



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For UG –R20

B. TECH - COMPUTER SCIENCE & ENGINEERING

(Applicable for batches admitted from 2020-2021)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE

| I Year – I SEMESTER | | | | | | |
|----------------------------|--------------------|--|-------------|----------|----------|----------------|
| S. No | Course Code | Courses | L | T | P | Credits |
| 1 | HS | Communicative English | 3 | 0 | 0 | 3 |
| 2 | BS | Mathematics - I (Calculus And Differential Equations) | 3 | 0 | 0 | 3 |
| 3 | BS | Applied Physics | 3 | 0 | 0 | 3 |
| 4 | ES | Programming for Problem Solving using C | 3 | 0 | 0 | 3 |
| 5 | ES | Computer Engineering Workshop | 1 | 0 | 4 | 3 |
| 6 | HS | English Communication Skills Laboratory | 0 | 0 | 3 | 1.5 |
| 7 | BS | Applied Physics Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | Programming for Problem Solving using C Lab | 0 | 0 | 3 | 1.5 |
| Total Credits | | | 19.5 | | | |

| I Year – II SEMESTER | | | | | | |
|-----------------------------|--------------------|--|-------------|----------|----------|----------------|
| S. No | Course Code | Courses | L | T | P | Credits |
| 1 | BS | Mathematics – II (Linear Algebra And Numerical Methods) | 3 | 0 | 0 | 3 |
| 2 | BS | Applied Chemistry | 3 | 0 | 0 | 3 |
| 3 | ES | Computer Organization | 3 | 0 | 0 | 3 |
| 4 | ES | Python Programming | 3 | 0 | 0 | 3 |
| 5 | ES | Data Structures | 3 | 0 | 0 | 3 |
| 6 | BS | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 7 | ES | Python Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | ES | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | MC | Environment Science | 2 | 0 | 0 | 0 |
| Total Credits | | | 19.5 | | | |



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| II Year – I SEMESTER | | | | | | |
|-----------------------------|--------------------|--|-------------|----------|----------|----------------|
| S. No | Course Code | Courses | L | T | P | Credits |
| 1 | BS | Mathematics III | 3 | 0 | 0 | 3 |
| 2 | CS | Object Oriented Programming through C++ | 3 | 0 | 0 | 3 |
| 3 | CS | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | CS | Software Engineering | 3 | 0 | 0 | 3 |
| 5 | CS | Mathematical Foundations of Computer Science | 3 | 0 | 0 | 3 |
| 6 | CS | Object Oriented Programming through C++ Lab | 0 | 0 | 3 | 1.5 |
| 7 | CS | Operating Systems Lab | 0 | 0 | 3 | 1.5 |
| 8 | CS | Software Engineering Lab | 0 | 0 | 3 | 1.5 |
| 9 | SO | Skill oriented Course - I Applications of Python-NumPy OR 2) Web Application Development Using Full Stack -Frontend Development – Module-I | 0 | 0 | 4 | 2 |
| 10 | MC | Constitution of India | 2 | 0 | 0 | 0 |
| Total Credits | | | 21.5 | | | |

| II Year – II SEMESTER | | | | | | |
|------------------------------|--------------------|--|-------------|----------|----------|----------------|
| S. No | Course Code | Courses | L | T | P | Credits |
| 1 | BS | Probability and Statistics | 3 | 0 | 0 | 3 |
| 2 | CS | Database Management Systems | 3 | 0 | 0 | 3 |
| 3 | CS | Formal Languages and Automata Theory | 3 | 0 | 0 | 3 |
| 4 | ES | Java Programming | 3 | 0 | 0 | 3 |
| 5 | HS | Managerial Economics and Financial Accountancy | 3 | 0 | 0 | 3 |
| 6 | CS | Database Management Systems Lab | 0 | 0 | 2 | 1 |
| 7 | CS | R Programming Lab | 0 | 1 | 2 | 2 |
| 8 | ES | Java Programming Lab | 0 | 0 | 3 | 1.5 |
| 9 | SO | Skill Oriented Course - II Applications of Python-Pandas OR 2) Web Application Development Using Full Stack -Frontend Development –Module-II | 0 | 0 | 4 | 2 |
| Total Credits | | | 21.5 | | | |
| 10 | Minor | Operating Systems ^{\$} | 3 | 0 | 2 | 3+1 |
| 11 | Honors | Any course from the Pool, as per the opted track | 4 | 0 | 0 | 4 |

