SQL Command line client
 - b. Write a My SQL queries to create table, and insert the data, update the data in the table
 - c. Write a My SQL queries to implement the subqueries in the My SQL command line client
 - d. Write a My SQL program to create the script files in the My SQL workbench
 - e. Write a My SQL program to create a database directory in Project and initialize a database. sql file to integrate the database into API

Textbooks:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
4. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon
5. AZAT MARDAN, Full Stack Java Script: Learn Back bone. js, Node.js and Mongo DB. 2015

Reference Books:

1. Full-Stack JavaScript Development by Eric Bush.
2. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.
3. Tomasz Dyl , Kamil Przeorski , Maciej Czarnecki, Mastering Full Stack React Web Development 2017

III B.Tech I Semester

	INTRODUCTION TO ARTIFICIAL INTELLIGENCE LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

- To teach the methods of implementing algorithms using artificial intelligence techniques
- To illustrate search algorithms
- To demonstrate the building of intelligent agents

Course Outcomes:

After completion of the course, students will be able to

- Implement search algorithms
- Solve Artificial intelligence problems
- Design chatbot and virtual assistant

List of Experiments:

1. Write a program to implement DFS and BFS
2. Write a Program to find the solution for traveling salesman Problem
3. Write a program to implement Simulated Annealing Algorithm
4. Write a program to find the solution for the wumpus world problem
5. Write a program to implement 8 puzzle problem
6. Write a program to implement Towers of Hanoi problem
7. Write a program to implement A* Algorithm
8. Write a program to implement Hill Climbing Algorithm
9. Build a Chatbot using AWS Lex, Pandora bots.
10. Build a bot that provides all the information related to your college.
11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
12. The following is a function that counts the number of times a string occurs in another string: #
Count the number of times string s1 is found in string s2 defcountsubstring(s1,s2):

```
count = 0
for i in range(0,len(s2)-
len(s1)+1): if s1 ==
s2[i:i+len(s1)]:
count
+= 1
return
count
```

For instance, count substring ('ab','cabalaba') returns 2.

Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).

13. Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count (lambda x: x>2, [1, 2, 3, 4, 5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher order function.
14. Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of

items containing N items that each have a unique name, a random size in the range 1 5 and a random value in the range 1. 10.

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should perform at least 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of $2.5 \times N$ for each value problem size N . Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding.

How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer?

Try running the above tests again with a backpack size of $1 \times N$ and with $4.0 \times N$.

15. Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitely large).

Write a function $layout(N, C, L)$ that can give a table placement (i.e. a number from $0 : : C - 1$) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number $0, \dots, N-1$ for each guest and that the list of restrictions is of the form $[(X, Y), \dots]$ denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

References:

1. David Poole, Alan Mack worth, Randy Goebel, Computational Intelligence: a logical approach, Oxford University Press, 2004.
2. G. Luger, —Artificial Intelligence: Structures and Strategies for complex problem solving, Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, —Artificial Intelligence: A new Synthesis, Elsevier Publishers, 1998.
4. Artificial Neural Networks, B. Yagna Narayana, PHI
5. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight, TMH.
6. Artificial Intelligence and Expert Systems, Patterson, PHI.

Online Learning Resources/Virtual Labs:

<https://www.tensorflow.org/><https://pytorch.org/>
<https://github.com/pytorch> <https://keras.io/> <https://github.com/kerasteam>
<http://deeplearning.net/software/theano/>
<https://github.com/Theano/Theano> <https://caffe2.ai/>
<https://github.com/caffe2>
<https://deeplearning4j.org/Scikit-learn> <https://scikit-learn.org/stable/>
<https://github.com/scikit-learn/scikit-learn>
<https://www.deeplearning.ai/>
<https://opencv.org/>
<https://github.com/qpwweee/keras-yolo3>
<https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/>

III B.Tech I Semester

	COMPUTER NETWORKS LAB Common to CSE, IT, CSD, CSE(IOT)	L	T	P	C
		0	0	3	1.5

Course Objectives:

- To understand the different types of networks
- To discuss the software and hardware components of a network
- To enlighten the working of networking commands supported by operating system
- To impart knowledge of Network simulator 2/3
- To familiarize the use of networking functionality supported by JAVA
- To familiarize with computer networking tools.

Course Outcomes (CO):

After completion of the course, students will be able to

- Design scripts for Wired network simulation
- Design scripts of static and mobile wireless networks simulation
- Analyze the data traffic using tools
- Design JAVA programs for client-server communication
- Construct a wired and wireless network using the real hardware

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.
 - Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless 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. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.
4. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.
5. Use Packet tracer software to build network topology and configure using Link State routing protocol.
6. Using JAVA RMI Write a program to implement Basic Calculator
7. Implement a Chatting application using JAVA TCP and UDP sockets.
8. 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.
9. Using Wire shark perform the following operations: -Inspect HTTP Traffic
 - .Inspect HTTP Traffic from a Given IP Address,

Good

- Inspect HTTP Traffic to a Given IP Address,
 - Reject Packets to Given IP Address,
 - Monitor Apache and MySQL Network Traffic.
10. 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.
 11. 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.
 12. 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.

References:

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. Elloitte Rusty Harold, —Java Network Programming, 3rd edition, O'REILLY, 2011.

Online Learning Resources/Virtual Labs:

- <https://www.netacad.com/courses/packet-tracer>- Cisco Packet Tracer.
- Ns Manual, Available at: <https://www.isi.edu/nsnam/ns/ns-documentation.html>, 2011.
- https://www.wireshark.org/docs/wsug_html_chunked/-Wireshark.
- <https://nptel.ac.in/courses/106105183/25>
- <http://www.nptelvideos.in/2012/11/computer-networks.html>
- <https://nptel.ac.in/courses/106105183/3>
- http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php



Online Learning Resources:

1. <https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-js-bootstrap-php-4/>
2. <https://www.w3schools.com/html>
3. <https://www.w3schools.com/css>
4. <https://www.w3schools.com/js/>
5. <https://www.w3schools.com/nodejs>
6. <https://www.w3schools.com/typescript>



III B.Tech – I semester

L	T	P	C
2	0	0	1

TINKERING LAB

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course objectives: The objectives of the course are to	
1	Encourage Innovation and Creativity
2	Provide Hands-on Learning and Impart Skill Development
3	Foster Collaboration and Teamwork
4	Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship
5	Impart Problem-Solving mind-set

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

- 1) Make your own parallel and series circuits using breadboard for any application of your choice.
- 2) Demonstrate a traffic light circuit using breadboard.
- 3) Build and demonstrate automatic Street Light using LDR.
- 4) Simulate the Arduino LED blinking activity in Tinkercad.
- 5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
- 6) Interfacing IR Sensor and Servo Motor with Arduino.
- 7) Blink LED using ESP32.
- 8) LDR Interfacing with ESP32.
- 9) Control an LED using Mobile App.
- 10) Design and 3D print a Walking Robot
- 11) Design and 3D Print a Rocket.
- 12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote place in your computer dashboard.
- 13) Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.

- 1) <https://aim.gov.in/pdf/equipment-manual-pdf.pdf>
- 2) <https://atl.aim.gov.in/ATL-Equipment-Manual/>
- 3) <https://aim.gov.in/pdf/Level-1.pdf>
- 4) <https://aim.gov.in/pdf/Level-2.pdf>
- 5) <https://aim.gov.in/pdf/Level-3.pdf>

III B.Tech II Semester

	MACHINE LEARNING Common to CSE, IT, CSD, CSE(AI), CSE(AI&ML), CSE(DS), AI&DS, CSE(IOT), CSE(CS)	L	T	P	C
		3	0	0	3

Course Objectives:

The course is introduced for students to

- Understand basic concepts of Machine Learning
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

Course Outcomes (CO):

After completion of the course, students will be able to

- Identify machine learning techniques suitable for a given problem
- Solve the problems using various machine learning techniques
- Design application using machine learning techniques
- To understand and explore Supervised Learning techniques
- To understand and explore unsupervised learning techniques

UNIT-I :**Lecture 8Hrs****Introduction to Machine Learning & Preparing to Model**

Introduction: What is Human Learning? Types of Human Learning, what is Machine Learning? Types of Machine Learning, Problems Not to Be Solved Using Machine Learning, Applications of Machine Learning, State-of-The-Art Languages/Tools in Machine Learning, Issues in Machine Learning
 Preparing to Model: Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing

UNIT-II :**Lecture 8Hrs****Modelling and Evaluation & Basics of Feature Engineering**

Introduction, selecting a Model, training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model Basics of Feature Engineering: Introduction, Feature Transformation, Feature Subset Selection

UNIT-III :**Lecture 9Hrs****Bayesian Concept Learning & Supervised Learning: Classification**

Introduction, Why Bayesian Methods are Important? Bayes' Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network

Supervised Learning: Classification: Introduction, Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms-*k*-Nearest Neighbour(*k*NN), Decision tree, Random forest model, Support vector machines

UNIT-IV:**Lecture 9Hrs****Supervised Learning: Regression**

Introduction, Example of Regression, Common Regression Algorithms-Simple linear regression, Multiple linear regression, Assumptions in Regression Analysis, Main Problems in Regression Analysis, Improving Accuracy of the Linear Regression Model, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

UNIT-V Unsupervised Learning**Lecture 9Hrs**

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering – Clustering as a machine learning task, Different types of clustering techniques, Partitioning methods, *K*-Medoids: a representative object-based technique, Hierarchical clustering, Density-based methods- DBSCAN Finding Pattern using Association Rule- Definition of common terms, Association rule, The apriori algorithm for association rule learning, Build the apriori principle rules

Textbooks:

1. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

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.

Online Learning Resources:

- Andrew Ng, —Machine Learning B.Techning
<https://www.deeplearning.ai/machine-learning-B.Techning/>
- 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>



III B.Tech II Semester

	CLOUDCOMPUTING Common to CSE,IT, CSD, CSE(AI), CSE(AI&ML), CSE(DS), AI&DS	L	T	P	C
		3	0	0	3

Course Objectives:

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

Course Out comes(CO):

After completion of the course, students will be able to

- Ability to create cloud computing environment
- Ability to design applications for Cloud environment
- Design & develop back up strategies for cloud data based on features.
- Use and Examine different cloud computing services.
- Apply different cloud programming model as per need.

UNIT I Basics of Cloud computing**Lecture 8Hrs**

Introduction to cloud computing: Introduction, 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, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing.

Cloud Services and Plat forms: Compute Services, Storage Services, Data, base Services, Application services, Content delivery services Analytics Services, Deployment and Management Services, Identity and Access Management services, Open Source Private Cloud software.

UNIT II Hadoop and Python**Lecture 9Hrs**

Hadoop Map Reduce: Apache Hadoop, Hadoop Map Reduce Job Execution, Hadoop Schedulers, Hadoop Clusters set up.

Cloud Application Design: Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

Python Basics: Introduction, Installing Python, Python data Types & Data Structures, Control flow, Function, Modules, Packages, File handling, Date/Time Operations, Classes.

