I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)
   I. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics, Computer Science and Creative Design thinking for the applications relevant to various streams of human centric Engineering and Technology.
   II. To enrich graduates with the core competencies necessary for applying knowledge of computer science and Design to design, build, deploy, manage and analyze enterprise projects in the context of interactive applications.
   III. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical and design thinking skills to solve real world problems and meet the diversified needs of industry, academia and research
   IV. To equip the graduates with entrepreneurial skills and qualities which help them to perceive the functioning of technology and interactive media industry, diagnose computing and design problems, explore the entrepreneurial opportunities and prepare them to manage and contribute efficiently to those businesses.

II. PROGRAM OUTCOMES (POs)

   PO#  Graduate Attribute
   1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
   2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
   3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
   4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
   5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
   6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
   7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
   8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

III. PROGRAM SPECIFIC OUTCOMES (PSOs)

1. To apply the skill of Design and creative thinking and provide state of the art digital solutions to modern and complex human centric engineering problems and be part of digital transformation.

2. To be able to harness the power of computing tools and emerging technologies along with digital media tools to provide solutions to challenging interactive technologies and associated businesses.

3. To be able to explore entrepreneurial opportunities in the fields of Design, innovation, digital media computing and allied fields, and create new business opportunities.

4. To be able to build, manage and contribute to complex usability projects involving human interaction while considering human factors, social needs, ethics and policies.
## SEMESTER I

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$ Skill Based Course

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$ Skill Based Course

# NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

$ Skill Based Course
## SEMESTER III

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^ Skill Based Course

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^ NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

|        |             | TOTAL                                 |          | 17   | 0    | 14   | 31               | 24      |

# NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.
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* Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I)

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*Open Elective – I Shall be chosen from the list of open electives offered by other Programmes

* Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)

* NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA
### SEMESTER VII / VIII*

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*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

** Open Elective II - IV (Shall be chosen from the list of open electives offered by other Programmes).

* Elective - Management shall be chosen from the Elective Management courses.

### SEMESTER VIII / VII*

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
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*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

TOTAL CREDITS: 160

### ELECTIVE – MANAGEMENT COURSES

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# PROFESSIONAL ELECTIVE COURSES: VERTICALS

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<th>Vertical IV</th>
<th>Vertical V</th>
<th>Vertical VI</th>
<th>Vertical VII</th>
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<td>Full Stack Development</td>
<td>Cloud Computing and Data Center Technologies</td>
<td>Marketing and Management</td>
<td>Creative Media for CSD</td>
<td>Emerging Technologies for CSD</td>
<td>Media Processing</td>
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<td>Neural Networks and Deep Learning</td>
<td>Cloud Services Management</td>
<td>Cloud Services Management</td>
<td>Supply Chain Management</td>
<td>Multimedia and Animation</td>
<td>Neural Networks and Deep Learning</td>
<td>Multimedia Data Compression and Storage</td>
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<td>Text and Speech Analysis</td>
<td>UI and UX Design</td>
<td>Data Warehousing</td>
<td>Marketing and Social Media Web Analytics</td>
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<td>Software Testing and Automation</td>
<td>Storage Technologies</td>
<td>Social Data Mining</td>
<td>Digital Audio &amp; Video Production Workflow</td>
<td>Quantum Computing</td>
<td>Streaming Media Tools and Technologies</td>
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<td>Image and Video Analytics</td>
<td>Web Application Security</td>
<td>Software Defined Networks</td>
<td>Financial Management</td>
<td>Digital Audio and Video Design</td>
<td>Cryptocurrency and Blockchain Technologies</td>
<td>Digital Audio and Video Design</td>
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<td>Computer Vision</td>
<td>DevOps</td>
<td>Stream Processing</td>
<td>Digital Marketing</td>
<td>Digital Marketing</td>
<td>DevOps</td>
<td>Wearable Devices Applications</td>
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<td>Big Data Analytics</td>
<td>Principles of Programming Languages</td>
<td>Security and Privacy in Cloud</td>
<td>Marketing Research and Marketing Management</td>
<td>Short Film Development</td>
<td>3D Printing and Design</td>
<td>3D Printing and Design</td>
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**Registration of Professional Elective Courses from Verticals:**

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E./B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2021, Clause 4.10.
### PROFESSIONAL ELECTIVE COURSES: VERTICALS

#### VERTICAL 1: DATA SCIENCE

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#### VERTICAL 2: FULL STACK DEVELOPMENT

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## VERTICAL 6: EMERGING TECHNOLOGIES FOR CSD

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# VERTICAL 7: MEDIA PROCESSING

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## OPEN ELECTIVES
(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

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**ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)**

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

Complete details are available in clause 4.10 of Regulations 2021.
VERTICALS FOR MINOR DEGREE  
(In addition to all the verticals of other programmes)

<table>
<thead>
<tr>
<th>Vertical I</th>
<th>Vertical II</th>
<th>Vertical III</th>
<th>Vertical IV</th>
<th>Vertical V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fintech and Block Chain</td>
<td>Foundations of Entrepreneurship</td>
<td>Principles of Public Administration</td>
<td>Statistics for Management</td>
<td>Sustainable infrastructure Development</td>
</tr>
<tr>
<td>Fundamentals of Investment</td>
<td>Team Building &amp; Leadership Management for Business</td>
<td>Constitution of India</td>
<td>Datamining for Business Intelligence</td>
<td>Sustainable Agriculture and Environmental Management</td>
</tr>
<tr>
<td>Banking, Financial Services and Insurance</td>
<td>Creativity &amp; Innovation in Entrepreneurship</td>
<td>Public Personnel Administration</td>
<td>Human Resource Analytics</td>
<td>Sustainable Bio Materials</td>
</tr>
<tr>
<td>Introduction to Blockchain and its Applications</td>
<td>Principles of Marketing Management for Business</td>
<td>Administrative Theories</td>
<td>Marketing and Social Media Web Analytics</td>
<td>Materials for Energy Sustainability</td>
</tr>
<tr>
<td>Fintech Personal Finance and Payments</td>
<td>Human Resource Management for Entrepreneurs</td>
<td>Indian Administrative System</td>
<td>Operation and Supply Chain Analytics</td>
<td>Green Technology</td>
</tr>
<tr>
<td>Introduction to Fintech</td>
<td>Financing New Business Ventures</td>
<td>Public Policy Administration</td>
<td>Financial Analytics</td>
<td>Environmental Quality Monitoring and Analysis</td>
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<td>Integrated Energy Planning for Sustainable Development</td>
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<td>Energy Efficiency for Sustainable Development</td>
</tr>
</tbody>
</table>
(choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

**VERTICAL 1: FINTECH AND BLOCK CHAIN**

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>CATEGORY</th>
<th>PERIODS PER WEEK</th>
<th>TOTAL CONTACT PERIODS</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>CMG331</td>
<td>Financial Management</td>
<td>PEC</td>
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<tr>
<td>2.</td>
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<td>PEC</td>
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</tr>
<tr>
<td>3.</td>
<td>CMG333</td>
<td>Banking, Financial Services and Insurance</td>
<td>PEC</td>
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<tr>
<td>4.</td>
<td>CMG334</td>
<td>Introduction to Blockchain and its Applications</td>
<td>PEC</td>
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<tr>
<td>5.</td>
<td>CMG335</td>
<td>Fintech Personal Finance and Payments</td>
<td>PEC</td>
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<tr>
<td>6.</td>
<td>CMG336</td>
<td>Introduction to Fintech</td>
<td>PEC</td>
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</tbody>
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**VERTICAL 2: ENTREPRENEURSHIP**