^{\$}- Integrated Course



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| III B. Tech – I Semester | | | | | | |
|---------------------------------|------------------------------|--|-----------------------|----------|----------|----------------|
| S.No | Course Code | Courses | Hours per week | | | Credits |
| | | | L | T | P | |
| 1 | PC | Computer Networks | 3 | 0 | 0 | 3 |
| 2 | PC | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 |
| 3 | PC | Data Warehousing and Data Mining | 3 | 0 | 0 | 3 |
| 4 | Open Elective / Job Oriented | Open Elective-I Open Electives offered by other departments/ Optimization in Operations Research (Job oriented course) | 3 | 0 | 0 | 3 |
| 5 | PE | Professional Elective-I Artificial Intelligence Software Project Management Distributed Systems Advanced Unix Programming | 3 | 0 | 0 | 3 |
| 6 | PC | Data Warehousing and Data Mining Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | Computer Networks Lab | 0 | 0 | 3 | 1.5 |
| 8 | SO | Skill Oriented Course – III 1. Animation course: Animation Design OR 2. Continuous Integration and Continuous Delivery using DevOps | 0 | 0 | 4 | 2 |
| 9 | MC | Employability Skills-I | 2 | 0 | 0 | 0 |
| 10 | PR | Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester | 0 | 0 | 0 | 1.5 |
| Total credits | | | | | | 21.5 |
| 11 | Minor | Database Management Systems ^s | 3 | 0 | 2 | 3+1 |
| 12 | Honors | Any course from the Pool, as per the opted track | 4 | 0 | 0 | 4 |

\$- Integrated Course



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| III B. Tech – II Semester | | | | | | |
|--|-----------------------------|---|----------------|---|---|-------------|
| S.No | Course Code | Courses | Hours per week | | | Credits |
| | | | L | T | P | C |
| 1 | PC | Machine Learning | 3 | 0 | 0 | 3 |
| 2 | PC | Compiler Design | 3 | 0 | 0 | 3 |
| 3 | PC | Cryptography and Network Security | 3 | 0 | 0 | 3 |
| 4 | PE | Professional Elective-II 1.Mobile Computing 2.Big Data Analytics 3.Object Oriented Analysis and Design 4.Network Programming | 3 | 0 | 0 | 3 |
| 5 | Open Elective /Job Oriented | Open Elective-II Open Electives offered by other departments/ MEAN Stack Development (<i>Job Oriented</i>) | 3 | 0 | 0 | 3 |
| 6 | PC | Machine Learning using Python Lab | 0 | 0 | 3 | 1.5 |
| 7 | PC | Compiler Design Lab | 0 | 0 | 3 | 1.5 |
| 8 | PC | Cryptography and Network Security Lab | 0 | 0 | 3 | 1.5 |
| 9 | SO | Skill Oriented Course - IV 1.Big Data:Spark OR 2.MEAN Stack Technologies-Module I (HTML 5, JavaScript, Node.js, Express.js and TypeScript) | 0 | 0 | 4 | 2 |
| 10 | MC | Employability skills-II | 2 | 0 | 0 | 0 |
| Total credits | | | | | | 21.5 |
| Industrial/Research Internship(Mandatory) 2 Months during summer vacation | | | | | | |
| 11 | Minor | Data Structures and Algorithms ^{\$} | 3 | 0 | 2 | 3+1 |
| 12 | Honors | Any course from the Pool, as per the opted track | 4 | 0 | 0 | 4 |
| Minor course through SWAYAM | | | - | - | - | 2 |