UNIT III Python for Cloud computing Lecture 8Hrs

Python for Cloud: Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for Map Reduce, Python packages of Interest, Python web Application Framework, Designing a RESTful web API.

Cloud Application Development in Python: Design Approaches, Image Processing APP, Document Storage App, Map Reduce App, Social Media Analytics App.

UNIT IV Big data, multimedia and Tuning**Lecture 8Hrs**

Big Data Analytics: Introduction, Clustering Big Data, Classification of Big data Recommendation of

Graph.

Systems.

Multimedia Cloud: Introduction, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Trans coding App.

Cloud Application Bench marking and Tuning: Introduction, Work load Character is tics, Application Performance Metrics, Design Considerations for a Bench marking Methodology, Bench marking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study, Hadoop bench marking case Study.

UNIT V Applications and Issues in Cloud

Lecture 9Hrs

Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity Access Management, Data Security, Key Management, Auditing.

Cloud for Industry, Health care & Education: Cloud Computing for Health care, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

Migrating in to a Cloud: Introduction, Broad Approaches to migrating into the cloud, the seven- step model of migration in to a cloud.

Organizational readiness and Change Management in The Cloud Age: Introduction, Basic concepts of Organizational Readiness, Drivers for changes: A frame work to comprehend the competitive environment, common change management models, change management maturity models, Organizational readiness self- assessment.

Legal Issues in Cloud Computing: Introduction, Data Privacy and security Issues, cloud contracting models, Jurisdictional issues raised by virtualization and at a location, commercial and business considerations, Special Topics.

Text books:

1. Cloud computing Ahands - on Approach lBy Arshdeep Bahga, Vijay Madiseti, Universities Press, 2016
2. Cloud Computing Principles and Paradigms: By RajKumar Buyya, James Broberg, Andrzej Goscinski, Wiley, 2016

Reference Books:

1. Masterin g Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi, TMH
2. Cloud computing AHands-On Approach by Arshdeep Bahga and Vijay Madiseti.
3. Cloud Computing: A Practical Approach, Anthony T.Velte, To by J.Velte, Robert Elsenpeter, Tata Mc Graw Hill, rp 2011.
4. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
5. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese,O_Reilly, SPD, rp 2011.
6. Essentials of Cloud Computing by K.Chandrasekaran. CRC Press.

Online Learning Resources:

Cloud computing – Course (nptel.ac.in)

Good

III B.Tech II Semester

	CRYPTOGRAPHY & NETWORK SECURITY	L	T	P	C
		3	0	0	3

Course Objectives:

This course aims at training students to master the:

- The concepts of classical encryption techniques and concepts of finite fields and number theory
- Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes, and message digests, and public key algorithms
- Design issues and working principles of various authentication protocols, PKI standards
- Various secure communication standards including Kerberos, IPsec, TLS and email
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications

Course Out comes:

After completion of the course, students will be able to

- Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory
- Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
- Apply the knowledge of cryptographic check sums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- Demonstrate the ability to apply **user authentication principles** including **Kerberos** for secure authentication
- Gain proficiency in securing web communications using **TLS** and **HTTPS**, manage secure remote access with **SSH**, and design **firewall policies**

UNIT-I**Lecture 9Hrs**

Computer and Network Security Concepts: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography, Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, Advanced Encryption Standard: AES Structure, AES Transformation Functions

UNIT II**Lecture 9Hrs****Number Theory:**

The Euclidean Algorithm, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Finite Fields: Finite Fields of the Form $GF(p)$, Finite Fields of the Form $GF(2^n)$. **Public Key Cryptography:** Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

UNIT-III**Lecture9Hrs**

Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. **Digital Signatures:** NIST Digital Signature Algorithm, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure

UNITIV**Lecture9Hrs**

User Authentication: Remote User Authentication Principles, Kerberos. Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

UNIT V**Lecture8Hrs**

Transport Level Security: Web Security Requirements, Transport Layer Security (TLS), HTTPS, Secure Shell (SSH)

Fire walls: Fire wall Characteristics and Access Policy, Types of Fire walls, Fire wall Location and Configurations.

Text books:

- 1) Cryptography and Network Security – William Stallings, Pearson Education, 8th Edition.
- 2) Cryptography, Network Security and Cyber Laws–Bernard Menezes, Cengage Learning, 2010 edition.

Reference Books:

- 1) Cryptography and Network Security-Behrouz A Forouzan, Debdeep Mukhopadhyaya, McGraw Hill, 3rd Edition, 2015.
- 2) Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

Online Learning Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105031/lecture>
- 2) [https://nptel.ac.in/courses/106/105/106105162/lecturebyDr.SouravMukhopadhyayIITKharagpur\[VideoLecture\]](https://nptel.ac.in/courses/106/105/106105162/lecturebyDr.SouravMukhopadhyayIITKharagpur[VideoLecture])
- 3) <https://www.mitel.com/articles/web-communication-cryptography-and-network-security> web articles by Mitel Power Connections

III B.Tech II Semester

	SOFTWARE TESTING METHODOLOGIES (Professional Elective-II)	L	T	P	C
		3	0	0	3

Course Objectives:

- To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
- It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.
- It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.
- To learn the domain testing, path testing and logic based testing to explore the testing process easier.

Course Outcomes:

- Know the basic concepts of software testing and its essentials.
- Able to identify the various bugs and correcting them after knowing the consequences of the bug.
- Use of program's control flow as a structural model is the corner stone of testing.
- Performing functional testing using control flow and transaction flow graphs.

UNIT-I**Lecture 9 Hrs**

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

UNIT-II**Lecture 8Hrs**

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III**Lecture 8Hrs**

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

UNIT-IV**Lecture 9Hrs**

Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:-over view, decision tables, path expressions, kv charts, specifications.

UNIT-V**Lecture 9Hrs**

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

TEXT BOOKS

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

REFERENCES BOOKS:

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

Goeh

5. Art of Software Testing – Meyers, John Wiley.

III B.Tech II Semester

	CYBER SECURITY Common to IT, CSE(DS),CSE(IOT) Professional Elective-II	L	T	P	C
		3	0	0	3

Course Objectives:

The course is designed to provide awareness on different cyber crimes, cyber offenses, tools and methods used in cybercrime.

Course Outcomes:

After completion of the course, students will be able to

- Classify the cybercrimes and understand the Indian ITA 2000
- Analyse the vulnerabilities in any computing system and find the solutions
- Predict the security threats of the future
- Investigate the protection mechanisms
- Design security solutions for organizations

UNIT I Introduction to Cybercrime**Lecture 8Hrs**

Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II Cyber Offenses: How Criminals Plan Them**Lecture 9Hrs**

Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing

UNIT III Cybercrime: Mobile and Wireless Devices**Lecture 9Hrs**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones,

Mobile Devices:



Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV Tools and Methods Used in Cybercrime**Lecture 8Hrs**

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V Cyber Security: Organizational Implications**Lecture 8Hrs**

Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

Reference Books:

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

Online Learning Resources:

<http://nptel.ac.in/courses/106105031/40>

<http://nptel.ac.in/courses/106105031/39>

<http://nptel.ac.in/courses/106105031/38>



III B.Tech II Semester

	DevOps Professional Elective-II	L	T	P	C
		3	0	0	3

Pre-requisite:

Fundamentals of software development and maintenance

Course Objectives:

- Understand collaboration and productivity by automating infrastructure and workflows
- Familiarize with continuous measuring applications performance

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

- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT serviceability
- Describe Dev Ops & Dev Sec Ops methodologies and their key concepts
- Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
- Set up complete private infrastructure using version control systems and CI/CD tools

UNIT I**Lecture 8 Hrs**

Dev Ops: An Overview, Dev Ops: Origins, Dev Ops: Roots, Dev Ops: Practices Dev Ops: Culture.

Adopting Dev Ops: Developing the Playbook. Developing a Business Case for a Dev Ops: Developing the Business Case

UNIT II**Lecture 9 Hrs**

Completing the Business Model Canvas, Customer Segments, Value Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, Cost Structures. Dev Ops Plays for Optimizing the delivery Pipeline: Dev Ops as an optimization Exercise, Core Themes, The Dev Ops Plays, Specializing Core Plays

UNIT III**Lecture 8Hrs**

Dev Ops Plays for Driving Innovation: Optimize to Innovate, The Uber Syndrome, Innovation and the Role of Technology, Core Themes, play: Build a Dev Ops Platform, play: Deliver Micro services Architectures, play: DevOps an API Economy, play: Organizing for Innovation.

UNIT IV**Lecture 10 Hrs**

Scaling Dev Ops for the Enterprise: Core Themes, play: Dev Ops Center of Competency, play: Developing Culture of Innovation at Scale, play: Developing a Culture of continuous Improvement, play: Team Models for Dev Ops, play: Standardization of Tools and Process, play: Security Considerations for Dev Ops, Play: Dev Ops and Outsourcing.

UNIT V**Lecture 10 Hrs**

G. S. Reddy

Leading Dev Ops Adoption in the Enterprise: Play: Dev Ops as a transformation Exercise, play: Developing a Culture of Collaboration and Trust, play: Dev Ops Thinking for the Line of Business, play: starting with Pilot Projects, Play: Rearing Unicorns on an Aircrafts Carrier. Appendix Case Study: Example Dev Ops Adoption Roadmap Organization Background, Roadmap Structure, Adoption Roadmap.

Text books:

1. Sanjeev Sharma, The Dev Ops Adoption Playbook, Published by John Wiley & Sons, Inc.2017

Reference Books:

1. Sanjeev Sharma & Bernie Coyne, Dev Ops for Dummies, Published by John Wiley & Sons, Inc.
2. Michael Huttermann, Dev Ops for Developers, Apress publishers,2012.

Online Learning Resources:

Learning Dev Ops with Terra form Infrastructure Automation Course | Udemy

Good.

III B.Tech II Semester

	EMBEDDED SYSTEM DESIGN	L	T	P	C
	Professional Elective-II	3	0	0	3

Course Objectives:

1. To understand the history, classification, and design process of embedded systems.
2. To explore the core components of embedded systems, including processors, memory, and I/O components.
3. To introduce onboard and external communication interfaces used in embedded systems.
4. To explain different firmware design approaches and programming techniques for embedded systems.
5. To provide an understanding of real-time operating systems and task management in embedded systems.

Course Outcomes:

After completing the course, the student will be able to,

1. Classify embedded systems based on their purpose, generation, and complexity.
2. Identify and select appropriate hardware components for an embedded system design.
3. Differentiate and implement various communication protocols like I2C, SPI, and CAN.
4. Develop firmware using assembly and high-level programming languages.
5. Analyze and apply RTOS-based task scheduling and synchronization techniques.

UNIT I Introduction to Embedded Systems

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT II Typical Embedded System

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT III Communication Interface

Onboard communication interfaces-I2C, SPI, CAN, parallel interface; External communication interfaces-RS232 and RS485, USB, infrared, Bluetooth, Wi-Fi, ZigBe, GPRS, GSM.