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<thead>
<tr>
<th>S. NO.</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
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<tbody>
<tr>
<td>1.</td>
<td>CMG337</td>
<td>Foundations of Entrepreneurship</td>
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<td>Team Building &amp; Leadership Management for Business</td>
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<tr>
<td>3.</td>
<td>CMG339</td>
<td>Creativity &amp; Innovation in Entrepreneurship</td>
<td>PEC</td>
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<tr>
<td>4.</td>
<td>CMG340</td>
<td>Principles of Marketing Management For Business</td>
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<tr>
<td>5.</td>
<td>CMG341</td>
<td>Human Resource Management for Entrepreneurs</td>
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<tr>
<td>6.</td>
<td>CMG342</td>
<td>Financing New Business Ventures</td>
<td>PEC</td>
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### VERTICAL 3: PUBLIC ADMINISTRATION

<table>
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<tr>
<th>S. NO.</th>
<th>COURSE CODE</th>
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<th>TOTAL CONTACT PERIODS</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>CMG343</td>
<td>Principles of Public Administration</td>
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<td>2.</td>
<td>CMG344</td>
<td>Constitution of India</td>
<td>PEC</td>
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<td>3.</td>
<td>CMG345</td>
<td>Public Personnel Administration</td>
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<td>4.</td>
<td>CMG346</td>
<td>Administrative Theories</td>
<td>PEC</td>
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<td>5.</td>
<td>CMG347</td>
<td>Indian Administrative System</td>
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<td>6.</td>
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<td>PEC</td>
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### VERTICAL 4: BUSINESS DATA ANALYTICS

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>COURSE CODE</th>
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<tbody>
<tr>
<td>1.</td>
<td>CMG349</td>
<td>Statistics for Management</td>
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<td>Datamining For Business Intelligence</td>
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<td>Human Resource Analytics</td>
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<td>Marketing And Social Media Web Analytics</td>
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<td>5.</td>
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<td>Operation And Supply Chain Analytics</td>
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<tr>
<td>6.</td>
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<td>Financial Analytics</td>
<td>PEC</td>
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<tr>
<td>S. No.</td>
<td>COURSE CODE</td>
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<tr>
<td>1.</td>
<td>CES331</td>
<td>Sustainable infrastructure Development</td>
<td>PEC</td>
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<tr>
<td>2.</td>
<td>CES332</td>
<td>Sustainable Agriculture and Environmental Management</td>
<td>PEC</td>
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<td>3.</td>
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<td>4.</td>
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<td>Materials for Energy Sustainability</td>
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<td>5.</td>
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<td>Green Technology</td>
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<td>6.</td>
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<td>Environmental Quality Monitoring and Analysis</td>
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<td>7.</td>
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<tr>
<td>8.</td>
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<td>Energy Efficiency for Sustainable Development</td>
<td>PEC</td>
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</table>
This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

“Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have a broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed.”

“One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character.”

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, make decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts,
but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the underprivileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering / Technology / Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References:
Guide to Induction program from AICTE
OBJECTIVES:

- To improve the communicative competence of learners
- To learn to use basic grammatic structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners’ ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

UNIT I  INTRODUCTION TO EFFECTIVE COMMUNICATION

What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C’s of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

UNIT II  INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II  NARRATION AND SUMMATION

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing—Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes & suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III  DESCRIPTION OF A PROCESS / PRODUCT

Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product/Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).
UNIT IV  CLASSIFICATION AND RECOMMENDATIONS
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc.,). Writing – Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal (chart, graph etc., to verbal mode)
Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V  EXPRESSION
Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative).
Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

LEARNING OUTCOMES:
At the end of the course, learners will be able
- To use appropriate words in a professional context
- To gain understanding of basic grammatic structures and use them in right context.
- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics

TEXT BOOKS:
1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
   Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES:

ASSESSMENT PATTERN
Two internal assessments and an end semester examination to test students’ reading and writing skills along with their grammatical and lexical competence.
COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that are needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I  MATRICES  9 + 3

UNIT II  DIFFERENTIAL CALCULUS  9 + 3

UNIT III  FUNCTIONS OF SEVERAL VARIABLES  9 + 3

UNIT IV  INTEGRAL CALCULUS  9 + 3
Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT V  MULTIPLE INTEGRALS  9 + 3

COURSE OUTCOMES:
At the end of the course the students will be able to
- Use the matrix algebra methods for solving practical problems.
Apply differential calculus tools in solving various application problems.
Able to use differential calculus ideas on several variable functions.
Apply different methods of integration in solving practical problems.
Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS:
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

PH3151 ENGNERING PHYSICS L T P C 3 0 0 3

COURSE OBJECTIVES:
- To make the students effectively achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS
momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum – Introduction to nonlinear oscillations.

UNIT II  ELECTROMAGNETIC WAVES  9
The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III  OSCILLATIONS, OPTICS AND LASERS  9

UNIT IV  BASIC QUANTUM MECHANICS  9
Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V  APPLIED QUANTUM MECHANICS  9
The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch’s theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL : 45 PERIODS

COURSE OUTCOMES:
After completion of this course, the students should be able to
- Understand the importance of mechanics.
- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
4. REFERENCES:

CY3151 ENGINEERING CHEMISTRY

COURSE OBJECTIVES:
- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I WATER AND ITS TREATMENT

UNIT II NANO CHEMISTRY
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES
Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.
Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV  FUELS AND COMBUSTION 9
Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.
Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO₂ emission and carbon footprint.

UNIT V  ENERGY SOURCES AND STORAGE DEVICES 9
Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion battery; Electric vehicles - working principles; Fuel cells: H₂-O₂ fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the students will be able:
- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

REFERENCES:

GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING  
3 0 0 3

COURSE OBJECTIVES:
- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING  
9

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS  
9
Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS  
9
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES  
9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

24
UNIT V  FILES, MODULES, PACKAGES

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter’s age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs using conditionals and loops for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:


REFERENCES:

5. https://www.python.org/

CO’s- PO’s & PSO’s MAPPING

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1 - low, 2 - medium, 3 - high, '-' - no correlation
UNIT I LANGUAGE AND LITERATURE


UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE


UNIT III FOLK AND MARTIAL ARTS

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலொறு – மக்களும் பண் பொடும் – கக.கக.பிள்ளள (தவளியீடு:தமிழ்நொடுபொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முளனவர் இல.சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – கொள்ளச் சு க் கொல் நகரிகம் (ததொல்லியல் துளற தவளியீடு).
4. தபொருளந – ஆற்றங்களர நொகரிகம். (ததொல்லியல் துளற தவளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

GE3152 குறிப்பிட்டுள்ள விளக்கம்

அத்தி புதிய இந்திய இலக்கியம்

நவீன இலக்கியத் தமிழகம் - கிராமேஸ் சுனிய்க்குரு - வரும்புரி கைத்திரும்பு -
தமிழ் கைத்திரும்புக் குருக்கள் - காலம் நாவீலம் சதுப்பு சுமார்ப்பை நோச்சு - நாயக
திருச்சும்பூத்து பொருளிய அறுரம் - காரியத்தில் வெளியோரையும் குறுவாகாத் -
தமிழ் கயுத்தார் மையம் போன்ற சமயச் சங்க கைத்திரும்புகள், கைத்திரும்புக் குருக்கள் சதுப்பு சுமார்ப்பை
தமிழ், குருக்குத் பொதுத் தனிப்புருவாகாத் கைத்திரும்புகள் - நாயக்
திருச்சும்பூத்து பொருளிய அறுரம் - நாயக் திருச்சும்பூத்து பொருளிய பாராட்டிகள் முதலே
பாராட்டிகள் அறுபர்ப்பியில் ப்பன்னிப்பா.