^{\$}- Integrated Course



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| IV B. Tech –I Semester | | | | | | |
|------------------------------------|-----------------------------|---|-----------------------|----------|----------|----------------|
| S.No | Course Code | Course Title | Hours per week | | | Credits |
| | | | L | T | P | C |
| 1 | PE | Professional Elective-III 1.Cloud Computing 2.Neural Networks and Soft Computing 3.Ad-hoc and Sensor Networks 4.Cyber Security & Forensics | 3 | 0 | 0 | 3 |
| 2 | PE | Professional Elective-IV 1. Deep Learning Techniques 2. Social Networks & Semantic Web 3. Computer Vision 4.MOOCs-NPTEL/SWAYAM% | 3 | 0 | 0 | 3 |
| 3 | PE | Professional Elective-V 1.Block-Chain Technologies 2.Wireless Network Security 3.Ethical Hacking 4.MOOCs-NPTEL/SWAYAM% | 3 | 0 | 0 | 3 |
| 4 | Open Elective /Job Oriented | Open Elective-III Open Electives offered by other departments/ API and Microservices (Job Oriented Course) | 3 | 0 | 0 | 3 |
| 5 | Open Elective /Job Oriented | Open Elective-IV Open Electives offered by other departments/ Secure Coding Techniques (Job Oriented Course) | 3 | 0 | 0 | 3 |
| 6 | HS | Universal Human Values 2: Understanding Harmony | 3 | 0 | 0 | 3 |
| 7 | SO | 1.PYTHON: Deep Learning OR 2.MEAN Stack Technologies-Module II- Angular JS and MongoDB OR 3.APSSDC offered Courses | 0 | 0 | 4 | 2 |
| 8 | PR | Industrial/Research Internship 2 months (Mandatory) after third year (to be evaluated during VII semester) | 0 | 0 | 0 | 3 |
| Total credits | | | | | | 23 |
| 11 | Minor | Software Engineering\$ / any other from PART-B (For Minor) | 3 | 0 | 2 | 3+1 |
| 12 | Honors | Any course from the Pool, as per the opted track | 4 | 0 | 0 | 4 |
| Minor course through SWAYAM | | | - | - | - | 2 |

\$- Integrated Course

% - MOOC Course



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| IV B. Tech –II Semester | | | | | | |
|--------------------------------|--------------------|--|-----------------------|----------|----------|----------------|
| S.No | Course Code | Course Title | Hours per week | | | Credits |
| | | | L | T | P | C |
| 1 | Project | Major Project Work, Seminar Internship | - | - | - | 12 |
| Total credits | | | | | | 12 |

Note:

1. **For integrated courses:** Theory and laboratory exams will be conducted separately, and the student concern will get credits if successfully completes both theory and laboratory. Only external exam will be conducted for Laboratory component. Credit based weightage shall be considered while awarding the grade.
2. **For MOOC courses:** Based on the students interest, student can register and complete a 12 week course one year in advance, by prior information to the concern.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SUGGESTED COURSES FOR HONORS PROGRAM

| | |
|---|---|
| <p>POOL1- AI & ML</p> <ol style="list-style-type: none"> 1. Mathematics for Machine Learning 2. Text Mining and Time Series Analysis 3. Natural Language Processing 4. Reinforcement Learning | <p>POOL2- Systems Engineering</p> <ol style="list-style-type: none"> 1. Internet of Things 2. Data Communications and Information Coding Theory 3. Service Oriented Architectures 4. Design of Secure Protocols 5. Network Coding |
| <p>POOL3- Information Security</p> <ol style="list-style-type: none"> 1. Principles of Cyber Security 2. Computational Number Theory 3. Cryptanalysis 4. Elliptic Curve Cryptography 5. Introduction to Quantum Computing and Quantum Cryptography 6. Public Key Infrastructure and Trust Management 7. Information Security Analysis and Audit 6. Cloud and IoT Security 7. Web Security 8. Block Chain Architecture Design and Use Cases | <p>POOL4 – Data Science</p> <ol style="list-style-type: none"> 1. Data Visualization 2. Statistical Foundations for Data Science 3. Mining Massive Data Sets 4. Medical Image Data Processing |



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SUGGESTED COURSES MINOR ENGINEERING IN CSE

Note:

1. Any THREE courses need to be studied from PART-A.
2. Any ONE course need to be studied from PART-B.
3. TWO, NPTEL courses of EIGHT week duration covering a total of 4 credits (offered by CSE Department only), Student can register at any time after the completion of II B.Tech. I Sem.
4. Students can pursue suggested MOOC Courses via NPTEL from II B.Tech II Sem and onwards, by prior information to the concern.