UNIT IV Embedded Firmware Design and Development

Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development.

UNIT V RTOS based Embedded System Design

Operating system basics, types of operating systems; tasks, process and threads, multiprocessing and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task communication- shared memory, message passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization Issues, Task Synchronization Techniques

Text books:

1. Introduction to Embedded Systems - Shibu KV, Mc Graw Hill Education.
2. Computers as Components – Wayne Wolf, Morgan Kaufmann (second edition).

References:

1. Embedded System Design -Frank Vahid, Tony Grivargis, John Wiley.
2. Embedded Systems- An integrated approach - Lyla b das, Pearson education 2012.
3. Embedded Systems – Raj Kamal, TMH



III B.Tech II Semester

	SOFTWARE PROJECT MANAGEMENT (Professional Elective-III)	L	T	P	C
		3	0	0	3

Course Objective:

This course is designed to enable the students to understand the fundamental principles of Software Project management & will also have a good knowledge of the responsibilities of a project manager and how to handle them.

Course Out comes:

After completion of the course, students will be able to

- Describe the fundamentals of Project Management
- Recognize and use Project Scheduling Techniques
- Familiarize with Project Control Mechanisms
- Understand Team Management
- Recognize the importance of Project Documentation and Evaluation

UNIT-I**Lecture 9Hrs**

Conventional Software Management: The water fall model, conventional software Management performance Evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT-II**Lecture 9Hrs**

The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Lifecycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts

UNIT-III**Lecture 9Hrs**

Work Flows of the process: Software process work flows, Inter Trans work flows. Check points of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: work break down structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning

UNIT-IV**Lecture 9Hrs**

Process Automation: Automation Building Blocks, The Project Environment.

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators Tailoring the Process: Process discriminants. Managing people and organizing teams.

UNIT-V**Lecture9Hrs**

Project Organizations and Responsibilities: Line - of-Business Organizations, Project Organizations, evolution of Organizations.

Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process stransitions.

Case Study: The Command Center Processing and Display System-Replacement(CCPDS-R)

Text books:

1. Software Project Management, Walker Royce, Pearson Education, 2012
2. Bob Hughes, Mike Cotterell and Rajib Mall—Software Project Management I, 6th Edition, Mc Graw Hill Edition, 2017

Reference Books:

1. Pankaj Jalote,—Software Project Management in practice I, 5th Edition, Pearson Education, 2017.
2. Murali K. Chemuturi, Thomas M. Cagley Jr. I Mastering Software Project Management: Best Practices, Tools and Techniques I, J. Ross Publishing, 2010
3. Sanjay Mohapatra,—Software Project Management I, Cengage Learning, 2011

Online Learning Resources:

<http://nptel.ac.in/courses/106101061/29>

Grace

III B.Tech II Semester

	MOBILE ADHOC NETWORKS (Professional Elective-III)	L	T	P	C
		3	0	0	3

Course Objective:

- Knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.
- Knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
- Knowledge of clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless.
- Knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards.

Course Outcomes:

- Describe the unique issues in ad-hoc/sensor networks.
- Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
- Discuss the challenges in designing routing and transport protocols for wireless Adhoc/sensor networks.
- Comprehend the various sensor network Platforms, tools and applications

UNIT- I**Introduction to Ad Hoc Networks:**

Characteristics of MANETs, Applications of MANETs and challenges of MANETs -Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT -II**Data Transmission:**

Broadcast storm problem, Broadcasting, Multicasting and Geocasting -TCP over Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT- III**Basics of Wireless, Sensors and Applications:**

Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT- IV**Data Retrieval in Sensor Networks:**

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots-Security:

Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

UNIT- V

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms -Operating System: Tiny OS -Imperative Language: nesC, Data flow style language: Tiny GALS, Node Level Simulators, ns-2 and its sensor network extension.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks –Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN –981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN –978-1-55860-914-3 (Morgan Kauffman)

Green

III B.Tech II Semester

	NATURAL LANGUAGE PROCESSING (Professional Elective-III)	L	T	P	C
		3	0	0	3

Course Objective

- Explain and apply fundamental algorithms and techniques in the area of natural language processing(NLP)
- Discuss approaches to syn tax and semantics in NLP.
- Examine current methods for statistical approach esto machine translation.
- Teach machine learning techniques used in NLP.

Course Out comes:

After completion of the course, students will be able to

- Under stand the various NLP Applications and Organization of Natural language, able to learn and implement realistic applications using Python.
- Apply the various Parsing techniques, Bayes Rule, Shannongame, Entropy and Cross Entropy.
- Under stand the fundamentals of CFG and parsers and mechan is msin ATN's.
- Apply Semantic Interpretation and Language Modelling.
- Apply the concept of Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.

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 Under standing Systems, Linguistic Back ground: Anoutline of English Syn tax.

UNIT- II Grammars and Parsing

Grammars and Parsing – Top – Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphologica l Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannongame, Entropy and Cross Entropy.

UNIT- III Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenonin Language, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

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, The maticroles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modelling

Introduction,n-

GramModels, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modelling Problems, Multilingual and Crosslingual Language Modelling.

UNIT-V**Machine Translation**

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusarakaor Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Givingup Agreementin Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Pre-processing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approach esto Summarization, Evaluation, How to Builda Summarizer, Competitions and Datasets.

Textbooks:

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, Akshar Bharathi, Vineetchaitanya, Prentice –Hall of India.

Reference Books:

1. Charniack, Eugene, Statistical Language Learning, MITPress,1993.
2. Jurafsky, Dan and Martin, James, Spccch and Language Proccssing, 2nd Edition, Prentice Hall,2008.
3. Manning, Christopher and Hen rich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press,1999.

Online Learning Resources:

<https://nptel.ac.in/courses/106/105/106105158/http://www.nptelvideos.in/2012/11/natural-language-processing.html>



III B.Tech II Semester	SOFTSKILLS	L	T	P	C
		1	0	2	2

(Common to All Branches of Engineering)

Course Code		Soft Skills		L	T	P	C
				0	1	2	2
Pre-requisite		SemesterIV/V					
Course Objectives:							
- To encourage all round development of the students by focusing on soft skills - To make the students aware of critical thinking and problem-solving skills - To enhance healthy relationship and understanding within and outside an organization - To function effectively with heterogeneous teams							
Course Outcomes (CO):							
COs	Statements						Blooms level
CO1	List out various elements of soft skills						L1, L2,
CO2	Describe methods for building professional image						L1, L2
CO3	Apply critical thinking skills in problem solving						L3
CO4	Analyse the needs of an individual and team for well-being						L4
CO5	Assess the situation and take necessary decisions						L5
CO6	Create a productive work place atmosphere using social and work-life skills ensuring personal and emotional well-being						L6
SYLLABUS							
UNIT – I		Soft Skills & Communication Skills			Lecture Hrs		
Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills - Significance, process, types - Barriers of communication - Improving techniques							
Activities: Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity (The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources) Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic. Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace. Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation							
UNIT – II		Critical Thinking			Lecture Hrs		
Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection							
Activities: Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale –							

Preli

evaluating the views of others - Case Study, Story Analysis		
UNIT – III	Problem Solving & Decision Making	Lecture Hrs
Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles Activities: Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion		
UNIT – IV	Emotional Intelligence & Stress Management	Lecture Hrs
Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates		
UNIT – V	Corporate Etiquette	Lecture Hrs
Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette -Corporate grooming tips - Overcoming challenges Activities Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games NOTE:- 1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill. 2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.		
Prescribed Books:		
1. Mitra Barun K, <i>Personality Development and Soft Skills</i> , Oxford University Press, Pap/Cdr edition 2012 2. Dr Shikha Kapoor, <i>Personality Development and Soft Skills: Preparing for Tomorrow</i> , K I 2018 ,esuoH gnihsilbuP lanoitanretnI		
Reference Books		
1. Sharma, Prashant, <i>Soft Skills: Personality Development for Life Success</i> , BPB Publications 2018. 2. Alex K, <i>Soft Skills</i> S.Chand& Co, 2012 (Revised edition)		

III B.Tech II Semester

	MACHINE LEARNING LAB Common to CSE, CSD, CSE(AI), CSE(AI&ML), CSE(DS), AI&DS	L	T	P	C
		0	0	3	1.5

Course Objectives:

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

Course Outcomes (CO):

After completion of the course, students will be able to

- Understand the Mathematical and statistical perspectives of machine learning algorithms through python programming
- Appreciate the importance of visualization in the data analytics solution.
- Derive insights using Machine learning algorithms

List of Experiments:**Note:**

- The programs can be implemented in either JAVA or Python.
 - For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
 - Data sets can be taken from standard repositories (<https://archive.ics.uci.edu/ml/datasets.html>) or constructed by the students.
- Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
 - For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
 - 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.
 - Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.
 - 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.
 - 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.
 - 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.
 - 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 Neighbour 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.

Projects

1. Predicting the Sale price of a house using Linear regression
2. Spam classification using Naïve Bayes algorithm
3. Predict car sale prices using Artificial Neural Networks
4. Predict Stock market trends using LSTM
5. Detecting faces from images

References:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.

Online Learning Resources/ Virtual Labs:

- 1) [Machine Learning A-Z \(Python & R in Data Science Course\) | Udemy](#)
- 2) [Machine Learning | Coursera](#)



III B.Tech II Semester

	CRYPTOGRAPHY AND NETWORK SECURITY LAB	L	T	P	C
		0	0	3	1.5

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.



III B.Tech II Semester

	Technical Report Writing & IPR	L	T	P	C
		2	0	0	0

Course Objectives:

1. To enable the students to practice the basic skills of research paper writing
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help them in knowing the significance of real life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks

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

COURSE OUTCOMES: At the end of the course, students will be able to		Blooms Level
CO1	Identify key secondary literature related to their proposed technical paper writing	L1, L2
CO2	Explain various principles and styles in technical writing	L1, L2
CO3	Use the acquired knowledge in writing a research/technical paper	L3
CO4	Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc.	L4
CO5	Evaluate different forms of IPR available at national & international level	L5
CO6	Develop skill of making search of various forms of IPR by using modern tools and techniques.	L3, L6

UNIT – I:

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings- discussing your limitations -hedging and criticizing -plagiarism and paraphrasing .

UNIT – II:

Technical Research Paper Writing: Abstract- Objectives-Limitations-Review
of Literature- Problems and Framing Research Questions- Synopsis

UNIT – III:

Process of research: publication mechanism: types of journals- indexing-seminars-
conferences- proof reading –plagiarism style; seminar & conference paper writing;
Methodology-discussion-results- citation rules

UNIT – IV:

Introduction to Intellectual property: Introduction, types of intellectual property, International organizations, agencies and
bodies, importance of intellectual property rights

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

UNIT – V:

Law of copy rights: Fundamentals of copy right law, originality of material, rights of reproduction, rights to
perform the work publicly, copy right ownership issues, copy right registration, notice of copy right,
international copy right law

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer. Patent law,
intellectual property audits.