அத்தி 2 பாராட்டுச் சுற்றுமார் பதிலும் நாயக் திருச்சும்பூத்து பாராட்டிகள் - சிதறக்
கைத்திரும்பு:

அத்தி பதிலும் கைத்திரும்பு: கைத்திரும்பு - குருக்குத் பொருளிய பாராட்டிகள் - புதியபாண்டி
மையம் போன்ற சமயச் சங்க கைத்திரும்புகள், கைத்திரும்புகள் - காலம்
திருச்சும்பூத் குருக்கள் - கைத்திரும்புக் கைத்திரும்புகள் - காலம்
திருச்சும்பூத் கைத்திரும்புகள், காலம்
திருச்சும்பூத்து பொருளிய அறுரம் - காலம்
திருச்சும்பூத்து பொருளிய பாராட்டிகள் முதலே
பாராட்டிகள் அறுபர்ப்பியில் ப்பன்னிப்பா.

அத்தி 3 கைத்திரும்புக் காலம் பதிலும் நாயக் சிதறக் கைத்திரும்புகள்:

அத்தி பதிலும் கைத்திரும்பு: கைத்திரும்பு, சிதறக் கைத்திரும்பு, கைத்திரும்புக் குருக்கள், கைத்திரும்பு
கைத்திரும்புக் குருக்கள், கைத்திரும்பு, பாராட்டிகள், கைத்திரும்பு
கைத்திரும்புக் கைத்திரும்பு.

அத்தி 4 கைத்திரும்புக் கைத்திரும்பு சிதறக் கைத்திரும்புகள்:

கைத்திரும்பு கைத்திரும்பு, சிதறக் கைத்திரும்பு - கைத்திரும்புக் கைத்திரும்பு
கைத்திரும்பு, கைத்திரும்பு கைத்திரும்பு
TEXT-CUM-REFERENCE BOOKS

1. தமிழ் வரலை மத்தியம் சாதைமாரின் கலைச்சந்திரம் - கதைச் சிற்பநிலை (தொழில்புறம்: சிற்பநிலை பொதுமக்கள் மான்றம் கல்விபிள்ளா குழுமம்).
2. கோலிமரியா துறைமுகம் - பண்டைமுருகு விளக்கம் (சிற்பநிலை பிரச்சனா).
3. இந்தப் பலகையாளர்களின் சமையல் துறை நேர்வாயில் (தொழில்புறம் குழுமம் குழுமம்).
4. பாசாதை - அழகியுறை நேர்வாயில் (தொழில்புறம் குழுமம் குழுமம்)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
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11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

TOTAL : 15 PERIODS
COURSE OBJECTIVES:
- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:
Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building — operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter’s age validity, student mark range validation)
12. Developing a game activity using Pygame like bouncing ball, car race etc.

COURSE OUTCOMES:
On completion of the course, students will be able to:
- CO1: Develop algorithmic solutions to simple computational problems
- CO2: Develop and execute simple Python programs.

TOTAL: 60 PERIODS
CO3: Implement programs in Python using conditionals and loops for solving problems.
CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

TEXT BOOKS:

REFERENCES:
5. https://www.python.org/

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PHYSICS LABORATORY : (Any Seven Experiments)

COURSE OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wavelength of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde’s string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students should be able to

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively.
CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

1. Preparation of Na$_2$CO$_3$ as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in a water sample.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler’s method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using a flame photometer.
13. Preparation of nanoparticles (TiO$_2$/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL : 30 PERIODS

COURSE OUTCOMES:

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

TEXT BOOKS:
OBJECTIVES:

- To improve the communicative competence of learners
- To help learners use language effectively in academic/work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

UNIT I  INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION

Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions( filling out a bank application for example).

UNIT II  NARRATION AND SUMMATION

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings- engaging in small talk- describing requirements and abilities.

UNIT III  DESCRIPTION OF A PROCESS / PRODUCT

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.

UNIT IV  CLASSIFICATION AND RECOMMENDATIONS

Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation-

UNIT V  EXPRESSION

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic-giving opinions-understanding a website-describing processes

TOTAL : 30 PERIODS

LEARNING OUTCOMES:
At the end of the course, learners will be able
- To listen and comprehend complex academic texts
• To speak fluently and accurately in formal and informal communicative contexts
• To express their opinions effectively in both oral and written medium of communication

ASSESSMENT PATTERN
• One online / app based assessment to test listening /speaking
• End Semester ONLY listening and speaking will be conducted online.
• Proficiency certification is given on successful completion of listening and speaking internal test and end semester exam.

HS3251

PROFESSIONAL ENGLISH - II

L T P C
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OBJECTIVES :
• To engage learners in meaningful language activities to improve their reading and writing skills
• To learn various reading strategies and apply in comprehending documents in professional context.
• To help learners understand the purpose, audience, contexts of different types of writing
• To develop analytical thinking skills for problem solving in communicative contexts
• To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I  MAKING COMPARISONS  6
Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases

UNIT II  EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING  6
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds

UNIT III  PROBLEM SOLVING  6
Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences

UNIT IV  REPORTING OF EVENTS AND RESEARCH  6
UNIT V  THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY  

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses.

TOTAL : 30 PERIODS

OUTCOMES:
At the end of the course, learners will be able

- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS :
   Department of English, Anna University.
3. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN.
   Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCE BOOKS:
   New Delhi.
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd.
   1990, Delhi.

ASSESSMENT PATTERN
Two internal assessments and an end semester examination to test students’ reading and writing skills along with their grammatical and lexical competence.

MA3251 STATISTICS AND NUMERICAL METHODS

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COURSE OBJECTIVES:
- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
● To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
● To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I    TESTING OF HYPOTHESIS     9 + 3
Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II    DESIGN OF EXPERIMENTS     9 + 3
One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - $2^2$ factorial design.

UNIT III    SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS     9 + 3

UNIT IV    INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION     9 +3
Lagrange’s and Newton’s divided difference interpolations – Newton’s forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson’s 1/3 rules.

UNIT V    NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS     9 +3

TOTAL: 60 PERIODS

COURSE OUTCOMES:
Upon successful completion of the course, students will be able to:

● Apply the concept of testing of hypothesis for small and large samples in real life problems.
● Apply the basic concepts of classifications of design of experiments in the field of agriculture.
● Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
● Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
● Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
TEXT BOOKS:


REFERENCES:


PH3256  PHYSICS FOR INFORMATION SCIENCE  L  T  P  C
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COURSE OBJECTIVES:
- To make the students understand the importance in studying electrical properties of materials.
- To enable the students to gain knowledge in semiconductor physics
- To instill knowledge on magnetic properties of materials.
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications
- To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

UNIT I  ELECTRICAL PROPERTIES OF MATERIALS  9

UNIT II  SEMICONDUCTOR PHYSICS  9
Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor:
random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT III MAGNETIC PROPERTIES OF MATERIALS 9

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9
Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT V NANODEVICES AND QUANTUM COMPUTING 9

TOTAL :45 PERIODS

COURSE OUTCOMES:
At the end of the course, the students should be able to

- gain knowledge on classical and quantum electron theories, and energy band structures
- acquire knowledge on basics of semiconductor physics and its applications in various devices
- get knowledge on magnetic properties of materials and their applications in data storage,
- have the necessary understanding on the functioning of optical materials for optoelectronics
- understand the basics of quantum structures and their applications and basics of quantum computing

TEXT BOOKS:
REFERENCES:


BE3251 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OBJECTIVES:
- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT I ELECTRICAL CIRCUITS
DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm’s Law - Kirchhoff’s Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)
Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

UNIT II ELECTRICAL MACHINES

UNIT III ANALOG ELECTRONICS
UNIT IV    DIGITAL ELECTRONICS  9
Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only).