Eligibility for Minor in CSE:

| PART A | | | | | |
|---------------|--|--------------|----------------|--|--|
| S.No | Subject | L-T-P | Credits | Course available in NPTEL | NPTEL Link |
| 1 | Operating Systems | 3-0-2 | 4 | Operating Systems | https://onlinecourses.swayam2.ac.in/cec21_cs20/preview |
| 2 | Data Structures and Algorithms | 3-0-2 | 4 | Data Structures Programming, Data Structures and Algorithms using Python | https://onlinecourses.swayam2.ac.in/cec22_cs10/preview https://onlinecourses.nptel.ac.in/noc22_cs26/preview |
| 3 | Software Engineering | 3-0-2 | 4 | Software Engineering | https://onlinecourses.swayam2.ac.in/cec21_cs21/preview |
| 4 | Computer Networks | 3-0-2 | 4 | Computer Networks | https://onlinecourses.swayam2.ac.in/cec22_cs05/preview |
| 5 | Database Management Systems | 3-0-2 | 4 | Data Base Management System (noc22-cs51) | https://onlinecourses.nptel.ac.in/noc22_cs51/preview |
| PART B | | | | | |
| S.No | Subject | L-T-P | Credits | Course available in NPTEL | NPTEL Link |
| 1 | Computational Thinking | 4-0-0 | 4 | Physics through Computational Thinking | https://onlinecourses.nptel.ac.in/noc22_ph12/preview |
| 2 | Object Oriented Programming through JAVA | 3-0-2 | 4 | | |
| 3 | Data Analytics using Python | 3-0-2 | 4 | Data Analytics with Python | https://onlinecourses.nptel.ac.in/noc22_cs8/preview |
| 4 | Artificial Intelligence | 4-0-0 | 4 | Artificial Intelligence: Knowledge Representation And Reasoning | 1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview 2. https://onlinecour |



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| | | | | | |
|----------|----------------------------|-------|---|--|--|
| | | | | (noc22-cs02), An Introduction to Artificial Intelligence (noc22-cs56), AI: Constraint Satisfaction (noc22-cs06) | ses.swayam2.ac.i n/cec21_cs08/pre view |
| 5 | Unix and Shell Programming | 3-0-2 | 4 | | |
| 6 | Cloud Computing | 4-0-0 | 4 | Cloud Computing and Distributed Systems (noc22- cs18), Cloud computing(noc22- cs20) | 1. https://onlinecourses.nptel.ac.in/noc22_cs18/preview 2. https://onlinecourses.nptel.ac.in/noc22_cs20/preview |



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Open Electives to be offered by CSE for other Branches:

| | |
|---|--|
| Open Elective-I: <ol style="list-style-type: none"> 1. Data Structures 2. Object Oriented Programming through JAVA 3. Data Base Management Systems 4. Computer Graphics 5. Advanced UNIX Programming 6. Computer Organization and Architecture 7. Operating Systems | Open Elective-II: <ol style="list-style-type: none"> 1. Python Programming 2. Web Technologies 3. Soft Computing 4. Distributed Computing 5. AI and ML for Robotics 6. Computer Networks 7. Big Data Analytics 8. Computational Tools |
| Open Elective-III: <ol style="list-style-type: none"> 1. AI Tools & Techniques 2. Image Processing 3. Information Security 4. Mobile Application Development 5. Data Science 6. Cyber Security 7. Introduction to Internet of Things | Open Elective-IV: <ol style="list-style-type: none"> 1. MEAN Stack Technologies 2. Deep Learning Techniques 3. Cloud computing with AWS 4. Block Chain Technologies 5. Cryptography & Network Security 6. Introduction to Machine Learning 7. Machine Learning with Python |