Textbooks:

1. Deborah. E. Bouchoux, *Intellectual Property Rights*, Cengage Learning India, 2013
2. Meenakshi Raman, Sangeeta Sharma. *Technical Communication: Principles and practices*. Oxford.

Reference Books:

1. R.Myneni, *Law of Intellectual Property*, 9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli, *Intellectual Property Rights* Tata McGraw Hill, 2001
3. P.Naryan, *Intellectual Property Law*, 3rd Ed, Eastern Law House, 2007.
4. Adrian Wallwork. *English for Writing Research Papers* Second Edition. Springer Cham
Heidelberg New York, 2016
5. Dan Jones, Sam Dragga, *Technical Writing Style*

Online Resources

1. <https://theconceptwriters.com.pk/principles-of-technical-writing/>
2. <https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html>
3. <https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html>
4. <https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/>
5. <https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf>
6. <https://lawbhoomi.com/intellectual-property-rights-notes/>
7. <https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf>

IV B.Tech I Semester

	DEEP LEARNING	L	T	P	C
		2	1	0	3

Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train, and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyse the key parameters and hyper parameters in a neural network's architecture

Course Outcomes:

After completion of the course, students will be able to

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs

UNIT-I

Lecture 8Hrs

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.

UNIT-II

Lecture 9Hrs

Machine Learning: Basics and Under fitting, 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 Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT-III

Lecture 8Hrs

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.

UNIT-IV

Lecture 9Hrs

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.

Grish

UNIT V

Lecture 8Hrs

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.

Text books:

1. Ian Good fellow, Yoshua Bengio, 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, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

Online Learning Resources:

1. <https://keras.io/datasets/>
2. <http://deeplearning.net/tutorial/deeplearning.pdf>
3. <https://arxiv.org/pdf/1404.7828v4.pdf>
4. <https://www.cse.iitm.ac.in/~miteshk/CS7015.html>
5. <https://www.deeplearningbook.org>
6. <https://nptel.ac.in/courses/106105215>



IV B.Tech I Semester

	Management Course- II	L	T	P	C
		2	0	0	2

BUSINESS ETHICS AND CORPORATE GOVERNANCE

(w.e.f academic year 2023-2024)

Subject Code	Title of the Subject	L	T	P	C
	BUSINESS ETHICS AND CORPORATE GOVERNANCE	2	0	0	2

COURSE OBJECTIVES : The objectives of this course are

1	To make the student understand the principles of business ethics
2	To enable them in knowing about the ethics in management
3	To facilitate the student's role in corporate culture
4	To impart knowledge about the fair-trade practices
5	To encourage the student in knowing about the corporate governance

Syllabus**UNIT-I: Ethics**

Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior.. Value systems - Business Ethics - Types, Characteristics, Factors, Contradictions and Ethical Practices in Management - Corporate Social Responsibility – Issues of Management – Crisis Management.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Analyze issues & crisis of management

UNIT-II: ETHICS IN MANAGEMENT

Introduction- Ethics in production, finance, Human resource management and Marketing Management - 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 – professional ethics and technical ethics.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the meaning of Ethics in various areas of management
- Compare and contrast professional ethics and technical ethics

- Develop ethical values in self and organization

UNIT-III : CORPORATE CULTURE

Introduction - Meaning, definition, Nature, and significance – Key elements of corporate culture, shared values, beliefs and norms, rituals, symbols and language - Types of corporate culture, hierarchical culture, market driven culture – Organization leadership and corporate culture, leadership styles and their impact on culture, transformational leadership and culture change.

LEARNING OUTCOMES:- After completion of this unit student will

- Define corporate culture
- Understand the key elements of corporate culture
- Analyze organization leadership and corporate culture

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 – Corporate law, Securities and financial regulations, corporate governance codes and principles.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand Law and Ethics
- Analyze Different fair trade practices
- Make use of Environmental Protection and Fair Trade Practices

UNIT -V: CORPORATE GOVERNANCE

Introduction - Meaning – 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. BoDs composition, Cadbury Committee - Various committees - Reports - Benefits and Limitations.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders in corporate governance
- Implementing corporate social responsibility in India.

Text books.

1. Murthy CSV: Business Ethics and Corporate Governance, HPH July 2017
2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH. June 2010

Reference books

1. Dr. K. Nirmala, KarunakaraReaddy. *Business Ethics and Corporate Governance*, HPH
2. H.R.Machiraju: *Corporate Governance*, HPH, 2013
3. K. Venkataramana, *Corporate Governance*, SHBP.



4. N.M.Khandelwal. *Indian Ethos and Values for Managers*

COURSE OUTCOMES: At the end of the course, students will be able to		BTL
CO1	Understand the Ethics and different types of Ethics.	L2
CO2	Understand business ethics and ethical practices in management	L2
CO3	Understand the role of ethics in management	L2
CO4	Apply the knowledge of professional ethics & technical ethics	L3
CO5	Analyze corporate law, ethics, codes & principles	L4
CO6	Evaluate corporate governance & corporate scams	L5

BTL = Bloom's Taxonomy Level

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_mg46/
2. <https://archive.nptel.ac.in/courses/110/105/110105138/>
3. https://onlinecourses.nptel.ac.in/noc21_mg54/
4. https://onlinecourses.nptel.ac.in/noc22_mg54/
5. <https://archive.nptel.ac.in/courses/109/106/109106117/>



E-Business**(Elective-2 VII - SEMESTER)****(w.e.f. Academic Year – 2023-2024)**

Subject Code	Title of the Subject	L	T	P	C
	E-Business	2	0	0	2

Course Objectives: The Objectives of this course are	
1	To provide knowledge on emerging concept on E-Business related aspect.
2	To understand various electronic markets & business models.
3	To impart the information about electronic payment systems & banking.
4	To create awareness on security risks and challenges in E-commerce.
5	To the students aware on different e-marketing channels & strategies.

Syllabus**Unit-I: Electronic Business**

Introduction – Nature, meaning, significance, functions and advantages - Definition of Electronic Business - Functions of Electronic Commerce (EC)-Advantages & Disadvantages of E-Commerce –E-Commerce and E-Business, Internet Services, Online Shopping- E-Commerce Opportunities for Industries.

Learning Outcomes: -After completion of this unit student

- Understand the concept of E-Business
- Contrast and compare E-Commerce & E-Business
- Evaluate opportunities of E-commerce for industry

Unit-II: Electronic Markets and Business Models

Introduction –E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals -Business Models- Business to Business (B2B)-Business to Customers(B2C) - Business to Government(B2G)-Auctions-B2B Portals in India

Learning Outcomes: -After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze the B2B,B2C and B2G model

Unit-III: Electronic Payment Systems:

Introduction to electronic payment systems (EPS) -Types of electronic payments - Credit/debit cards, e-



wallets, UPI, and crypto currencies -Smart cards and digital wallets: Features and usage -Electronic Fund Transfer (EFT): Role in business transactions -Infrastructure requirements and regulatory aspects of e-payments

Learning Outcomes: -After completion of this unit student will

- Understand the Electronic payment system
- Contrast and compare EFT and smart cards
- Analyze debit card and credit cards

Unit-IV:E-Security

Security risks and challenges in electronic commerce - Cyber threats - Phishing, hacking, identity theft, and malware - Digital Signatures & Certificates - Security protocols over public networks (HTTP, SSL, TLS) -Firewalls in securing e-business platforms.

Learning Outcomes: -After completion of this unit student will

- Understand E-Security
- Contrast and compare security protocols and public network
- Evaluate on Digital signature

Unit-V:E-Marketing:

Introduction – Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Market Research– – E-marketing planning: Online branding, social media marketing, and email marketing - E-business strategies: Digital advertising, content marketing, and analytics – E-Customer Relationship Management (eCRM) E-supply chain management (e-SCM)

Learning Outcomes: -After completion of this unit student will

- Understand the concept of online marketing
- Apply the knowledge of online marketing
- Compare e-CRM and e-SCM

Text Books:

1. Arati Oturkar&Sunil Khilari. *E-Business*. Everest Publishing House, 2022
2. P.T.S Joseph. *E-Commerce*, Fourth Edition, Prentice Hall of India, 2011

References:

1. Debjani, Kamallesh K Bajaj. *E-Commerce*, Second Edition Tata McGraw-Hill's, 2005
2. Dave Chaffey.*E-Commerce E-Management*, Second Edition, Pearson, 2012.
3. Henry Chan. *E-Commerce Fundamentals and Application*, RaymondLeathamWiley India 2007
4. S. Jaiswal. *E-Commerce* GalgotiaPublication Pvt Ltd., 2003.



COURSE OUTCOMES: At the end of the course student will be able to		BTL
CO1	Remember E-Business & its nature, scope and functions.	L1
CO2	Understand E-market-Models which are practicing by the organizations	L2
CO3	Apply the concepts of E-Commerce in the present globalized world.	L3
CO4	Analyze the various E-payment systems & importance of net banking.	L4
CO5	Evaluate market research strategies & E-advertisements.	L5
CO6	Understand importance of E-security & control	L2

BTL = Bloom's Taxonomy Level

Online Resources:

<https://www.slideshare.net/fatimahAlkreem/e-businessppt-67935771>

<https://www.slideshare.net/VikramNani/e-commerce-business-models>

<https://www.slideshare.net/RiteshGoyal/electronic-payment-system>

<https://www.slideshare.net/WelingkarDLP/electronic-security>

<https://www.slideshare.net/Ankitha2404/emarketing-ppt>



(w.e.f academic year 2023-2024)

Subject Code	Title of the Subject	L	T	P	C
	Management Science	2	0	0	2

COURSE OBJECTIVES : The objectives of this course are	
1	To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2	To make the students understand the role of management in Production
3	To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
4	To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
5	To make the students aware of the contemporary issues in modern management

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 - **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 of the Unit, the students will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure of an enterprise.

UNIT - II OPERATIONS MANAGEMENT

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- **Material Management** - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - **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 students will be able to

- Understand the core concepts of Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

UNIT - III HUMAN RESOURCES MANAGEMENT (HRM)

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process - Employee Training and Development - methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration



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

- Understand the concepts of HRM, Recruitment, Selection, Training & Development
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

UNIT - IV STRATEGIC & PROJECT MANAGEMENT

Definition & Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management** - Network Analysis - Programme Evaluation 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 students will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques

UNIT - V CONTEMPORARY ISSUES IN MANAGEMENT

Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management – employee engagement and retention - Business Process Re-engineering and Benchmarking - Knowledge Management – change management – sustainability and corporate social responsibility.