UNIT V    MEASUREMENTS AND INSTRUMENTATION  9

TOTAL: 45 PERIODS

COURSE OUTCOMES:
After completing this course, the students will be able to
CO1:  Compute the electric circuit parameters for simple problems
CO2:  Explain the working principle and applications of electrical machines
CO3:  Analyze the characteristics of analog electronic devices
CO4:  Explain the basic concepts of digital electronics
CO5:  Explain the operating principles of measuring instruments

TEXT BOOKS:

REFERENCES:

GE3251    ENGINEERING GRAPHICS

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
• Drawing engineering curves.
• Drawing a freehand sketch of simple objects.
• Drawing orthographic projection of solids and section of solids.
• Drawing development of solids
• Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)
Importance of graphics in engineering applications — Use of drafting instruments — BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT I PLANE CURVES 6+12
Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS AND FREEHAND SKETCHING 6+12
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6 +12
Sectioning of above solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12
Principles of isometric projection — isometric scale — isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)

TOTAL: (L=30+P=60) 90 PERIODS
OUTCOMES:
On successful completion of this course, the student will be able to
• Use BIS conventions and specifications for engineering drawing.
• Construct the conic curves, involutes and cycloid.
• Solve practical problems involving projection of lines.
• Draw the orthographic, isometric and perspective projections of simple solids.
• Draw the development of simple solids.

TEXT BOOK:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit a solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day
OBJECTIVES:
- To understand the concepts of ADTs
- To design linear data structures – lists, stacks, and queues
- To understand sorting, searching, and hashing algorithms
- To apply Tree and Graph structures

UNIT I  
ABSTRACT DATA TYPES 9
Abstract Data Types (ADTs) – ADTs and classes – introduction to OOP – classes in Python – inheritance – namespaces – shallow and deep copying
Introduction to analysis of algorithms – asymptotic notations – divide & conquer – recursion – analyzing recursive algorithms

UNIT II  
LINEAR STRUCTURES 9

UNIT III  
SORTING AND SEARCHING 9

UNIT IV  
TREE STRUCTURES 9

UNIT V  
GRAPH STRUCTURES 9

TOTAL: 45 HOURS

OUTCOMES:
At the end of the course, the student should be able to:
- explain abstract data types
- design, implement, and analyze linear data structures, such as lists, queues, and stacks, according to the needs of different applications
- design, implement, and analyze efficient tree structures to meet requirements such as searching, indexing, and sorting
- model problems as graph problems and implement efficient graph algorithms to solve them

TEXT BOOKS:
REFERENCES:


CO’s- PO’s & PSO’s MAPPING

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1 - low, 2 - medium, 3 - high, '-' - no correlation

GE3252 TAMILS AND TECHNOLOGY L T P C 1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

UNIT III MANUFACTURING TECHNOLOGY 3
UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING


TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலொறு - மேக்கலை பண்பாடு - தொலை பொழுது (தவளியீடு: கோப்பேரி புராணம் கல்விப் பண்பாடு).
2. கடலைச்சாக குருதியான - பெல்லைப்பூட்டல் தொகுப்பு. (மேனேசு பொன்றாம்).
3. சிறுமி - தொட்டெழுக்கத்தை நகரத்தின் குண்டு துற்றாரை (தவளியீடு: கோப்பேரி புராணம்).
4. வட்டத் தொட்டெழுக்க துற்றாரை. (தவளியீடு: கோப்பேரி புராணம்).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

GE3252 கதையுடை இனத்துக்கதுப்பில்பாடு L T P C 
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அங்கு I கதையுடை பரவல்கு கதையுடை இனத்துக்கதுப்பில்பாடு 3
கதையுடை கதையுடை அதுக்கு கதையுடை - பரவல்கு கதையுடை இனத்துக்கதுப்பில்பாடு - கதையுடை திறன்
பாசனத்துக்கது பரவல்கு கதையுடை கதையுடை இனத்துக்கதுப்பில்பாடு.
அலகு II அறிவியல் மற்றும் கல்வியியல்: 3
கல்வி கருவிகள் முதன்மைப் பட்டியலில் கில்பரசிக்குட்படும் கல்வி கருவிகள் மற்றும் கல்வியியல், கல்வியியல் தொழில்நுட்பம் - சம்பத்தாசியரங்கள் தொடர் ஆடையில் பொருள் விளக்கம் - மக்கள் நோய் தொலைத்தொடரும், கல்வியியல் - பள்ளிகள் கல்வியியல் மற்றும் பச்சையடயான கல்வி கருவிகள் - தமிழ் கல்வியியல் பட்டியல் அறிக்கை, புகழ்பூர்வ ஆய்வு அளவையும் முதலும் கிள்லல்த் தொழில் மற்றும் - சுரங்க கல்வி நிகழ்வு - பிரிவுகள் காலக்கிழக்கு இணையான முதல் கல்வி கருவிகள்

அலகு III கல்வி குழுவியல்: 3
சோன்மான குழு கல்வி - சோன்மான குழு தமிழியல் - சோன்மான குழு நூற்றாண், சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு மாணவர்கள் - சோன்மான குழு மாணவர்கள் - சோன்மான குழு கல்வியியல் - சோன்மான குழு கல்வியியல் - சோன்மான குழு கல்வியியல் - சோன்மான குழு கல்வியியல்

அலகு IV சோன்மான முறை சோன்மான குழுவியல் நூற்றாண்: 3
சோன்மான, சோன்மான, சோன்மான, சோன்மான - சோன்மான குழு சோன்மான குழு - சோன்மான குழு - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண் - சோன்மான குழு கல்வி நூற்றாண்

அலகு V கல்வி குழு நூற்றாண் குழுவியல்: 3
கல்வி குழு கல்வி நூற்றாண் - கல்வி குழு கல்வி நூற்றாண் - கல்வி குழு கல்வி நூற்றாண் - கல்வி குழு கல்வி நூற்றாண் - கல்வி குழு கல்வி நூற்றாண் - கல்வி குழு கல்வி நூற்றாண்

TEXT-CUM-REFERENCE BOOKS
1. தமிழக வரலைமுகம் - மக்களம் மாணவரின் - க.த. விளக்கம் (தமிழில்: கல்வியியல் பட்டியல் மாணவர்கள் குழு கல்வி நூற்றாண் குழு)
2. கல்வியியல் குழும் - முதல்பட்டியல் (தமிழில் பட்டியல்)
3. கையில் - கல்வியியல் நூற்றாண் குழு கல்வி நூற்றாண் (தமிழில் குழு கல்வி நூற்றாண்)
4. மாணவாரம் - கல்வியியல் நூற்றாண் (தமிழில் குழு கல்வி நூற்றாண்)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)

TOTAL: 15 PERIODS
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

   Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.
NX3251 NCC Credit Course Level 1*
(ARMY WING)
NCC Credit Course Level - I

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TOTAL: 30 PERIODS

48
### NCC Credit Course Level 1*

**NAVAL WING**

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**TOTAL: 30 PERIODS**

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**TOTAL : 30 PERIODS**
COURSE OBJECTIVES:
The main learning objective of this course is to provide hands-on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.

2. Wiring various electrical joints in common household electrical wire work.

3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.

4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I  CIVIL ENGINEERING PRACTICES  15

PLUMBING WORK:
 a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
 b) Preparing plumbing line sketches.
 c) Laying pipe connection to the suction side of a pump
 d) Laying pipe connection to the delivery side of a pump.
 e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:
 a) Sawing,
 b) Planing and
 c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:
 a) Studying joints in door panels and wooden furniture
 b) Studying common industrial trusses using models.

PART II  ELECTRICAL ENGINEERING PRACTICES  15

 a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
b) Staircase wiring

c) Fluorescent Lamp wiring with introduction to CFL and LED types.

d) Energy meter wiring and related calculations/calibration

e) Study of Iron Box wiring and assembly

f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)

g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES

WELDING WORK:
   a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
   b) Practicing gas welding.

BASIC MACHINING WORK:
   a) (simple)Turning.
   b) (simple)Drilling.
   c) (simple)Tapping.

ASSEMBLY WORK:
   a) Assembling a centrifugal pump.
   b) Assembling a household mixer.
   c) Assembling an airconditioner.

SHEET METAL WORK:
   a) Making of a square tray

FOUNDRY WORK:
   a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES

SOLDERING WORK:
   a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:
   a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:
   a) Study an elements of smart phone..
   b) Assembly and dismantle of LED TV.
   c) Assembly and dismantle of computer/ laptop
COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

- Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
- Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CD3281 DATA STRUCTURES AND ALGORITHMS LABORATORY

OBJECTIVES:

- To implement ADTs in Python
- To design and implement linear data structures – lists, stacks, and queues
- To implement sorting, searching and hashing algorithms
- To solve problems using tree and graph structures

LIST OF EXPERIMENTS:

1. Implement simple ADTs as Python classes
2. Implement recursive algorithms in Python
3. Implement List ADT using Python arrays
4. Linked list implementations of List
5. Implementation of Stack and Queue ADTs
6. Applications of List, Stack and Queue ADTs
7. Implementation of sorting and searching algorithms
8. Implementation of Hash tables
9. Tree representation and traversal algorithms
10. Implementation of Binary Search Trees
11. Implementation of Heaps
12. Graph representation and Traversal algorithms
13. Implementation of single source shortest path algorithm
14. Implementation of minimum spanning tree algorithms

OUTCOMES:

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

- implement ADTs as Python classes
- design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications
• design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting
• model problems as graph problems and implement efficient graph algorithms to solve them

TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:

CO’s- PO’s & PSO’s MAPPING

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1 - low, 2 - medium, 3 - high, ‘-’ - no correlation

GE3272 COMMUNICATION LABORATORY

OBJECTIVES
• To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
• To be able to communicate effectively through writing.

UNIT I
Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition-discussing progress toward goals-talking about experiences- talking about events in life- discussing past events-Writing: writing emails (formal & semi-formal).
UNIT II
Speaking: discussing news stories - talking about frequency - talking about travel problems - discussing travel procedures - talking about travel problems - making arrangements - describing arrangements - discussing plans and decisions - discussing purposes and reasons - understanding common technology terms. Writing: - writing different types of emails.

UNIT III
Speaking: discussing predictions - describing the climate - discussing forecasts and scenarios - talking about purchasing - discussing advantages and disadvantages - making comparisons - discussing likes and dislikes - discussing feelings about experiences - discussing imaginary scenarios. Writing: short essays and reports - formal/semi-formal letters.

UNIT IV
Speaking: discussing the natural environment - describing systems - describing position and movement - explaining rules - (example - discussing rental arrangements) - understanding technical instructions. Writing: writing instructions - writing a short article.

UNIT V
Speaking: describing things relatively - describing clothing - discussing safety issues - (making recommendations) - talking about electrical devices - describing controlling actions. Writing: job application (Cover letter + Curriculum vitae) - writing recommendations.

TOTAL: 60 PERIODS

LEARNING OUTCOMES
- Speak effectively in group discussions held in a formal/semi formal contexts.
- Write emails and effective job applications.

Assessment Pattern
- One online / app based assessment to test speaking and writing skills
- Proficiency certification is given on successful completion of speaking and writing.

MA3304 DISCRETE MATHEMATICAL STRUCTURES L T P C 3 1 0 4

UNIT I FUNDAMENTALS OF LOGIC 9 + 3
Basic connectiveness and Truth table - Logical equivalences - The laws of logic - Logical Implications - Rules of Inferences - Quantifiers - Definitions and proof of theorems.

UNIT II COMBINATORICS 9 + 3
The rules of sum and product - Permutations and Combinations - The Pigeon hole principle - The principle of inclusion and exclusion - Recurrence relations.
UNIT III   GROUPS  9 + 3
Groups - Definitions and examples - Subgroups and Homomorphism - Cosets and Lagrange's theorem - Normal subgroups - Group codes.

UNIT IV   LATTICES  9 + 3
Posets - Lattices - Definitions and Examples - Properties of Lattices - Lattices as Algebraic systems - Some special Lattices - Boolean Algebra.

UNIT V   GRAPH THEORY  9 + 3
Definitions and Examples - Sub Graphs - Graph Isomorphism - Euler Trails and Circuits - Planar Graphs - Hamilton paths and Cycles - Graph coloring - Trees - Rooted trees.

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

CS3492 DATABASE MANAGEMENT SYSTEMS  3 0 0 3

COURSE OBJECTIVES:
- To learn the fundamentals of data models, relational algebra and SQL
- To represent a database system using ER diagrams and to learn normalization techniques
- To understand the fundamental concepts of transaction, concurrency and recovery processing
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
- To have an introductory knowledge about the Distributed databases, NOSQL and database security
UNIT I  RELATIONAL DATABASES

UNIT II  DATABASE DESIGN

UNIT III  TRANSACTIONS

UNIT IV  IMPLEMENTATION TECHNIQUES

UNIT V  ADVANCED TOPICS

OUTCOMES:
Upon completion of this course, the students will be able to
CO1: Construct SQL Queries using relational algebra
CO2: Design database using ER model and normalize the database
CO3: Construct queries to handle transaction processing and maintain consistency of the database
CO4: Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database
CO5: Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement.

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES:

CO’s- PO’s & PSO’s MAPPING

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CS3391 OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:
- To understand Object Oriented Programming concepts and basics of Java programming language
- To know the principles of packages, inheritance and interfaces
- To develop a java application with threads and generics classes
- To define exceptions and use I/O streams
- To design and build Graphical User Interface Application using JAVAFX

UNIT I INTRODUCTION TO OOP AND JAVA

UNIT II INHERITANCE, PACKAGES AND INTERFACES

UNIT III EXCEPTION HANDLING AND MULTITHREADING
UNIT IV I/O, GENERICS, STRING HANDLING

UNIT V JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS

COURSE OUTCOMES:
On completion of this course, the students will be able to
CO1: Apply the concepts of classes and objects to solve simple problems
CO2: Develop programs using inheritance, packages and interfaces
CO3: Make use of exception handling mechanisms and multithreaded model to solve real world problems
CO4: Build Java applications with I/O packages, string classes, Collections and generics concepts
CO5: Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES:

CO’s- PO’s & PSO’s MAPPING

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COURSE OBJECTIVES:

- To determine the necessity of user interaction by understanding usability engineering and user modeling
- To learn the methodologies for designing interactive systems
- To investigate the core and complex user experience design issues
- To examine the evaluation methodologies of design
- To understand design issues for web and mobile platforms

UNIT I  HCI AND USABILITY  6

UNIT II  INTERACTION STYLES  6

UNIT III  USER EXPERIENCE DESIGN  6
Frameworks for User Centric Computing, Computational models of users, Advancing the user experience, Timely user Experience, Information search, Data Visualization.

UNIT IV  COGNITIVE SYSTEMS AND EVALUATION OF HCI  6
Communication and collaboration models Task analysis, dialog notations and design, Evaluation Techniques- assessing user experience- usability testing – Heuristic evaluation and walkthroughs, analytics predictable models.

UNIT V  INTERACTION TECHNIQUES FOR WEB AND MOBILE  6
Designing websites, social media, Collaborative environments, Agents and Avatars, Ubiquitous computing, Mobile Computing, Wearable Computing, Multimodal interface design Ethics in Design.

TOTAL : 30 PERIODS

LIST OF EXPERIMENTS:
Understanding the basic principles through simple experiments

- Comparing Usability and User Experience Goals
- Accessibility and Inclusiveness
- Describing Interfaces and Interaction Styles
- Serial Position Effect
- Weber's Law
- Short-term memory, Long-Term Memory, Sensory Memory
- Hick Hyman's Law
- GOMS Model
- Consistency and Inconsistency in Interaction
Designing interaction:
- Storyboards, Prototyping of a dashboard / Control Panel of any device
- Mobile and wearable Computing
- Experimenting with Agile UX design
- Designing for Collaborative Interactions / social interactions (Ex: shared whiteboards)

Evaluation:
- Heuristic Evaluation
- Finding patterns within variation
- Cognitive walkthrough
- Fitts Law
- Analytics / A/B Testing
- card-sorting technique
- Blocking, Unblocking, Counterbalancing

COURSE OUTCOMES:
On Successful completion of the course, Students will be able to
CO1: Design for usability based on a variety of classic Universal user-centric models
CO2: Use complex interaction styles and techniques for contextual design
CO3: Evaluate interaction designs and implementations.
CO4: Understand the models and theories for user interaction
CO5: Suggest suitable designs for web and mobile applications.

TEXT BOOKS:

REFERENCES:

WEB REFERENCES:
1. https://cpe-iitg.vlabs.ac.in/Introduction.html
4. https://nptel.ac.in/courses/106103220

CO’s- PO’s & PSO’s MAPPING

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CD3301 DATA ANALYTICS AND VISUALIZATION

COURSE OBJECTIVES:
- To understand the need of data analytics
- To understand the different methods of analytics
- To learn the applications of predictive analytics
- To understand the impact of data visualization in data analytics
- To provide hands on experience in Data Analytics

UNIT I INTRODUCTION TO DATA ANALYTICS
UNIT II  PREDICTIVE ANALYTICS

UNIT III  APPLICATION OF PREDICTIVE ANALYTICS

UNIT IV  DATA VISUALIZATION
Stacked Bar Chart – Histogram – Butterfly Chart – Donut Chart – Scatter Plot – Bubble Chart – Box Plot – Pareto Chart – Bump Chart – Maps – Gantt Chart

UNIT V  DASHBOARD

LIST OF EXPERIMENTS
1. Working with Python Pandas Data Science Library
2. Working with Python Numpy and Lambdas Library
3. Data cleaning and manipulation
4. Data Wrangling
5. Plots in Python
6. Creation, manipulation of list, dictionaries, Tuples, Series, DataFrames
7. Linear Regression with Python
8. Logistic Regression with Python
9. Clustering with Python

PRACTICALS 30 PERIODS
THEORY 45 PERIODS
TOTAL : 75 PERIODS

COURSE OUTCOMES:
CO1 : Able to develop data analytic programs for different use cases
CO2 : Able to perform data visualization for data exploration
CO3 : Develop data analytic applications
CO4 : Get practice to analyze and interpret data for business solutions
CO5 : To predict usefulness of data to the respective domain

TEXT BOOKS
REFERENCES

CO’s- PO’s & PSO’s MAPPING

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CS3351 DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION L T P C 3 0 2 4

COURSE OBJECTIVES:
- To analyze and design combinational circuits.
- To analyze and design sequential circuits
- To understand the basic structure and operation of a digital computer.
- To study the design of data path unit, control unit for processor and to familiarize with the hazards.
- To understand the concept of various memories and I/O interfacing.

UNIT I COMBINATIONAL LOGIC 9

UNIT II SYNCHRONOUS SEQUENTIAL LOGIC 9
Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters.
UNIT III COMPUTER FUNDAMENTALS

UNIT IV PROCESSOR
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.

UNIT V MEMORY AND I/O

PRACTICAL EXERCISES:
1. Verification of Boolean theorems using logic gates.
2. Design and implementation of combinational circuits using gates for arbitrary functions.
3. Implementation of 4-bit binary adder/subtractor circuits.
4. Implementation of code converters.
5. Implementation of BCD adder, encoder and decoder circuits
7. Implementation of the synchronous counters
8. Implementation of a Universal Shift register.
9. Simulator based study of Computer Architecture

COURSE OUTCOMES:
At the end of this course, the students will be able to:
CO1 : Design various combinational digital circuits using logic gates
CO2 : Design sequential circuits and analyze the design procedures
CO3 : State the fundamentals of computer systems and analyze the execution of an instruction
CO4 : Analyze different types of control design and identify hazards
CO5 : Identify the characteristics of various memory systems and I/O communication

TEXT BOOKS

REFERENCES
COURSE OBJECTIVES

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, inheritance, exception handling and file processing.
- To develop applications using generic programming and event handling.

LIST OF EXPERIMENTS

1. Solve problems by using sequential search, binary search, and quadratic sorting algorithms (selection, insertion).
2. Develop stack and queue data structures using classes and objects.
3. Develop a java application with an Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10% of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club funds. Generate pay slips for the employees with their gross and net salary.
4. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape.
5. Solve the above problem using an interface.
6. Implement exception handling and creation of user defined exceptions.
7. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
8. Write a program to perform file operations.
9. Develop applications to demonstrate the features of generics classes.
10. Develop applications using JavaFX controls, layouts and menus.
11. Develop a mini project for any application using Java concepts.

Lab Requirements: for a batch of 30 students
Operating Systems: Linux / Windows
Front End Tools: Eclipse IDE / Netbeans IDE
TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of this course, the students will be able to
CO1: Design and develop java programs using object oriented programming concepts
CO2: Develop simple applications using object oriented concepts such as package, exceptions
CO4: Create GUIs and event driven programming applications for real world problems
CO3: Implement multithreading, and generics concepts
CO5: Implement and deploy web applications using Java
CO’s- PO’s & PSO’s MAPPING

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CS3481 DATABASE MANAGEMENT SYSTEMS LABORATORY

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COURSE OBJECTIVES:

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand design and implementation of typical database applications.
- To be familiar with the use of a front end tool for GUI based application development.

LIST OF EXPERIMENTS:

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create a set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different ‘where’ clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins.
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in a database table.
9. Create View and index for database tables with a large number of records.
12. Develop a simple GUI based database application and incorporate all the above-mentioned features.
13. Case Study using any of the real life database applications from the following list
   a) Inventory Management for a EMart Grocery Shop
   b) Society Financial Management
   c) Cop Friendly App – Eseva
   d) Property Management – eMall
   e) Star Small and Medium Banking and Finance
• Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.
• Apply Normalization rules in designing the tables in scope.
• Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features.
• Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.
• Ability to showcase ACID Properties with sample queries with appropriate settings

List of Equipments:(30 Students per Batch)
MYSQL / SQL : 30 Users

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of this course, the students will be able to:
CO1: Create databases with different types of key constraints.
CO2: Construct simple and complex SQL queries using DML and DCL commands.
CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.
CO4: Create an XML database and validate with meta-data (XML schema).
CO5: Create and manipulate data using NOSQL database.

CO’s- PO’s & PSO’s MAPPING

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GE3361 PROFESSIONAL DEVELOPMENT L T P C
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OBJECTIVES:

To be proficient in important Microsoft Office tools: MS WORD, EXCEL, POWERPOINT.

• To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
• To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered
To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

**MS WORD:**

Create and format a document
Working with tables
Working with Bullets and Lists
Working with styles, shapes, smart art, charts
Inserting objects, charts and importing objects from other office tools
Creating and Using document templates
Inserting equations, symbols and special characters
Working with Table of contents and References, citations
Insert and review comments
Create bookmarks, hyperlinks, endnotes footnote
Viewing document in different modes
Working with document protection and security
Inspect document for accessibility

**MS EXCEL:**

Create worksheets, insert and format data
Work with different types of data: text, currency, date, numeric etc.
Split, validate, consolidate, Convert data
Sort and filter data
Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,)
Work with Lookup and reference formulae
Create and Work with different types of charts
Use pivot tables to summarize and analyse data
Perform data analysis using own formulae and functions
Combine data from multiple worksheets using own formulae and built-in functions to generate results
Export data and sheets to other file formats
Working with macros
Protecting data and Securing the workbook

**MS POWERPOINT:** 10 Hours

Select slide templates, layout and themes

Formatting slide content and using bullets and numbering

Insert and format images, smart art, tables, charts

Using Slide master, notes and handout master

Working with animation and transitions

Organize and Group slides

Import or create and use media objects: audio, video, animation

Perform slideshow recording and Record narration and create presentable videos

**TOTAL: 30 PERIODS**

**OUTCOMES:**

On successful completion the students will be able to

- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements.
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding.
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

**CD3402 VISUAL DESIGN AND COMMUNICATION**

**COURSE OBJECTIVES:**

- Understand the basics concepts and fundamental principles of visual design.
- Explain the rules for making visually appealing and aesthetical design.
- Develop visual thinking.
- Familiarize the students with visual design software programs such as Adobe Illustrator, InDesign and Photoshop.
- Expose to wider application of design in media, advertisement and entertainment industry.

**UNIT I ELEMENTS, PRINCIPLES AND THEORIES OF DESIGN** 9

Introduction to design and visual communication, Meaning and Purpose of design, Design thinking processes, Multi-dimensional approach to finding a meaningful solution to a problem. Element of Design, Gestalt Principles – Semiotics – Color etc., Critical evaluation of designs - Composition: Focus, leading lines, juxtaposition, white space, Rule of thirds, the Golden ratio., Typography: Evolution, principle, typeface & font, structure of letter (Baseline, meanline, ascender, descender,
etc.), Serif & Sans-serif font, use in news media, illustrated magazines, ads, signs, logos, brochures, movie posters, digital platforms, etc.

UNIT II  ASPECTS OF DESIGNING  9
Design processes: Discuss the problem, developing creative brief, concept building, visualization, development, etc., Stages of campaign planning, Steps involved in designing Press ad, Magazine ad, Hoardings, Kiosks, Interior & Exterior Signage, Danglers and Banners etc., Focusing on the composition and balancing the different element of design, Choice and use of images and colors Tagline, Visuals, Copy, Spot colors, Process colors, Color Management for images, Understanding the in-house style guide

UNIT III  LAYOUTS AND DESIGN  9
Elements of an effective layout, Book design: stages of book/e-book design., Periodicals: magazine and newsletters functions. Editorial planning, design planning, design approach, Newspaper makeup: using photographs, communicating with type and color, Poster design: strengths and limitations of poster designing, its steps and poster production, Creative brief, research, brainstorming, conceptualization, refinement, client presentation, development, etc.

UNIT IV  UNDERSTANDING DESIGNING SOFTWARE AND ITS USAGES : ILLUSTRATOR, INDESIGN  9
Understanding the basic architecture of and differences between vector and raster graphic software and their wider usages in media industry, Designing Logotype, Processes of logo design: Principles of logo design, Letterhead design, Business Card, Envelop, Catalogues, Brochures, Digital Posters, etc., Using the standardized style sheets on software, Basics of Adobe Illustrator: Document types and templates, Configuring the user interface, Creating various shapes, Fill and stroke, Transformation techniques, Selection tools, Grouping the objects, Alignment & distribution, Handling the appearance of objects, Drawing, Use of Various Brushes, Working with images (tracing), Typing options, Saving & exporting for print and the web, Basics of Adobe InDesign: Document type, Managing the workspace, working with templates, Bleed and slug, Importing docs and text, Various tools: Selection, type, line, pen, etc. Grouping, ungrouping and rotating, Layer, Color & swatches, Working with lines and frames, Master page, Guide-columns- grids etc., Using text and image: Basic formatting, Inserting symbols, Header and footer, Character & Paragraph style, Working with multiple pages and magazine spread, Creation and usages of table, Cheat sheets and shortcuts, Exporting options.

UNIT V  VISUAL DESIGN FOR THE DIGITAL PLATFORMS  9
Understanding user experience for the Web, Static vs. dynamic design, Issues of file size and load time, Type of typography for the Web, Making GIF animation, User-friendly designs, Compression techniques: Lossy and Lossless, Color choices.

COURSE OUTCOMES:
CO1: Practice the sketching and drawing in the visual design
CO2: Demonstrate the basics concepts and principles of visual design.
CO3: Apply the rules for making visually appealing and aesthetic design.
CO4: Use visual design software programs such as Adobe Illustrator, InDesign and Photoshop.
CO5: Design wider application of design in media, advertisement and entertainment industry.

**TEXT BOOKS:**

**REFERENCES**

**CO’s- PO’s & PSO’s MAPPING**

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**AL3452 OPERATING SYSTEMS**

**COURSE OBJECTIVES:**
- To understand the basics and functions of operating systems.
- To understand Processes and Threads
- To analyze Scheduling algorithms and process synchronization.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To be familiar with I/O management and File systems.
- To be familiar with the basics of virtual machines and Mobile OS like iOS and Android.

**UNIT I INTRODUCTION**
UNIT II  PROCESS MANAGEMENT  11

UNIT III  MEMORY MANAGEMENT  10
Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Segmentation with paging; Virtual Memory - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing.

UNIT IV  STORAGE MANAGEMENT  10

UNIT V  VIRTUAL MACHINES AND MOBILE OS  7
Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android.

PRACTICAL EXERCISES:  30 PERIODS
1. Installation of Operating system : Windows/ Linux
2. Illustrate UNIX commands and Shell Programming
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Illustrate the inter process communication strategy
6. Implement mutual exclusion by Semaphores
7. Write a C program to avoid Deadlock using Banker’s Algorithm
8. Write a C program to Implement Deadlock Detection Algorithm
9. Write C program to implement Threading
10. Implement the paging Technique using C program
11. Write C programs to implement the following Memory Allocation Methods
   a. First Fit  b. Worst Fit  c. Best Fit
12. Write C programs to implement the various Page Replacement Algorithms
13. Write C programs to Implement the various File Organization Techniques
14. Implement the following File Allocation Strategies using C programs
   a. Sequential  b. Indexed  c. Linked
15. Write C programs for the implementation of various disk scheduling algorithms
COURSE OUTCOMES:
At the end of this course, the students will be able to:
   CO1: Analyze various scheduling algorithms and process synchronization.
   CO2: Explain deadlock, prevention and avoidance algorithms.
   CO3: Compare and contrast various memory management schemes.
   CO4: Explain the functionality of file systems I/O systems, and Virtualization.
   CO5: Compare iOS and Android Operating Systems.

TOTAL: 75 PERIODS

TEXTBOOKS

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CD3403 COMPUTER GRAPHICS

UNIT I 2D GRAPHICS PROCESSING
Display devices, Computer Graphics APIs, 2D output Primitives, attributes of output primitives, 2D Transformations, Viewing – Clipping.
UNIT II  3D GRAPHICS PIPELINE  9
3D Primitives, 3D Object representations - Mesh Modeling, parametric curves and surfaces, coordinate systems, Viewing, 3D Transformations, 3D Viewing pipeline, Projections – Parallel, Perspective, Clipping in 3D.

UNIT III  VULKAN GRAPHICS API  9

UNIT IV  RENDERING and GPU  9

UNIT V  DATA STRUCTURES AND PROCEDURAL GRAPHICS  9
Data Structures for Graphics – Triangle Mesh, Scene Graph, Spatial Data Structures, BSP Trees, Octrees Fractals, Particle Systems, point cloud, procedural textures, grammar-based models, Constructive Solid Geometry.

TOTAL : 45 PERIODS

COURSE OUTCOMES:
On Successful completion of the course, Students will be able to
CO1:Implement 2D transformations and algorithms for generating primitives and attributes
CO2:Solve problems in 3D transformations and viewing
CO3:Implement and Render graphics using open source Vulkan API
CO4:Implement rendering techniques and Use GPU based rendering
CO5:Experiment with different procedural graphics and common data structures.

LABORATORY EXPERIMENTS:  (Reference: https://vulkan-tutorial.com/)

Software Requirements: On Windows: Vulkan SDK, GLFW, GLM, C++ compiler and IDE like visual studio.

1. Install vulkan sdk with c++ in Visual Studio and set up the work environment.
2. Understand vulkan environment for setting up graphics experiment: setup, presentation, graphics pipeline commands, window surface, swap chain, image views, buffers.
3. Drawing 2D primitives (points, lines, polygons, triangle fan, triangle strip etc.)
4. Setting up the camera, lights and performing viewing transformations. Demonstrate a Simple projection transformation for a primitive.
5. Drawing 3D primitive "Cube" and show the cube from different camera angles and perspectives.
6. Place lights and Shade the cube using any shading language or simple flat
shading, with different colors for different surfaces of the cube.

7. Apply basic transformations on the cube including Translation, Rotation, Scaling.
8. Understand different types of shaders in Vulkan
9. Using different Buffers (Depth Buffer, Stencil Buffer) to implement different effects on the 3D model.
10. Applying textures on a Cube.
11. Perform the above steps on other geometric objects other than Cube.
12. Create a simple 3D scene with different objects and with different attributes
13. Perform Rendering with Environment and Bump maps and other rendering techniques

TEXT BOOKS:


REFERENCES:


Web References:

2. https://vulkan.org/
5. https://opengl.org/

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CD3401  FUNDAMENTALS OF COMPUTER NETWORKS

COURSE OBJECTIVES:
- To understand the concept of layering in networks.
- To know the functions of protocols of each layer of TCP/IP protocol suite.
- To visualize the end-to-end flow of information.
- To learn the functions of network layer and the various routing protocols
- To familiarize the functions and protocols of the Transport layer

UNIT I  INTRODUCTION AND APPLICATION LAYER  10

UNIT II  TRANSPORT LAYER  9

UNIT III  NETWORK LAYER  7
Switching : Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP, RARP, ICMP, DHCP

UNIT IV  ROUTING  7

UNIT V  DATA LINK AND PHYSICAL LAYERS  12

COURSE OUTCOMES:
At the end of this course, the students will be able to:
CO 1: Explain the basic layers and its functions in computer networks.
CO 2: Understand the basics of how data flows from one node to another.
CO 3: Analyze routing algorithms.
CO 4: Describe protocols for various functions in the network.
CO 5: Analyze the working of various application layer protocols.

TEXT BOOKS

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CS3491 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING L T P C 3 0 2 4

COURSE OBJECTIVES:
The main objectives of this course are to:
- Study about uninformed and Heuristic search techniques.
- Learn techniques for reasoning under uncertainty
- Introduce Machine Learning and supervised learning algorithms
- Study about ensembling and unsupervised learning algorithms
- Learn the basics of deep learning using neural networks

UNIT I PROBLEM SOLVING
UNIT II  PROBABILISTIC REASONING  9

UNIT III  SUPERVISED LEARNING  9

UNIT IV  ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING  9
Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization

UNIT V  NEURAL NETWORKS  9
Perceptron - Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error backpropagation, from shallow networks to deep networks – Unit saturation (aka the vanishing gradient problem) – ReLU, hyperparameter tuning, batch normalization, regularization, dropout.

PRACTICAL EXERCISES:  30 PERIODS
1. Implementation of Uninformed search algorithms (BFS, DFS)
2. Implementation of Informed search algorithms (A*, memory-bounded A*)
3. Implement naïve Bayes models
4. Implement Bayesian Networks
5. Build Regression models
6. Build decision trees and random forests
7. Build SVM models
8. Implement ensembling techniques
9. Implement clustering algorithms
10. Implement EM for Bayesian networks
11. Build simple NN models
12. Build deep learning NN models

COURSE OUTCOMES:
At the end of this course, the students will be able to:
CO1: Use appropriate search algorithms for problem solving
CO2: Apply reasoning under uncertainty
CO3: Build supervised learning models
CO4: Build ensembling and unsupervised models
CO5: Build deep learning neural network models

TOTAL: 75 PERIODS
TEXT BOOKS:

REFERENCES

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GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY  L T P C  2 0 0 2

UNIT I ENVIRONMENT AND BIODIVERSITY  6
UNIT II ENVIRONMENTAL POLLUTION

UNIT III RENEWABLE SOURCES OF ENERGY
Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT IV SUSTAINABILITY AND MANAGEMENT
Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols- Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT V SUSTAINABILITY PRACTICES

TOTAL: 30 PERIODS

TEXT BOOKS:
5. Bradley, A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.

REFERENCE BOOKS:

CD3412 VISUAL DESIGN AND COMMUNICATION LABORATORY L T P C 0 0 4 2

COURSE OBJECTIVES:
- To explore the Adobe Illustrator tools
- To be able to use Keyboard Shortcuts for Drawing
- To create & develop Artboards using Illustrator.
- To be familiar with the common functions of layers and Exporting

LIST OF EXPERIMENTS
1). Exploring the Adobe Illustrator Interface, Illustrator Tools and Keyboard Shortcuts for Drawing
2). Creating Basic Shapes and the usage of Eraser Tool
3). Explore the Shape Builder Tool and Live Paint Bucket Tool
4). Using Color in Illustrator, Changing the Background Color of an Artboard
5). Understanding & Creating Artboards Using the Paintbrush Tool
6). Downloading the Data Files and Saving a file
7). Creating Logo, PowerPoint Template, Invitation, Letterhead and Business Card
8). How to Navigate Your Document and Creating Shapes & Adding Fill and Strokes
10). Access the layers panel, Navigate the layers panel, Change the options for a layer. Become familiar with the common functions of layers and Exporting

Mini Project:
Emoji Challenge Activity

PRACTICALS 60 PERIODS

OUTCOMES:
CO1. Apply procedures to use Adobe Illustrator for visual communications.
CO2. Understand Adobe Illustrator Creative Cloud interface and program settings.
CO4. Apply procedures to create and modify visual elements Adobe Illustrator Creative Cloud.
CO5. Apply procedures to save and export assets for specific purposes using Adobe Illustrator Creative Cloud

REFERENCES
CD3411  IOT BASED DESIGN LABORATORY  L T P C  0 0 4 2

OBJECTIVES:
- To learn how to work with IoT–based sensors and microcontrollers.
- To conduct experiments using CloudSim.
- To read data from sensor and encrypt them.
- To transmit and receive data using public/private cloud.
- To build customized user-interface (UI) for an application.

LIST OF EXPERIMENTS:
1. Sensors to microcontroller communication.
4. Usage of Google Apps and Amazon Web Service (AWS).
5. Installation of Guest OS using Virtual box / VMware.
6. Simulation of cloud infrastructures in CloudSim.
7. Secured communication from microcontroller to backend.
8. Store sensor data in the public / private cloud.
9. Analyze the insight of sensor data visually.
10. Develop customized user-interface for an application.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
CO1: Retrieve and process various sensors data using microcontroller.
CO2: Analyze the use of Cloud applications.
CO3: Execute various algorithms using CloudSim.
CO4: Transmit sensor data safely using encryption algorithm.
CO5: Communicate with the external world using wired / wireless communication protocols.
CO6: Build an IoT application with look-and-feel UI by connecting to public / private cloud.

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