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| I Year - I Semester | | | | |
|-----------------------|---|---|---|---|
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |
| COMMUNICATIVE ENGLISH | | | | |

Introduction

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

Course Objectives:

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

Course Outcomes:

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

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

Unit 1:

Lesson-1: A Drawer full of happiness from “Infotech English”, Maruthi Publications

Lesson-2: Deliverance by Premchand from “The Individual Society”, Pearson Publications. (Non-detailed)

Listening: Listening to short audio texts and identifying the topic. Listening to prose, prose and conversation.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introductions and introducing others.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Reading for Writing: Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.

Grammar: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural basic sentence structures; simple question form - wh-questions; word order in sentences.

Pronunciation: Vowels, Consonants, Plural markers and their realizations

Unit 2:

Lesson-1: Nehru's letter to his daughter Indira on her birthday from "Infotech English", Maruthi Publications

Lesson-2: Bosom Friend by Hira Bansode from "The Individual Society", Pearson Publications.(Non-detailed)

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts, both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)

Grammar: Use of articles and zero article; prepositions.

Pronunciation: Past tense markers, word stress-di-syllabic words

Unit 3:

Lesson-1: Stephen Hawking-Positivity 'Benchmark' from "Infotech English", Maruthi Publications

Lesson-2: Shakespeare's Sister by Virginia Woolf from "The Individual Society", Pearson Publications.(Non-detailed)

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Critical reading.

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing. E-mail etiquette, Writing CV's.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words

Grammar: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Pronunciation: word stress-poly-syllabic words.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Unit 4:

Lesson-1: Liking a Tree, Unbowed: Wangari Maathai-biography from “Infotech English”, Maruthi Publications

Lesson-2: Telephone Conversation-Wole Soyinka from “The Individual Society”, Pearson Publications.(Non-detailed)

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Writing SOP, writing for media.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.

Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Pronunciation: Contrastive Stress

Unit 5:

Lesson-1: Stay Hungry-Stay foolish from “Infotech English”, Maruthi Publications

Lesson-2: Still I Rise by Maya Angelou from “The Individual Society”, Pearson Publications.(Non-detailed)

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

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

Pronunciation: Stress in compound words

Text Books:

1. “Infotech English”, Maruthi Publications. (Detailed)
2. “The Individual Society”, Pearson Publications.(Non-detailed)

Prescribed text book for Laboratory for Semesters-I & II:

1. “Infotech English”, Maruthi Publications. (with Compact Disc)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Reference Books

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



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| I Year - I Semester | | | | |
|---|---|---|---|---|
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |
| MATHEMATICS-I (Calculus And Differential Equations) | | | | |

Course Objectives:

- To familiarize a variety of well-known sequences and series, with a developing intuition about the behaviour of new ones.
- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

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

- utilize mean value theorems to real life problems (L3)
- solve the differential equations related to various engineering fields (L3)
- familiarize with functions of several variables which is useful in optimization (L3)
- apply double integration techniques in evaluating areas bounded by region (L3)
- students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems(L5)

UNIT – I: Sequences, Series and Mean value theorems:

(10hrs)

Sequences and Series: Convergences and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series– Leibnitz's rule.

Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders, Problems and applications on the above theorem.

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

(10hrs)

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– Orthogonal trajectories– Electrical circuits.

UNIT – III: Linear differential equations of higher order:

(10hrs)

Homogeneous and Non-homogeneous differential equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x^n , $e^{ax}V(x)$ and $x^nV(x)$ – Method of Variation of parameters, Cauchy and Legendre's linear equations.

Applications: LCR circuit, Simple Harmonic motion.

UNIT – IV: Partial differentiation:

(10hrs)

Introduction – Homogeneous function – Euler's theorem– Total derivative– Chain rule– Jacobian – Functional dependence –Taylor's and MacLaurin's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT – V: Multiple integrals:

(8 hrs)

Double and Triple integrals – Change of order of integration in double integrals – Change of variables to polar, cylindrical and spherical coordinates.