LEARNING OUTCOMES At the end of the Unit, the students will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in TQM, SCM
- Analyze CRM, BPR
- Evaluate change management & sustainability

Text Books:

1. Frederick S. Hillier, Mark S. Hillier. *Introduction to Management Science*, October 26, 2023
2. A.R. Aryasri, *Management Science*, TMH, 2019

References:

1. Stoner, Freeman, Gilbert. *Management*, Pearson Education, New Delhi, 2019.
2. Koontz & Weihrich, *Essentials of Management*, 6/e, TMH, 2005.
3. Thomas N. Duening & John M. Ivancevich, *Management Principles and Guidelines*, Biztantra.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
5. Samuel C. Certo, *Modern Management*, 9/e, PHI, 2005

COURSE OUTCOMES: At the end of the course, students will be able to		BTL
CO1	Remember the concepts & principles of management and designs of organization in a practical world	L1

CO2	Understand the knowledge of Work-study principles & Quality Control techniques in industry	L2
CO3	Apply the process of Recruitment & Selection in organization.	L3
CO4	Analyze the concepts of HRM & different training methods.	L4
CO5	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.	L5
CO6	Create awareness on contemporary issues in modern management & technology.	L3

BTL = Blooms Taxonomy Level

ONLINE RESOUECES:

1. <https://www.slideshare.net/slideshow/introduction-to-management-and-organization-231308043/231308043>
2. <https://nptel.ac.in/courses/112107238>
3. <https://archive.nptel.ac.in/courses/110/104/110104068/>
4. <https://archive.nptel.ac.in/courses/110/105/110105069/>
5. https://onlinecourses.nptel.ac.in/noc24_mg112/



IV B.Tech I Semester

	SOFTWARE ARCHITECTURE AND DESIGN	L	T	P	C
	PATTERNS (Professional Elective –IV)	3	0	0	3

Course Objectives:

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

- To understand the concept of patterns and the Catalog.
- To discuss the Presentation tier design patterns and their affect on: sessions, client access, validation and consistency.
- To understand the variety of implemented bad practices related to the Business and Integration tiers.

Course Out comes:

- To highlight the evolution of patterns.
- To learn how to add functionality to designs while minimizing complexity
- To learn what design patterns really are, and are not
- To know about specific design patterns.
- To learn how to use design patterns to keep code quality high without over design.

UNIT-I

Envisioning Architecture: The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT- II

Analyzing Architectures: Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Moving from one system to many: Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT- III

Patterns: Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage. Creational and Structural patterns: Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

UNIT- IV

Behavioural patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy. template method, visitor.

UNIT- V

Case Studies: A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.



TEXT BOOKS:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education.

REFERENCES:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.



IV B.Tech I Semester

	BLOCK CHAIN TECHNOLOGY	L	T	P	C
	(Professional Elective –IV)	3	0	0	3

Course Objectives:

- Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from block chain technology into their own projects.

Course Outcomes (CO):

After completion of the course, students will be able to

1. Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
2. Identify the risks involved in building Block chain applications.
3. Review of legal implications using smart contracts.
4. Choose the present landscape of Blockchain implementations and Understand Crypto currency markets
5. Examine how to profit from trading crypto currencies.

UNIT - I Introduction

Lecture 8Hrs

Introduction, Scenarios, Challenges Articulated, Block chain, Block chain Characteristics, Opportunities Using Block chain, History of Block chain. Evolution of Block chain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Block chain Evolution, Consortia, Forks, Public Block chain Environments, Type of Players in Block chain Ecosystem, Players in Market.

UNIT - II Block chain Concepts

Lecture 9Hrs

Block chain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on block chain, data storage on block chain, wallets, coding on block chain: smart contracts, peer-to-peer network, types of block chain nodes, risk associated with bloc chain solutions, life cycle of block chain transaction.

UNIT - III Architecting Block chain solutions

Lecture 9Hrs

Architecting Block chain solutions: Introduction, Obstacles for Use of Block chain, Block chain Relevance Evaluation Framework, Block chain Solutions Reference Architecture, Types of Block chain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Block chain Solutions, Architecture Considerations, Architecture with Block chain Platforms, Approach for Designing Block chain Applications.

UNIT - IV Ethereum Block chain Implementation

Lecture 8Hrs

Ethereum Block chain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, My Ether Wallet, Ethereum Networks/Environments, Infura, Ether scan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, Open Zeppelin in Contracts .

UNIT - V Hyper ledger Block chain Implementation

Lecture 8Hrs

Hyper ledger Implementation: Introduction, Use Case – Car Ownership Tracking, Hyper ledger Fabric, Hyper ledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chain code Functions Using Client Application.

Advanced Concepts in Block chain: Introduction, Inter Planetary File System (IPFS), Zero Knowledge Proofs, Oracles, Self-Sovereign Identity, Block chain with IoT and AI/ML Quantum Computing and Block chain, Initial Coin Offering, Block chain Cloud Offerings, Block chain and its Future Potential.

Textbooks:

1. Ambadas, Arshad Sarfarz Ariff, Sham —Block chain for Enterprise Application Developersl, Wiley, 2020
2. Andreas M. Antonopoulos, —Mastering Bitcoin: Programming the Open Blockchainll, O'Reilly, 2017

Reference Books:

1. Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2. Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly

Online Learning Resources:

<https://github.com/blockchainedindia/resources>



IV B.Tech I Semester

	AUGMENTED REALITY AND VIRTUAL REALITY (Professional Elective –IV)	L	T	P	C
		3	0	0	3

Course Objective:

The primary objective of this course is to introduce students to the foundational principles and technologies of Virtual Reality (VR) and Augmented Reality (AR), along with the key devices, modeling techniques, and interaction mechanisms involved in creating immersive environments. The course will cover the essentials of VR and AR, including hardware, software, and human perception, as well as advanced concepts such as 3D modeling, interaction design, and audio rendering. Students will gain hands-on experience in the use of VR/AR systems and explore the challenges and methodologies for building interactive virtual environments.

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

1. Understand the core concepts of Virtual Reality and Augmented Reality, and their differences.
2. Learn about the hardware and software components required for VR and AR systems, as well as the impact of human physiology and perception on the virtual experience.
3. Gain knowledge of input devices (trackers, navigation, and gesture interfaces) and output devices (graphics, sound displays, and haptic feedback).
4. Develop skills in modeling techniques, including geometric, kinematics, physical, and behavior modeling for VR and AR environments.
5. Explore the technologies and methodologies used to create Augmented Reality systems, including marker-based AR and AR software development.

UNIT – I

(10 Lectures)

INTRODUCTION TO VIRTUAL REALITY (VR): Defining Virtual Reality, Key elements of virtual reality experience, Virtual Reality, Telepresence, Augmented Reality and Cyberspace.

Bird's-Eye View: Hardware, Software, Human Physiology and Perception.

UNIT-II

(10 Lectures)

Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.

Output Devices: Graphics displays, sound displays & haptic feedback.

UNIT-III

(10 Lectures)

Modeling: Geometric modeling, Kinematics modeling, Physical modeling, Behaviour modeling, Model management.

UNIT-IV

(10 Lectures)

Augmented Reality (AR): Taxonomy, Technology and Features of Augmented Reality, AR Vs VR, Challenges with AR, AR systems and functionality, Augmented Reality Methods, Visualization Techniques for Augmented Reality, Enhancing interactivity in AR Environments, Evaluating AR systems

AR software development : AR software, Camera parameters and camera calibration, Marker-based augmented reality, AR Toolkit.

Q red.

UNIT-V**(10 Lectures)****Interaction & Audio:**

Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction.
Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering.

Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction.

Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering. (from Text Book2)

TEXT BOOKS:

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc, 2017.
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.

REFERENCES:

1. Rajesh K. Maurya, *Computer Graphics with Virtual Reality System*, 3rd Edition, Wiley Publication, 2018.
2. William R. Sherman and Alan B. Craig, *Understanding Virtual Reality Interface, Application, and Design*, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2019.
3. Grigore C. Burdea, Philippe Coiffet, *Virtual Reality Technology*, 2nd Edition, Wiley, 2017.
4. K.S. Hale and K. M. Stanney, *Handbook on Virtual Environments*, 2nd Edition, CRC Press, 2015.

WEB REFERENCES:

1. <http://vr.cs.uiuc.edu/vrbook.pdf>
2. <https://nptel.ac.in/courses/106/106/106106138/>



IV B.Tech I Semester

	INTERNET OF THINGS Common to CSE, IT, CSD, CSE(AI), CSE(DS),AI&DS (Professional Elective –IV)	L	T	P	C
		3	0	0	3

Course Objectives:

- Understand the basics of Internet of Things and protocols.
- Discuss the requirement of IoT technology
- Introduce some of the application areas where IoT can be applied.
- Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management

Course Outcomes:

After completion of the course, students will be able to

- Understand general concepts of Internet of Things.
- Apply design concept to IoT solutions
- Analyze various M2M and IoT architectures
- Evaluate design issues in IoT applications
- Create IoT solutions using sensors, actuators and Devices

UNIT- I Introduction to IoT

Definition and Characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates

UNIT- II Prototyping IoT Objects using Microprocessor/Microcontroller

Working principles of sensors and actuators, setting up the board – Programming for IoT, Reading from Sensors, Communication: communication through Bluetooth, Wi-Fi.

UNIT-III IoT Architecture and Protocols

Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, Protocols- 6LowPAN, RPL, CoAP, MQTT, IoT frameworks- Thing Speak.

UNIT- IV Device Discovery and Cloud Services for IoT

Device discovery capabilities- Registering a device, Deregister a device, Introduction to Cloud Storage models and communication APIs Web-Server, Web server for IoT.

UNIT- V UAV IoT

Introduction to Unmanned Aerial Vehicles/Drones, Drone Types, Applications: Defense, Civil, Environmental Monitoring; UAV elements and sensors- Arms, motors, Electronic Speed Controller(ESC), GPS, IMU, Ultra sonic sensors; UAV Software –Arudpilot, Mission Planner, Internet of Drones(IoD)- Case study FlytBase.

Text books:

1. Vijay Madiseti and Arshdeep Bahga, — Internet of Things (A Hands-on-Approach)ll, 1st Edition, VPT, 2014.
2. Handbook of unmanned aerial vehicles, K Valavanis; George J Vachtsevanos, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.

Reference Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, — From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligencell, 1st Edition, Academic Press, 2014.
2. ArshdeepBahga, Vijay Madiseti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
3. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.
4. Francis daCosta, —Rethinking the Internet of Things: A Scalable Approach to Connecting Everythingll, 1st Edition, Apress Publications, 2013
5. Cuno Pfister, Getting Started with the Internet of Things, O'Reilly Media, 2011, ISBN: 9781-4493-9357-1
6. DGCA RPAS Guidance Manual, Revision 3 – 2020
7. Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs, John Baichtal

Online Learning Resources:

1. <https://www.arduino.cc/>
2. <https://www.raspberrypi.org/>
3. <https://nptel.ac.in/courses/106105166/5>
4. <https://nptel.ac.in/courses/108108098/4>



IV B.Tech I Semester

	AGILE METHODOLOGIES (Professional Elective –V)	L	T	P	C
		3	0	0	3

Course Objectives:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide good understanding of software design and a set of software technologies and APIs.
- To carry out detailed examination and demonstration of Agile development and testing techniques.
- To discuss Agile software development

Course Out comes:

After completion of the course, students will be able to

- Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams.
- Show how agile approaches can be scaled up to the enterprise level.

UNIT I AGILE METHODOLOGY**Lecture 9 Hrs**

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES**Lecture 8Hrs**

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT**Lecture 8 Hrs**

Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING**Lecture 9 Hrs**

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE

Lecture 9 Hrs

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

Text books:

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

Reference Books:

1. Craig Larman, —Agile and Iterative Development: A Manager's Guide, Addison-Wesley, 2004.
2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

Online Learning Resources:

<https://www.nptelvideos.com/video.php?id=904>



IV B.Tech I Semester

	METaverse (Professional Elective –V)	L	T	P	C
		3	0	0	3

Course Objectives:

The main objectives of the course are to:

1. Present and discuss Metaverse characteristics, concepts and layers.
2. Explain and analyse Metaverse technologies, tools, platforms, and applications.
3. Discuss design theories and practices relevant to the Metaverse.
4. Explore cyber security and cybercrime in the Metaverse.
5. Examine open challenges in the Metaverse.

Course Out comes:

After completion of the course students are expected to be able to:

1. Under stand the characteristics, and interdisciplinary nature of the Metaverse, the opportunities and risks it presents.
2. Analyze Metaverse layers, the technologies used in creating them, as well as design theories and practices for Metaverse.
3. Examine and discuss Metaverse platforms, applications and the latest technological developments in this area.
4. Identify cyber security issues, understand cybercrime, and discuss the open challenges.
5. Building Metaverse Applications

Unit-1

Metaverse fundamentals: Metaverse evolution, Metaverse importance and characteristics, the interdisciplinary nature of the Metaverse, Metaverse opportunities and risks, Computer-mediated communication (social presence theory, social information processing theory, media richness theory, cyborg theory), Avatar-mediated communication.

Unit-2

The seven layers of Metaverse: ExperienceDiscovery, Creator economy, Spatial computing, Decentralization, Human interface, Infrastructure
Metaverse Technologies part I: AR/VR/MR/XR, 3D reconstruction, Game engines, Smart glasses, wearables, haptic devices, headsets and headwear.

Unit-3

Metaverse technologies part II: Blockchain, smart contracts, tokens, NFTs, Cryptography, Artificial Intelligence (AI), Internet of Things (IoT), Edge computing and 5G, 6G.Design theories and practices: Social presence and co-presence, Motion sickness and cybersickness, Uncanny valley, Sense of self-location, sense of agency and sense of body ownership, Universal simulation principle, Prototyping, Evaluation techniques (qualitative and quantitative).

Unit-4

Tools and technologies for Metaverse UX and UI: Tools and services for avatar systems, Spatial user interface design, Cross-platform user experience design, Multimodal user interface, Technologies and devices for human computer interaction in Metaverse, Metaverse platforms: Decentraland, SANDBOX, Roblox, Axie Infinity, uHive, Hyper Nation, Nakamoto (NAKA), Metahero (HERO), Star Atlas (ATLAS), Bloktopia (BLOK), Stageverse, Spatial, PalkaCity, Viverse, Sorare, Illuvium, Upland, Second Life, Sansar, Sensorium Galaxy

Goel

Unit-5

Metaverse applications - part I: Gaming and entertainment, Travel and tourism, Education and learning, Remote working, Commerce and business, Metaverse applications - part II: Real estate, Banking and Finance, Healthcare, Social media, Fashion, Metaverse and cyber security: Cyber security concerns in Metaverse: Social engineering attacks, Data theft, Decentralization vs vulnerabilities, Cyber security risks in Metaverse: process, people, technology, Metaverse and cybercrime: Scam and theft, Rug pull, Money manipulation and wash trading, Money laundering, Metaverse challenges and open issues: Persistency, Interoperability and scalability, Maturity, Regulation, Usefulness and ease-of-use, Privacy and data security, Content creation, NFTs and creator economy, Social, legal and ethical issues in the Metaverse

Text books

The Metaverse, Terry Winters, Independently published, 2021, ISBN: 979-8450959283

Reference Books:

1. Ball, M., 2022, —The Metaverse and How It Will Revolutionize Everything—, Liveright, ISBN: 978-1324092032
2. Damar, M. (2021). Metaverse shape of your life for future: A bibliometric snapshot. Journal of Metaverse, 1(1), 1–8.
3. Day, J. (2022) Metaverse will see cyber warfare attacks unlike anything before: 'Massively elevated', February 28.
<https://www.express.co.uk/news/science/1570844/metaverse-news-cyber-warfare-attacks-virtual-worlds-russia-china-spt>.
4. Polyviou, A., Sharma K., Pappas, I.O.(2023). Training in the metaverse: Employing physiological data to improve how we build metaverses for businesses. The next generation internet: The role of metaverses, AR, VR, MR, and digital twins, Temple University Institute for Business and Information Technology Link: <https://ibit.temple.edu/nextgenerationinternet>
5. QuHarrison T. , Keeney, S., 2022, —The Metaverse Handbook: Innovating for the Internet's NextTectonic Shift, Wiley, ISBN: 978-1119892526
6. The mistocleous, M., Christodoulou, K., & Katelaris, L. (2023). An Educational Metaverse Experiment: The first on-chain and in- Metaverse academic course. Information Systems. EMCIS2022. Lecture Notes in Business Information Processing, Springer, Cham.
7. Stephenson, N., 1992, —Snow Crash, ISBN: 978-055338

IV B.Tech I Semester

		L	T	P	C
	QUANTUM COMPUTING APPLICATIONS (Professional Elective –V)	3	0	0	3

Course Objectives:

- To introduce the principles and mathematical foundations of quantum computation.
- To understand quantum gates, circuits, and computation models.
- To explore quantum algorithms and their advantages over classical ones.
- To develop the ability to simulate and write basic quantum programs.
- To understand real-world applications and the future of quantum computing in AI, cryptography, and optimization.

Course Outcomes:

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

- Explain the fundamental concepts of quantum mechanics used in computing.
- Construct and analyze quantum circuits using standard gates.
- Apply quantum algorithms like Deutsch-Jozsa, Grover's, and Shor's.
- Develop simple quantum programs using Qiskit or similar platforms.
- Analyze applications and challenges of quantum computing in real-world domains.

UNIT I: Fundamentals of Quantum Mechanics and Linear Algebra

Classical vs Quantum Computation, Complex Numbers, Vectors, and Matrices, Hilbert Spaces and Dirac Notation, Quantum States and Qubits, Superposition and Measurement, Tensor Products and Multi-Qubit Systems.

UNIT II: Quantum Gates and Circuits

Quantum Logic Gates: Pauli, Hadamard, Phase, Controlled Gates and CNOT, Unitary Operations and Reversibility, Quantum Circuit Representation, Quantum Teleportation, Simulation of Quantum Circuits.

UNIT III: Quantum Algorithms and Complexity

Quantum Parallelism and Interference, Deutsch and Deutsch-Jozsa Algorithms, Grover's Search Algorithm, Shor's Factorization Algorithm, Quantum Fourier Transform, Complexity Classes: BQP, P, NP, and QMA.

UNIT IV: Quantum Programming and Simulation Platforms

Introduction to Qiskit and IBM Quantum Experience, Writing Quantum Circuits in Qiskit, Measuring Qubits and Result, Classical-Quantum Hybrid Programs, Noisy Intermediate-Scale Quantum (NISQ) Systems, Limitations and Current State of Quantum Hardware.

UNIT V: Applications and Future of Quantum Computing

Quantum Machine Learning: Basics and Models, Quantum Cryptography and Quantum Key Distribution, Quantum Algorithms in AI and Optimization, Quantum Advantage and Supremacy, Ethical and Societal Impact of Quantum Technologies, Future Trends and Research Directions.

Textbooks:

1. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.

2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
3. Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019.

Reference Books:

1. David McMahon, Quantum Computing Explained, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, An Introduction to Quantum Computing, Oxford University Press, 2007.
3. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press, 2013.

Online Learning Resources:

1. **IBM Quantum Experience and Qiskit Tutorials**
2. **Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley**
3. **edX – The Quantum Internet and Quantum Computers**
4. **YouTube – Quantum Computing for the Determined by Michael Nielsen**
5. **Qiskit Textbook – IBM Quantum**



IV B.Tech I Semester

	CYBER PHYSICAL SYSTEMS	L	T	P	C
		3	0	0	3

Course Objective:

The objective of this course is to provide students with a comprehensive understanding of the various techniques and methodologies used to design, secure, synchronize, and schedule operations within **Cyber- Physical Systems (CPS)**. The course will cover symbolic synthesis for CPS, security aspects, distributed synchronization, real-time scheduling, and model integration, with an emphasis on both basic principles and advanced techniques.

Course Out comes: Upon the Successful Completion of the Course, the Students would be able to:

1. Understand the core principles behind CPS
2. Identify Security mechanisms of Cyber physical systems
3. Under stand Synchronization in Distributed Cyber-Physical Systems
4. To Understand the Scheduling for Cyber-Physical Systems
5. To understand the various Cyber-Physical System models

UNIT - I

Symbolic Synthesis for Cyber-Physical Systems

Introduction and Motivation, Basic Techniques - Preliminaries, Problem Definition, Solving the Synthesis Problem, Construction of Symbolic Models, Advanced Techniques: Construction of Symbolic Models, Continuous-Time Controllers, Software Tools

UNIT - II

Security of Cyber-Physical Systems

Introduction and Motivation, Basic Techniques - Cyber Security Requirements, Attack Model, Countermeasures, Advanced Techniques: System Theoretic Approaches

UNIT - III

Synchronization in Distributed Cyber-Physical Systems: Challenges in Cyber-Physical Systems, A Complexity-Reducing Technique for Synchronization, Formal Software Engineering, Distributed Consensus Algorithms, Synchronous Lockstep Executions, Time-Triggered Architecture, Related Technology, Advanced Techniques

UNIT - IV

Real-Time Scheduling for Cyber-Physical Systems

Introduction and Motivation, Basic Techniques - Scheduling with Fixed Timing Parameters, Memory Effects, Multiprocessor/Multicore Scheduling, Accommodating Variability and Uncertainty

UNIT - V

Model Integration in Cyber-Physical Systems

Introduction and Motivation, Causality, Semantic Domains for Time, Interaction Models for Computational Processes, Semantics of CPS DSMLs, Advanced Techniques, For Spec, The Syntax of CyPhyML, Formalization of Semantics, Formalization of Language Integration.

TEXT BOOKS:

1. Raj Raj kumar, Dion is io De Niz, and Mark Klein, Cyber-Physical Systems, Addison-Wesley Professional.
2. Rajeev Alur, Principles of Cyber-Physical Systems, MIT Press, 2015



IV B.Tech I Sem

	PROMPT ENGINEERING	L	T	P	C
	Skill Enhancement Course	0	1	2	2

Course Objective:

This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance. Understanding Prompt Engineering is a comprehensive course designed to equip learners with the knowledge and skills to effectively generate and utilize prompts in natural language processing (NLP) and machine learning (ML) applications. This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance.

Course Out comes:

- Understanding the fundamentals and evolution of prompt engineering.
- Gaining the ability to craft effective closed-ended, open-ended, and role-based prompts.
- Learning to probe and stress-test AI models for bias and robustness.
- Applying prompt optimization techniques and performance evaluation methods.
- Mitigating bias and promoting ethical prompting practices in NLP/ML systems.

Module 1: Introduction to Prompt Engineering

- *Lesson 1: Foundations of Prompt Engineering*
 - Overview of prompt engineering and its significance in NLP and ML.
 - Historical context and evolution of prompt-based approaches.

Module 2: Types of Prompts and Their Applications

- *Lesson 2: Closed-Ended Prompts*
 - Understanding and creating prompts for specific answers.
 - Applications in question- answering systems.
- *Lesson 3: Open-Ended Prompts*
 - Crafting prompts for creative responses.
 - Applications in language generation models.

Module 3: Strategies for Effective Prompting

- *Lesson 4: Probing Prompts*
 - Designing prompts to reveal model biases.
 - Ethical considerations in using probing prompts.
- *Lesson 5: Adversarial Prompts*
 - Creating prompts to stress-test models.
 - Enhancing robustness through adversarial prompting.

Module 4: Fine-Tuning and Optimizing with Prompts

- *Lesson 6: Fine-Tuning Models with Prompts*
 - Techniques for incorporating prompts during model training.
 - Balancing prompt influence and generalization.

- *Lesson 7: Optimizing Prompt Selection*
 - Methods for selecting optimal prompts for specific tasks.
 - Customizing prompts based on model behavior.

Module 5: Evaluation and Bias Mitigation

- *Lesson 8: Evaluating Prompt Performance*
 - Metrics and methodologies for assessing model performance with prompts.
 - Interpreting and analyzing results.
- *Lesson 9: Bias Mitigation in Prompt Engineering*
 - Strategies to identify and address biases introduced by prompts.
 - Ensuring fairness and inclusivity in prompt-based models.

Module 6: Real-World Applications and Case Studies

- *Lesson 10: Case Studies in Prompt Engineering*
- *Exploration of successful implementations and challenges in real-world scenarios.*
- *Guest lectures from industry experts sharing their experiences.*

Text books:

1. "Prompt Engineering in Action" – *Danny D. Sullivan*
2. "The Art of Prompt Engineering with Chat GPT: A Hands-On Guide" – *Nathan Hunter.*

Reference Books:

1. "Prompt Engineering in Practice" – *Michael F. Lewis*
2. "Mastering AI Prompt Engineering: The Ultimate Guide for Chat GPT Users" – *Adriano Damiao*
3. "Writing AI Prompts For Dummies" – *Stephanie Diamond and Jeffrey Allan*
4. "Prompt Engineering Guide" (Online Resource) – *promptingguide.ai*

Online Resource link :

<https://www.udemy.com/course/understanding-prompt-engineering/?couponCode=NVDINCTA35TRT>

(Common to All Branches of Engineering)

R-23

Course Code	Gender Sensitization		L	T	P	C
			0	0	2	0
Pre-requisite		Semester				
Course Objectives:						
- To enable students to understand the gender related issues, vulnerability of women and men - To familiarize them about constitutional safeguard for gender equality - To expose the students to debates on the politics and economics of work - To help students reflect critically on gender violence - To make them understand that gender identities and gender relations are part of culture as they shape the way daily life is lived in the family as well as wider community and the workplace.						
Course Outcomes (CO):						
COs	Statements					Bloom level
CO1	Understand the basic concepts of gender and its related terminology					L1, L2
CO2	Identify the biological, sociological, psychological and legal aspects of gender.					L1, L2
CO3	Use the knowledge in understanding how gender discrimination works in our society and how to counter it.					L3
CO4	Analyze the gendered division of labour and its relation to politics and economics.					L4
CO5	Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all culture and gender groups					L5
CO6	Develop students' sensibility with regard to issues of gender in contemporary India					L3

SYLLABUS

Unit-1 UNDERSTANDING GENDER

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

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

Unit-2 GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and its Consequences- Declining Sex Ratio- Demographic Consequences-Gender Spectrum -

Unit-3 GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- —My Mother doesn't Work. —Share the Load. —Work: Its Politics and Economics -Fact and Fiction- Unrecognized



and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit-4GENDER-BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence

Unit-5GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Just Relationships

Prescribed Books

1. A.Suneetha, Uma Bhugubanda, et al. *Towards a World of Equals: A Bilingual Textbook on Gender*, Telugu Akademi, Telangana, 2015.
2. Butler, Judith. *Gender Trouble: Feminism and the Subversion of Identity*. UK Paperback Edn. March 1990

Reference Books

1. Wtatt, Robin and Massood, Nazia, *Broken Mirrors: The dowry Problems in India*, London : Sage Publications, 2011
2. Datt, R. and Kornberg, J.(eds), *Women in Developing Countries, Assessing Strategies for Empowerment*, London: Lynne Rienner Publishers, 2002
3. Brush, Lisa D., *Gender and Governance*, New Delhi, Rawat Publication, 2007
4. Singh, Direeti, *Women and Politics World Wide*, New Delhi, Axis Publications, 2010
5. Raj Pal Singh, Anupama Sihag, *Gender Sensitization: Issues and Challenges* (English, Hardcover), Raj Publications, 2019
6. A.Revathy& Murali, Nandini, *A Life in Trans Activism*(Lakshmi Narayan Tripathi). The University of Chicago Press, 2016

Online Resources:

1. Understanding Gender

chrome-

extension://kdpelmjpfafjppnhbloffcjpeomlnpah/https://www.arvindguptatoys.com/arvindgupta/kamla-gender1.pdf

https://onlinecourses.swayam2.ac.in/nou24_hs53/preview

2. Gender Roles and Relations

<https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes>

<https://www.verywellmind.com/understanding-gender-roles-and-their-effect-on-our-relationships-7499408>

https://onlinecourses.swayam2.ac.in/cec23_hs29/preview

3. Gender and Labour

<https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed>

https://onlinecourses.nptel.ac.in/noc23_mg67/preview

4. GENDER-BASED VIOLENCE

https://eige.europa.eu/gender-based-violence/what-is-gender-based-violence?language_content_entity=en

<https://www.worldbank.org/en/topic/socialsustainability/brief/violence-against-women-and-girls>

https://onlinecourses.swayam2.ac.in/nou25_ge38/preview

5. GENDER AND CULTURE

<https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/>

<https://sociology.iresearchnet.com/sociology-of-culture/gender-and-culture/>

<https://archive.nptel.ac.in/courses/109/106/109106136/>

Abdulali Sohaila. —I Fought For My Life...and Won. Available online (at: <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>)



HONOURS

	QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives

- To introduce the fundamentals of quantum computing
- The problem-solving approach using finite dimensional mathematics

Course Outcomes

- Understand basics of quantum computing
- Understand physical implementation of Qubit
- Understand Quantum algorithms and their implementation
- Understand The Impact of Quantum Computing on Cryptography

UNIT - I

History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II

Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III

Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere
Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT - V

Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

TEXT BOOKS:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms

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	No SQL DATABASES	L	T	P	C
		3	0	0	3

Course Objectives:

- Discuss the history unstructured data
- To know non- relational databases and their importance in Data science.
- Under stand the differences between Relational and No SQL databases
- To explore the several types of No SQL data bases and understand the role in Big Data.

Course Out comes:

After completion of the course, students will be able to

- Explain and compare different types of No SQL database.
- Compare and contrast RDBMS with different No SQL databases.
- Define, compare and use the four types of No SQL databases (Document-oriented, Key Value pairs, Column-oriented and Graph
- Demonstrate the architecture, define objects, load data, query data and performance tune Column-oriented, Key-Value pair, Document and Graph databases.
- Evaluate No SQL database development tools and programming languages

UNIT I Overview and history of No SQL Data bases

Lecture 12Hrs

Definition of the four types of No SQL data bases. The value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The emergence of No SQL, Key Points.

UNIT II RDBMS Vs No SQL

Lecture 12Hrs

Comparison of relational databases to new No SQL stores, Mongo DB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges No SQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregated-Oriented Databases, Replication and Sharding, Map Reduce on databases, Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT III Document Data bases

Lecture 12Hrs

No-SQL Key-Value Databases using Mongo DB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analysis or Real Time Analytics.

UNIT IV Column Oriented Databases

Lecture 12Hrs

Column-oriented No SQL databases using Apache HBASE, Column-oriented No SQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

UNIT V Key Value Data bases

Lecture 12Hrs

No SQL Key-Value databases using Riak, Key-Value Data bases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences,

Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Firebase- Cloud hosted No SQL Database, Graph No SQL databases using Neo4j, No SQL database development tools and programming languages, Graph Databases features, consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

Text books:

1. Sadalage, P. & Fowler, No SQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition 2019.

Reference Books:

1. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the No SQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC.
ISBN-13: 978-1934356920 ISBN-10: 1934356921
2. Guy Harrison, Next Generation Database: No SQL and big data, Apress.

Online Learning Resources:

1. <https://www.ibm.com/cloud/learn/nosql-databases>
2. <https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp>
3. <https://www.geeksforgeeks.org/introduction-to-nosql/>
4. <https://www.javatpoint.com/nosql-databa>



	SOFTWARE DEFINED DATA CENTER	L	T	P	C
		3	0	0	3

Course Objectives:

- Introduce conventional Data Centers followed by Modern Data Centers
- To discuss various software elements of modern data centers
- Explain Virtualization concepts for Data Centers
- Discuss Compute, Storage and Network virtualization

Course Out comes:

After completion of the course, students will be able to

- Understanding of difference between Conventional Data Center Vs Modern Data Centers
- Differentiate Cloud computing and Software Defined Data Centers
- Differentiate Virtualization with conventional techniques
- Explore the techniques of Software Defined Compute, Storage and Networking components
- Able Manage Software Defined Data Centers and Develop the techniques for future Data Centers.

UNIT I Introduction

Lecture 12Hrs

Data Center evolution, A history of Modern Data Center, Focus on cost reduction, Focus on Customer service in the business, Flattening of the IT organization, IT as an operational Expense, Monolithic Storage Array rise and fall, Move From Disk to Flash, Emergence of Convergence, The Role of Cloud computing.

UNIT II Emerging Data Center Trends

Lecture 12Hrs

Emergence of SDCC, Commoditization of Hardware, Software Defined – Compute, Storage, Networking and Security, Software Defined Storage (SDS), Hyper convergence, Hyper Converged Infrastructure(HCI) and SDS relationship, Flash in Hyper convergence, Modern IT business Requirements.

UNIT III Data Center Agility

Lecture 12Hrs

Principles and Strategies, Transform Data Center, Align Data Center and Business Needs, Server virtualization, VDI, Eliminate and Implement Monolithic to Hyper convergence, Full Stack Management.

UNIT V Hyper converged Infrastructure

Lecture 12Hrs

Software Defined Storage, SDS comparison to Traditional Storage, SDS requirements, SDS in Hyper converged, Hyper convergence Design Model, Virtual Storage appliances, Appliance vs. Software/Reference Architecture,

UNIT V Future Data Centers

Lecture 12Hrs

Data growth, Storage capacity, flash storage deployment, Deployment Experiences SDS and HCI, IT transformations- Automation, Orchestration, Dev Ops, Open Standards and Interoperability, Performance Benchmarking Standards, Future Trends, Containers Instead of virtual machines, Open Source tools, Beyond Today's Flash, Pooling of Resources.



Text books:

1. Building a Modern Data Center, Principles and Strategies of Design, Scott D.Lowe, James Green, David Davis. Actual Tech Media, 2016.

Reference Books:

1. Data Center Handbook: Plan, Design, Build, and Operations of a Smart Data Center, Second Edition, HwaiyuGeng P.F., 2021 John Wiley & Sons.

A handwritten signature in black ink, consisting of a large, stylized 'P' followed by a series of loops and a long horizontal stroke.

CLOUD SECURITY		L	T	P	C
		3	0	0	3

Pre-requisites: Computer Networks, Cryptography and Network Security, Cloud Computing.

Course Objectives:

The course is designed to

- Understand the cloud security and privacy issues.
- Familiarize with the Threat Model and Cloud Attacks.
- Understand the Data Security and Storage.
- Analyze Security Management in the Cloud

Course Out comes:

After completion of the course, students will be able to

- Distinguish the various cloud security and privacy issues.
- Analyze the various threats and Attack tools.
- Describe the Data Security and Storage.
- Analyze the Security Management in the Cloud

UNIT I Over view of Cloud Computing

Lecture 9 Hrs

Overview of Cloud Computing: Introduction, Definitions and Characteristics, Cloud Service Models, Cloud Deployment Models, Cloud Service Platforms, Challenges Ahead. Introduction to Cloud Security: Introduction, Cloud Security Concepts, CSA Cloud Reference Model, NIST Cloud Reference Model, NIST Cloud Reference Model.

UNIT II Cloud Security and Privacy Issues

Lecture 9 Hrs

Cloud Security and Privacy Issues: Introduction, Cloud Security Goals/Concepts, Cloud Security Issues, Security Requirements for Privacy, Privacy Issues in Cloud. Infrastructure Security: The Network Level, the Host Level, the Application Level, SaaS Application Security, PaaS Application Security, IaaS Application Security.

UNIT III Threat Model and Cloud Attacks

Lecture 9 Hrs

Threat Model and Cloud Attacks: Introduction, Threat Model- Type of attack entities, Attack surfaces with attack scenarios, A Taxonomy of Attacks, Attack Tools-Network-level attack tools, VM-level attack tools, VMM attack tools, Security Tools, VMM security tools.

UNIT IV Data Security and Storage

Lecture 9Hrs

Information Security Basic Concepts, an Example of a Security Attack, Cloud Software Security Requirements, Rising Security Threats. Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security.

UNIT V Security Management in the Cloud

Lecture 9 Hrs

Evolution of Security Considerations, Security Concerns of Cloud Operating Models, Identity Authentication, Secure Transmissions, Secure Storage and Computation, Security Using Encryption Keys, Challenges of Using Standard Security Algorithms, Variations and Special Cases for Security Issues with Cloud Computing, Side Channel Security Attacks in the Cloud. Security Management in the Cloud- Security Management Standards, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management.



Text books:

1. Preeti Mishra, Emmanuel S Pilli, Jaipur R C Joshi Graphic Era., —Cloud Security Attacks, Techniques, Tools, and Challengesl, 1st Edition, 2022, CRC press.
2. Tim Mather, SubraKumaraswamy, and ShahedLati—Cloud Security and Privacyl, 1st Edition, 2019, O'Reilly Media, Inc.

Reference Books:

1. Naresh Kumar Sehgal Pramod Chandra, P. Bhatt John M. Acken., —Cloud Computing with Security Concepts and Practicesl, 2nd Edition Springer nature Switzerland AG 2020.
2. Essentials of Cloud Computing by K. Chandrasekaran Special Indian Edition CRC press.
3. Raj kumar Buyya,—Cloud Computing Principles and Paradigmsl, John Wiley.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc19_cs64/preview
- <https://archive.nptel.ac.in/courses/106/105/106105167/>



	ROBOTICS AND INTELLIGENT SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives:

- Understand the basic concepts of robotics.
- Discuss the requirement of robotic technology
- Introduce robotics kinematics, dynamic analysis and programming.
- Understand the concepts of intelligent system and apply them to robotics

Course Out comes:

After completion of the course, students will be able to

- Understand general concepts of Robotics and intelligent systems.
- Understand robotics control systems
- Analyze and understand the various programming languages of robotics
- Understand Industrial robots and its applications
- Create IoT solutions using sensors, actuators and Devices

UNIT- I

Lecture 8Hrs

Introduction to Robotics : Back ground, Historical development, Robot Arm Kinematics and Dynamics, Manipulator Trajectory planning and Motion Control, Robot Sensing

UNIT- II

Lecture 9Hrs

Robot Arm Kinematics and Dynamics: Introduction to Kinematics, Direct and Inverse Kinematics Problem and solution, Dynamics introduction, Lagrange-Euler Formulation, Newton Euler Formulation, Generalized D'Alembert Equations of motion. Trajectory planning,

UNIT- III

Lecture 9Hrs

Sensing and Vision: Introduction to Sensing, Proximity Sensing, Touch Sensors, Force and Torque Sensing, Image acquisition, Illumination techniques, Imaging Geometry, Recognition and Interpretation.

UNIT IV

Lecture 8Hrs

Robot Programming Languages: Introduction to Robot Programming Languages, Characteristics of Robot Level Languages, three levels of robot programming, requirements of a robot programming language, Task Level Languages, problems peculiar to robot languages, Introduction to Robot

Operating System (ROS)

UNIT V

Lecture 8Hrs

Robot Intelligence: Introduction, State Space Search, Problem Reduction, Use of Predicate Logic, Means-Ends Analysis, Problem solving, Robot Learning, Robot Task Planning, Basic Problems in Task Planning, Expert systems and knowledge engineering.

Text books:

1. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, Robotics : Control, Sensing, Vision and Intelligence
2. Aaron Martinez, Enrique Fernandez, Learning ROS for Robotics Programming: A practical, instructive, and comprehensive guide to introduce your self to ROS, the top-notch, leading robotics framework, PACKT publishing, Open Source.

Reference Books:

John J. Craig, Introduction to Robotics: Mechanics and Control, Addison Wesley publication, Third Edition.

Online Learning Resources

<https://nptel.ac.in/courses/107106090>

<https://nptel.ac.in/courses/112108298>

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	No SQL Lab	L	T	P	C
		0	0	3	1.5

Course Outcomes:

Upon successful completion of the course, the student will be able to:

List of Experiments:

1. Mongo DB installation and configuration in windows.
2. Demonstrate how to create and drop a database in Mongo DB.
3. Creating the Collection in Mongo DB on the fly
4. Creating collection with options before inserting the documents and drop the collection created.
5. Mongo DB insert document
 - a. Insert single document
 - b. Insert multiple documents in collection
6. Querying all the documents in json format and Querying based on the criteria.
7. Mongo DB update document
 - a. Using update() method.
 - b. Using save() method.
8. MongoDB delete document from a collection.
 - a. Using remove() method.
 - b. Remove only one document matching your criteria
 - c. Remove all documents
9. Mongo DB Projection
10. limit(), skip(), sort() methods in Mongo DB
11. Mongo DB indexing
 - a. Create index in Mongo DB
 - b. Finding the indexes in a collection
 - c. Drop indexes in a collection
 - d. Drop all the indexes
12. Mongo DB with java and PHP
 - a. Create a simple application that uses Mongo DB with Java
 - b. Create a simple application that uses Mongo DB with PHP

Web References:



	Quantum & Cloud Computing Lab	L	T	P	C
		0	0	3	1.5

Course Objectives (COs)

This course aims to:

1. Introduce fundamental quantum computing concepts such as qubits, superposition, and quantum gates using Qiskit.
2. Develop an understanding of quantum algorithms through practical implementation, including Deutsch's algorithm.
3. Provide hands-on experience in cloud computing by simulating cloud environments, VM allocation, and scheduling policies.
4. Analyze cloud resource management techniques such as load balancing and deployment models.
5. Explore cloud security challenges by simulating cyber threats like Denial of Service (DoS) attacks.

Course Out comes (CLOs)

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

1. Implement and compare classical and quantum bits using Qiskit.
2. Design and analyze quantum circuits using logic gates and linear algebra principles.
3. Simulate and evaluate cloud computing infrastructures including data centers, VM allocation, and scheduling policies.
4. Apply resource provisioning techniques to optimize cloud performance and load balancing.
5. Assess cloud security threats by implementing and analyzing DoS attack simulations.

Quantum Computing Lab:

1. **Simulating Classical vs Quantum Bits**
 - o Implement **classical bits and qubits** using Qiskit.
 - o Compare **bit flip** vs **quantum superposition** using Hadamard gates.
2. **Quantum Logic Gates Implementation**
 - o Implement and visualize basic **quantum gates** (X, Y, Z, H, S, T).
 - o Apply these gates to single and multiple qubits.
3. **Linear Algebra in Quantum Computing**
 - Represent **quantum states** using matrices and vectors.
 - Perform **matrix operations** (addition, multiplication, tensor product).
4. **Deutsch's Algorithm Implementation**
 - Demonstrate quantum parallelism using **Deutsch's algorithm**. Compare results with classical computation.



Cloud Computing Lab:

1. **Simulation of a Simple Cloud Data Center:** Create a cloud environment with multiple **Hosts, Virtual Machines (VMs), and Cloudlets**.
2. **VM Allocation and Scheduling Policies:** Implement and compare **Time-Shared and Space-Shared** VM allocation policies.
3. **Resource Provisioning and Load Balancing :** Simulate dynamic **resource allocation** for better load balancing.
4. **Cloudlet Scheduling Algorithms:** Implement and compare **FCFS (First-Come-First-Serve), Round Robin, and Priority-Based Scheduling**.
5. **Performance Analysis of Cloud Deployment Models :** Simulate and compare **Public, Private, Hybrid, and Community Cloud** environments.
6. **Simulating Denial of Service (DoS) Attacks:** Implement a scenario where multiple requests overload a cloud server.

TEXT BOOKS:

1. Shashank Tiwari, Professional No SQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-6
2. Pramod Sadalage and Martin Fowler, No SQL Distilled, Addison-Wesley Professional, 2012.

REFERENCE BOOKS:

1. Dan McCreary and Ann Kelly, Making Sense of No SQL, Manning Publications, 2013.
2. Gaurav Vaish, Getting Started with No SQL, Packt Publishing, 2013.