Applications: Finding Areas and Volumes.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. Joel Hass, Christopher Heil and Maurice D. Weir, Thomas calculus, 14th Edition, Pearson.
3. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press, 2013.
4. Srimantha Pal, S C Bhunia, Engineering Mathematics, Oxford University Press.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

| I Year - I Semester | | | | |
|--|---|---|---|---|
| | L | T | P | C |
| | 3 | 0 | 0 | 3 |
| APPLIED PHYSICS (For All Circuital Branches like ECE, EEE, CSE etc) | | | | |

Course Objectives:

1. Bridging the gap between the physics in school at 10+2 level and UG level engineering courses.
2. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
3. Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
4. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals and band theory for crystalline solids. Metals-Semiconductors-Insulators concepts utilization of transport phenomenon of charge carriers in semiconductors.
5. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
6. To Understand the physics of Semiconductors and their working mechanism. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Course Outcomes:

1. Explain the need of coherent sources and the conditions for sustained interference (L2). Identify the applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2). Classify ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)
2. Explain various types of emission of radiation (L2). Identify the role of laser in engineering applications (L3). Describe the construction and working principles of various types of lasers (L1). Explain the working principle of optical fibers (L2). Classify optical fibers based on refractive index profile and mode of propagation (L2). Identify the applications of optical fibers in medical, communication and other fields (L2). Apply the fiber optic concepts in various fields (L3).
3. Describe the dual nature of matter (L1). Explain the significance of wave function (L2). Identify the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). Identify the role of classical and quantum free electron theory in the study of electrical conductivity (L3). Classify the energy bands of solids (L2).



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

4. Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Claussius-Mosotti relation in dielectrics (L2). Classify the magnetic materials based on susceptibility and their temperature dependence (L2). Explain the applications of dielectric and magnetic materials (L2). Apply the concept of magnetism to magnetic devices (L3)
5. Outline the properties of charge carriers in semiconductors (L2). Identify the type of semiconductor using Hall effect (L2). Identify applications of semiconductors in electronic devices (L2). Classify superconductors based on Meissner's effect (L2). Explain Meissner's effect, BCS theory & Josephson effect in superconductors (L2).

Unit-I: Wave Optics

12hrs

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffraction - 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 Outcomes:

The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Analyze** the differences between interference and diffraction with applications (L4)
- **Illustrate** the concept of polarization of light and its applications (L2)
- **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit-II: Lasers and Fiber optics

8hrs

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping mechanisms – Ruby laser – He-Ne laser - Applications of lasers.

Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture - Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers - Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **Explain** the working principle of optical fibers (L2)
- **Classify** optical fibers based on refractive index profile and mode of propagation (L2)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

- **Identify** the applications of optical fibers in various fields (L2)

Unit III: Quantum Mechanics, Free Electron Theory and Band theory **10hrs**

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– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution- Density of states (3D) - Fermi energy.

Band theory of Solids: Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - v vs K diagram - effective mass of electron – Classification of crystalline solids– concept of hole.

Unit Outcomes:

The students will be able to

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)
- **Explain** the importance of K-P model
- **Classify** the materials based on band theory (L2)
- **Apply** the concept of effective mass of electron (L3)

Unit-IV: Dielectric and Magnetic Materials

8hrs

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation- Piezoelectricity.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials- Eddy currents- Engineering applications.

Unit Outcomes: *The students will be able to*

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Clausius- Mosotti relation in dielectrics(L2)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **Explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic data storage devices (L3)

Unit – V: Semiconductors and Superconductors

10hrs

Semiconductors: Introduction- 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 – Hall coefficient –Applications of Hall effect.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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

Unit Outcomes:

The students will be able to

- **Classify** the energy bands of semiconductors (L2)
- **Interpret** the direct and indirect band gap semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)
- **Identify** applications of semiconductors in electronic devices (L2)
- **Classify** superconductors based on Meissner's effect (L2)
- **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

Text books:

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

Reference Books:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers (2009).
3. Shatendra Sharma, Jyotsna Sharma, “ Engineering Physics”, Pearson Education, 2018
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning