# MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

An Autonomous Institution

# Department of Computer Science and Engineering w / s in Cyber Security

## Curriculum and Syllabus (I - IV Semester) 2024 - 2025

[ Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai | Recognised by UGC 12(B) & 2(f) Act | An ISO 9001:2015 Certified | NAAC Accredited with 'A' Grade | NBA – Mechanical ]

*34, Rajiv Gandhi Salai (OMR) Siruseri IT Park, Chennai - 603 103*

**MOHAMED SATHAK A J COLLEGE OF ENGINEERING**
**Chennai – 603103**

**REGULATIONS 2024**
**(CHOICE BASED CREDIT SYSTEM)**

# B.E – COMPUTER SCIENCE AND ENGINEERING w/s in CYBER SECURITY

## I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: **Technical Proficiency and Innovation**
Graduates will possess strong technical knowledge and skills in **Computer Science and Engineering (Cyber Security)**, enabling them to solve complex problems, design and implement, innovative and sustainable solutions for Industry and Society.

PEO2: **Professional and Ethical Leadership**
Graduates will achieve successful careers and contribute towards technological advancements in terms of leadership, ethical responsibility, effective communication, and teamwork.

PEO3: **Lifelong Learning and Societal Contribution**
Graduates will engage in lifelong learning to be updated with cutting edge technology and apply their skills to address global challenges thus promoting socio economic development.

## II. PROGRAM OUTCOMES (POs)

i. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
ii. **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
iii. **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.
iv. **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 for complex problems
v. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
vi. **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.
vii. **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.

viii. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

ix. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

x. **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.

xi. **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.

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

## III. PROGRAM SPECIFIC OUTCOMES (PSOs)

Graduates will be able to

PSO1: Design and implement sustainable solutions in **Computer Science and Engineering (Cyber Security)** domain by using innovation, technical knowledge acquired, modern hardware and software tools.

PSO2: Adapt and excel in **Computer Science and Engineering (Cyber Security)** domain through continual learning, higher education, research and use of new technology for societal and industry needs.

PSO3: Contribute in leadership roles to create new opportunities and ensuring adherence of economic, environmental and ethical standards.

| PEO | PO | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO1 | PSO2 | PSO4 |
| 1 | 3 | 3 | 3 | 3 | 3 | | | | | | 2 | 1 | 3 | 3 | 2 |
| 2 | | | | | | 2 | 2 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 3 |
| 3 | | | | | | 3 | 3 | | 1 | | | 3 | 2 | 2 | 2 |

**1 - Low, 2 - Medium, 3 - High, '-' - No correlation**

**Department of Computer Science and Engineering w /s in Cyber Security**

**Curriculum for the students Admitted from 2024 - 2025 onwards**

**Semester - I**

| S.No | Subject Code | Subject | L | T | P | Credit | Conduct Periods | Category |
|---|---|---|---|---|---|---|---|---|
| | 24IP101 | Induction Program : (Universal Human Value - I) | | | | | | |
| **Theory Course** | | | | | | | | |
| 1 | 24TA101 | Heritage of Tamils / தமிழர் மரபு | 1 | 0 | 0 | 1 | 1 | HSMC |
| 2 | 24EN101 | Technical Communication - I | 3 | 0 | 0 | 3 | 3 | HSMC |
| 3 | 24MA101 | Matrices and Calculus | 3 | 1 | 0 | 4 | 4 | BSC |
| 4 | 24PY111 | Engineering Physics | 3 | 0 | 2 | 4 | 5 | BSC |
| 5 | 24CH111 | Engineering Chemistry | 3 | 0 | 2 | 4 | 5 | BSC |
| 6 | 24CS111 | Programming in C | 2 | 0 | 4 | 4 | 6 | ESC |
| 7 | 24GE121 | Engineering Visualization | 1 | 0 | 4 | 3 | 5 | ESC |
| **Laboratory Course** | | | | | | | | |
| 8 | 24EN121 | English for Enhancing Self Competence | 0 | 0 | 2 | 1 | 2 | EEC |
| 9 | 24GE122 | Product Tinkering Laboratory | 0 | 0 | 2 | 1 | 2 | ESC |
| | | | **16** | **1** | **16** | **25** | **33** | |

| Semester - II | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **S.No** | **Subject Code** | **Subject** | **L** | **T** | **P** | **Credit** | **Conduct Periods** | **Category** |
| **Theory Course** | | | | | | | | |
| 1 | 24TA201 | Tamils and Technology / தமிழரும் தொழில் நுட்பமும் | 1 | 0 | 0 | 1 | 1 | HSMC |
| 2 | 24EN201 | Technical Communication - II | 3 | 0 | 0 | 3 | 3 | HSMC |
| 3 | 24MA201 | Transforms and Numerical Methods | 3 | 1 | 0 | 4 | 4 | BSC |
| 4 | 24CS211 | Python Programming | 2 | 0 | 4 | 4 | 6 | PCC |
| 5 | 24CS112 | Computational Thinking | 1 | 0 | 2 | 2 | 3 | ESC |
| 6 | 24EE111 | Basic Electrical and Electronics Engineering | 3 | 0 | 2 | 4 | 5 | ESC |
| 7 | 24GE101 | Basic Civil and Mechanical Engineering | 3 | 0 | 0 | 3 | 3 | ESC |
| **Laboratory Course** | | | | | | | | |
| 8 | 24EN221 | English for Professional Competance | 0 | 0 | 2 | 1 | 2 | EEC |
| 9 | 24MA221 | Engineering Mathematics Laboratory | 0 | 0 | 2 | 1 | 2 | BSC |
| 10 | 24IT121 | IT Essential Skills | 0 | 0 | 2 | 1 | 2 | ESC |
| 11 | 24GE124 | Electrical and Electronics Workshop Practice | 0 | 0 | 2 | 1 | 2 | ESC |
| | | | **16** | **1** | **16** | **25** | **33** | |
| **Mandatory Course#** | | | | | | | | |
| A | | Personality and Character Development Activity: (Universal Human Value - II) | | | | | | MC |
| B | | NSS / NCC / NSO / YRC / Club Activity : Phase 1* | | | | | | MC* |
| * | The student may opt any one. They have to complete the respective Phase II and Phase III. It is a mandatory course to get the degree certificate after completing 4 years as per the norms of UGC, AICTE & Anna University. If any student did not complete the course after completing it only degree certificate is awarded. | | | | | | | |
| # | Activities are conducted exclusively for two week apart from the academic activity | | | | | | | |

| SEMESTER III | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S.No | Subject Code | Subject | L | T | P | Contact Periods | Credits | Category |
| 1 | 24MA301 | Discrete Mathematics | 3 | 0 | 0 | 3 | 3 | ESC |
| 2 | 24CS303 | Java Programming | 3 | 0 | 0 | 3 | 3 | PCC |
| 3 | 24IT301 | Data Structures and Algorithms | 3 | 0 | 0 | 3 | 3 | PCC |
| 4 | 24EC312 | Digital System Design | 2 | 1 | 2 | 5 | 4 | PCC |
| 5 | 24ES321 | Innovation and Design Thinking | 1 | 0 | 2 | 3 | 2 | ESC |
| 6 | 24GE311 | Universal Human Values and Ethics | 1 | 0 | 2 | 3 | 2 | HSMC |
| 7 | 24IT321 | Data Structures and Algorithms Laboratory | 0 | 0 | 4 | 4 | 2 | PCC |
| 8 | 24CS322 | Java Programming Laboratory | 0 | 0 | 4 | 4 | 2 | PCC |
| 9 | | Language Elective - I | 0 | 0 | 2 | 2 | 0 | MC |
| 10 | 24MC321 | NSS / NSO / YRC - Level II | 0 | 0 | 2 | 2 | 0 | MC |
| **Total** | | | | | | **32** | **21** | |

Language Elective (Non-Credit Mandatory Course): Student can select any one and submit the certificate

1. Advanced English Communication-Level I and Level II–Certified by Cambridge University Press & Assessment
2. Hindi - Level I (Parichaya) and Level II (Prathmic) Certified by Dakshina Bharat Hindi Prachar Shaba
3. Japanese – Level N5 and N4 Certified by JLPT / NPTEL / SWAYAM
4. German – Level A1 and A2 Certified by Goethe / NPTEL / SWAYAM
5. French - Level A1 and A2 Certified by Goethe / NPTEL / SWAYAM

| SEMESTER IV | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S.No | Subject Code | Subject | L | T | P | Contact Periods | Credits | Category |
| 1 | 24CY401 | Cryptography and Cyber Security | 3 | 0 | 0 | 3 | 3 | PCC |
| 2 | 24CS301 | Computer Organization and Architecture | 3 | 0 | 0 | 3 | 3 | PCC |
| 3 | 24CY402 | Database Management Systems and Security | 3 | 0 | 0 | 3 | 3 | PCC |
| 4 | 24MA411 | Probability and Statistics | 2 | 1 | 2 | 5 | 4 | BSC |
| 5 | 24CH411 | Environmental Studies and Sustainable Development | 2 | 0 | 2 | 4 | 3 | BSC |
| 6 | 24CY412 | Cyber Forensics | 3 | 0 | 2 | 5 | 4 | PCC |
| 7 | 24CY421 | Cryptography and Cyber Security Lab | 0 | 0 | 4 | 4 | 2 | PCC |
| 8 | 24CY422 | Database Management Systems and Security Lab | 0 | 0 | 4 | 4 | 2 | PCC |
| 9 | | Language Elective - Level I* | 0 | 0 | 2 | 2 | 0 | MC |
| 10 | | Audit Course - II | 0 | 0 | 2 | 2 | 0 | MC |
| **Total** | | | | | | **35** | **24** | |

Audit Course-II (Non-Credit Mandatory Course): Student can select any one of the following and Complete the same to get the degree certificate

1. Disaster Management
2. Industrial Safety
3. Gender Sensitisation

Chairman BoS | Director IQAC | Head Academics | Principal

# HERITAGE OF TAMILS

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24TA101 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 1:0:0 | **Credits** | 1 |
| **Total Teaching Periods** | 15 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | Tamil | | |

**Course Objectives:**

1. To familiarize about the importance of Tamil Language and its literature
2. To teach about the heritage of Tamil from art and sculpture
3. To teach about the culture of Tamil from Folk music and martial arts
4. To impart knowledge on thinai concepts
5. To provide insight on the contribution of Tamil in freedom struggle and Indian culture

**Unit: I LANGUAGE AND LITERATURE** **3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE** **3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: III FOLK AND MARTIAL ARTS** **3**

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

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: IV THINAI CONCEPT OF TAMILS** **3**

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.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE** **3**

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.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Total** **15**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Sol Vilayattu |
| Unit 2: | Drawing |
| Unit 3: | Theme based activities (Folk and Dance) |
| Unit 4: | Essay & Poetry Writing (Thinai) |
| Unit 5: | Try to learn about basic Siddha Vaithiyam |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Explain the salient features of Tamil language and its literature. |
| CO2: | Discuss about the heritage of Tamil exhibited by various forms of art and sculpture. |
| CO3: | Describe Tamil heritage displayed by folk music and martial arts |
| CO4: | Discuss and describe the features of five Thinais in Tamil. |
| CO5: | Describe the contribution of Tamil in freedom struggle and Indian culture. |

**Text Books:**

T1: Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

T2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. ISBN 9788185693343.

**References**


R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Published by: International Institute of Tamil Studies

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).ISBN 9788185329567.

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author) ISBN 8170260548.

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

**Web links and Video Lectures (e-Resources):**

1. https://onlinecourses.nptel.ac.in/noc24_cs36/preview - Unit IV
2. https://digimat.in/nptel/courses/video/113106106/L01.html - Unit I

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 2 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 4 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 5 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| **AVG** | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# தமிழர் மரபு

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24TA101 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 1:0:0 | **Credits** | 1 |
| **Total Teaching Periods** | 15 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | Tamil | | |

**Course Objectives:**

1. தாய்மொழியின் நிகரற்ற தொன்மையை விளக்குவது
2. பழம் தமிழரின் துறை சார்ந்த ஓவியங்கள் மற்றும் சிற்பங்கள் நவீன கலைகள் குறித்து விளக்குவது
3. வியக்க வைக்கும் பழந்தமிழரின் கலைகள், இசை மற்றும் வீரவிளையாட்டுகள் பற்றி தெரியப்படுத்துவது
4. தமிழர்களின் திணைக் கோட்பாடுகளை பற்றி விளக்குவது
5. தமிழரின் தன்னிகரற்ற ஈடுபாடு - சித்த மருத்துவம் மற்றும் விடுதலைப் போராட்டம் பற்றி விளக்குவது

**அலகு – I மொழி மற்றும் இலக்கியம்** **3**

இந்திய மொழிக் குடும்ங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கirள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம் ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு - II மரபு பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை சிற்பக் கலை** **3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் மிருதங்கம் - பறை வீணை யாழ் நாதஸ்வரம் தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு – III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்** **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு – IV தமிழர்களின் திணைக் கோட்பாடுகள்** **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு – V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு** **3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள்-தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Total** **15**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Sol Vilayattu |
| Unit 2: | Drawing |
| Unit 3: | Theme based activities (Folk and Dance) |
| Unit 4: | Essay & Poetry Writing (Thinai) |
| Unit 5: | Try to learn about basic Siddha Vaithiyam |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | தமிழ் மொழி மற்றும் அதன் இலக்கியத்தின் முக்கிய அம்சங்களை விளக்குவார்கள். |
| CO2: | கலை மற்றும் சிற்பத்தின் பல்வேறு வடிவங்களால் காட்சிப்படுத்தப்பட்ட தமிழின் பாரம்பரியத்தைப் பற்றி விவாதிப்பார்கள் |
| CO3: | நாட்டுப்புற இசை மற்றும் தற்காப்பு கலைகளால் காட்டப்படும் தமிழ் பாரம்பரியத்தை விளக்குவார்கள் |
| CO4: | தமிழில் ஐந்து திணைகளின் அம்சங்களைப் பற்றி விளக்குவார்கள். |
| CO5: | சுதந்திரப் போராட்டத்திலும் இந்திய கலாச்சாரத்திலும் தமிழின் பங்களிப்பை விவரிப்பார்கள். |

**Text Books:**


| | |
|---|---|
| T1: | தமிழக வரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்.) |
| T2: | கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம் ) |

**References**


R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Published by: International Institute of Tamil Studies

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).ISBN 9788185329567.

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author) ISBN 8170260548.

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)


**Web links and Video Lectures (e-Resources):**

3. https://onlinecourses.nptel.ac.in/noc24_cs36/preview - Unit IV
1. https://digimat.in/nptel/courses/video/113106106/L01.html - Unit I

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 2 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 4 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 5 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| **AVG** | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

# TECHNICAL COMMUNICATION -I

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24EN101 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 3:0:0 | **Credits** | 3 |
| **Total Teaching Periods** | 45 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | English | | |

**Course Objectives:**

1. To facilitate students to develop their comprehension skills.
2. To equip the students to improve their receptive skills.
3. To equip learners with better vocabulary and enhance their writing skills.
4. To aid students to speak effectively in all kinds of communicative contexts.
5. To improve the learners' basic proficiency in workplace communication.

**Unit: I DEVELOPING COMPREHENSION SKILLS 9**

**Listening**: Introduction to Informational listening **Reading**: Short Narratives and Skimming Passages. **Speaking** Introducing Oneself, Narrating a Story / Incident. **Writing:** Sequential Writing (Jumbled Sentences), Process/Product Description **Grammar:** Parts of Speech -Verbs – Main & Auxiliary- Pronouns **Vocabulary**: Misleading words- Spell check - Homonyms & homophones.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: II LISTENING AND EXTENDED READING 9**

**Listening**: Listening for Comprehension-Gap Filling **Reading**: News reading-Scanning Passages – Reading Longer Texts- Cloze Reading **Speaking**: Importance of speaking skill - Short Conversation- Public Speaking Do's & Don'ts **Writing**: Note Making, Note Taking - Paragraph Writing - Types of Paragraph - Compare and Contrast **Grammar**: Tenses – Form, Function and Meaning - Basic Sentence structure-Articles **Vocabulary**: One-Word Substitutes, Phrasal Verbs – Cause and Effect expressions

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: III INTRODUCTION TO FORMAL WRITING 9**

**Listening**: Listening to Lectures and Taking Notes **Reading**: Reading on Visual Content **Speaking**: One-Minute Talk **Writing**: Informal Letter Writing , Email Writing, Data Interpretation-Pie chart, Bar chart **Grammar**: Tenses, Active Voice, Passive Voice, Impersonal-Preposition **Vocabulary**: Guessing the meaning from context, Cloze Exercise - Word power.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: IV ENHANCING SPEAKING ABILITY 9**

**Listening:** Listening to Speeches **Reading:** Speed Reading **Speaking:** Just a Minute **Writing:** Instructions,Formal letter writing, Data Interpretation-Flow chart, Table **Grammar:** 'Wh' Questions / Yes or No Questions, Question Tag, Imperatives **Vocabulary:** Synonyms, Antonyms, Different forms of same words.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: V** **EXTENSIVE LANGUAGES FOR WORKPLACE** **9**

**Listening**: Extensive Listening -Audio scripts – Listening to Conversation **Reading**: Extensive reading (Jigsaw Reading, Short Stories, Novels) - Introduction to Technical Article **Speaking**: Short Presentations on Technical Topics -Tips for Doing Presentation **Writing:** Recommendations, Essay Writing **Grammar:** Collocation, Concord -Compound words **Vocabulary:** Informal Vocabulary and Formal Substitutes

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1, L2, L3

**Total** **45**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Speaking task |
| Unit 2: | Reading task |
| Unit 3: | Speaking task |
| Unit 4: | Reading task |
| Unit 5: | Speaking task |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Apply comprehension skills and interpret different contents. |
| CO2: | Read and comprehend various texts and audiovisual contents |
| CO3: | Infer data from graphs and charts and communicate it in varied contexts. |
| CO4: | Participate in diverse speaking situations. |
| CO5: | Present, discuss and coordinate with peers in workplace using language skills. |

**Text Books:**

T1: Anna University English Department, "English for Engineers and Technologists", Orient Black Swan, ISBN-978-93-5442-067-2, Edition 2022 –Vol-I.

T2: Ashraf Rizvi. M, "Effective Technical Communication", McGraw Hill Education, Second edition (2017)- ISBN-9352605780, 978-9352605781 2nd Edition.

T3: Sylvan Barnet, Hugo Bedau, and John O'Hara, "Critical Thinking Reading and Writing", Bedford/St. Martin's: 11th Edition, ISBN-13 : 978-1319332051 (16 December 2022)

**References**

R1: Addison Wesley Longman, "Technical English", Pearson, ISBN:978-1292042862, 8th Edition 2013.

R2: Norman Lewis, "Word Power Made Easy", Goyal Saab; Latest edition (1 January 2020), ebook ISBN-978-0-307-81749-5

R3: Pinnacle , "SSC 60 Days English Vocabulary book" 3rd edition, English and Hindi, 20,000+ words, , ISBN-715791456, 3rd Edition - 19 September 2023

**Web links and Video Lectures (e-Resources):**

1. https://leverageedu.com/blog/internship-request-letter/ - Unit - IV
2. https://www.englishgrammar.org/ - All Units Grammar
3. https://www.indeed.com/career-advice/career-development/letter-of-introduction - Unit III

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | - | 1 | 3 | - | 2 | 1 | 1 | 1 |
| 2 | - | - | - | - | - | - | - | - | 1 | 3 | - | 2 | 1 | 1 | 1 |
| 3 | - | - | - | - | - | - | - | - | 1 | 3 | - | 2 | 1 | 1 | 1 |
| 4 | - | - | - | - | - | - | - | - | 1 | 3 | - | 3 | 1 | 1 | 1 |
| 5 | - | - | - | - | - | - | - | - | 1 | 3 | - | 3 | 1 | 1 | 1 |
| AVG | - | - | - | - | - | - | - | - | 1 | 3 | - | 2.4 | 1 | 1 | 1 |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# MATRICES AND CALCULUS

**(Common to All Branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24MA101 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 3:1:0 | **Credits** | 4 |
| **Total Teaching Periods** | 60 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | Mathematics | | |

**Course Objectives:**

1. To impart knowledge on the concepts of matrix algebra techniques needed for practical applications.
2. To familiarize the students with differential calculus.
3. To familiarize students with single integrals and multiple integrals.
4. To illustrate the simple applications of vector calculus.
5. To make the students to understand the concept of analytic function.
6. To introduce the basic concepts of complex integration.

**Unit: I MATRICES `12**

Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Statement and applications of Cayley-Hamilton Theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL Videos
**RBT Level:** L1 - L3

**Unit: II DIFFERENTIAL CALCULUS 12**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation -Applications: Maxima and Minima of functions of one variable.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL Videos
**RBT Level:** L1 - L3

**Unit: III INTEGRAL CALCULUS & MULTIPLE INTEGRAL 12**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts - Double integrals - Double integral in polar coordinates - Area-enclosed by plane curves – Triple integrals – Volume of solids.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1 - L3

**Unit: IV VECTOR CALCULUS 12**

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL Videos
**RBT Level:** L1 - L3

**Unit: V ANALYTIC FUNCTIONS AND COMPLEX INTEGRATION 12**

Analytic functions –Necessary and sufficient conditions for analyticity -Construction of analytic function - Conformal mapping – Mapping by functions w=z+c, cz, 1/z -Bilinear Transformation, Line integral - Cauchy‟s integral theorem – Cauchy's integral formula – Taylor's and Laurent's series

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1 - L3

**Total 60**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | To Explore the applications of matrices in real-world scenarios. |
| Unit 2: | Use differential equations to model the rate of change of pollutant concentration over time and space. |
| Unit 3: | Apply integral calculus to optimize production levels, pricing strategies, and economic decision- making. |
| Unit 4: | Apply concepts of gradient, divergence, and curl in various coordinate systems to analyze vector fields. |
| Unit 5: | Use Python to visualize complex functions in the complex plane., Example: $w= 1/z^2$ |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Use the matrix algebra methods to diagonalize a given matrix and identify the special properties of matrices. |
| CO2: | Demonstrate different differentiation techniques and find maxima and minima of a given function. |
| CO3: | Find area enclosed by plane curves and volume of solids using integration techniques. |
| CO4: | Apply the concepts of gradient, curl and divergence across various disciplines. |
| CO5: | Utilize the concepts of analytic functions and construct analytic functions. |
| CO6: | Apply the basic concepts of complex integration to solve complex integrals. Expand a given function into Taylor's Series and Laurent's Series |

**Text Books:**


T1: Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.ISBN : 9788126567880

T2: B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2016.ISBN : 9789382332300


**References**


R1: M. K. Venkataraman, "Engineering Mathematics", Volume I, 4th Edition, The National Publication Company, Chennai, 2003. ISBN : 9788183311261

R2: Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2015. ISBN : 9789385509183

R3: S.S. Sastry, "Engineering Mathematics", Vol. I & II, PHI Learning Private Limited, 4th Edition, New Delhi, 2014 ISBN : 9788120350039

R4: Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.ISBN : 9781259064917

**Web links and Video Lectures (e-Resources):**

1. https://archive.nptel.ac.in/courses/111/108/111108157/ - Unit I
2. https://archive.nptel.ac.in/courses/111/106/111106146/ - Unit II
3. https://archive.nptel.ac.in/courses/111/105/111105122/ - Unit III
4. https://archive.nptel.ac.in/courses/111/105/111105122/ - Unit IV
5. https://archive.nptel.ac.in/courses/111/103/111103070/ - Unit V

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| 4 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| 5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| **AVG** | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# ENGINEERING PHYSICS
**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24PY111 | **Course Type** | Integrated |
| **Teaching Periods/Week (L: T:P)** | 3:0:2 | **Credits** | 4 |
| **Total Teaching Periods** | 75 | **IAT + ESE Marks** | 50+50 |
| **Teaching Department** | Physics | | |

**Course Objectives:**

1. To impart knowledge on physical properties of materials and inculcate interest in students in observing facts experimentally.
2. To teach various types of oscillations.
3. To teach the acoustic properties and its applications.
4. To equip the students with understanding the importance of thermal physics and its applications
5. To impart the basics of optics, lasers, and their applications.
6. To introduce the importance and applications of quantum mechanics.

**Unit: I MECHANICS OF MATERIALS 9**

Rigid Body - Centre of mass - Rotational Energy - Moment of inertia (M.I) - Moment of Inertia for uniform objects with various geometrical shapes. Elasticity - Hooke's law - Poisson's ratio - stress-strain diagram for ductile and brittle materials - uses- Bending of beams - Cantilever - supported beams - uniform and non-uniform bending - Young's modulus determination - I shaped girders -Twisting couple

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: II OSCILLATIONS AND ACOUSTICS 9**

Simple harmonic motion – Torsional pendulum – Damped oscillations – Shock Absorber – Forced oscillations and Resonance – Applications of resonance.- Waves and Energy Transport – Sound waves – Intensity level – Standing Waves – Doppler effect and its applications – reverberation – Sabine's Reverberation formula- Speed of blood flow. Ultrasound – applications – Echolocation and Medical Imaging.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, NPTEL
**RBT Level:** L1, L2, L3

**Unit: III THERMAL PHYSICS 9**

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints – bimetallic strips – thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity – Forbe's and Lee's disc method: theory and experiment – conduction through compound media (series and parallel) – thermal insulation -applications: heat exchangers, refrigerators, ovens and solar water heaters.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: IV OPTICS AND LASERS** **9**

Interference – Thin film interference – Air wedge – Applications – Interferometers – Michelson Interferometer – Polarization – polarizers – Laser – characteristics – Spontaneous and Stimulated emission- population- inversion – Metastable states – optical feedback – Nd-YAG laser, CO2 laser, Semiconductor laser – Industrial and medical applications – Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic
communication – Fiber sensors – Fiber lasers.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, NPTEL
**RBT Level:** L1, L2, L3

**Unit: V QUANTUM PHYSICS** **9**

Black body radiation (Qualitative) – Planck's hypothesis – Einstein's theory of Radiation – Matter waves – de Broglie hypothesis – Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Physical significance of wave function – Normalization – Particle in an infinite potential well-particle in a three-dimensional box – Degenerate energy states – Barrier penetration and quantum, tunneling – Tunneling microscope.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2

**Total** **45**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Models- Based on Moment of Inertia, cantilever and center of mass |
| Unit 2: | Case Studies – Based on the intensity of different animals, birds, and mammals. |
| Unit 3: | Chart – Based on the difference between Forbes and Lee's disc apparatus |
| Unit 4: | Presentation- Application of Laser and different types of Lasers |
| Unit 5: | Problems Assignment – problems DeBroglie, Schrodinger |

**PRACTICAL (Any seven experiments)** **30**

1. Torsional Pendulum-Determination of rigidity modulus of wire and moment of inertia of the disc
2. Non-uniform bending -Determination of Young's modulus of the material of the beam.
3. Uniform bending–Determination of Young's modulus of the material of the beam.
4. Lee's Disc Experiment - Determination of thermal conductivity of bad conductors.
5. Laser-Determination of the wavelength of the laser using grating - Determination of the width of the groove of the compact disc using laser. - Estimation of laser parameters
6. Optical fibre -Determination of Numerical Aperture and acceptance angle
7. Simple harmonic oscillations of cantilever
8. Air wedge - Determination of thickness of a thin sheet/wire
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
10. Melde's string experiment

**Equipments required**

| S.No | Name of the Equipment and Accessories | Required numbers for batch of 30 students |
|---|---|---|
| 1 | Torsional Pendulum Kit | 5 |
| 2 | Simple harmonic oscillations of cantilever | 5 |
| 3 | Travelling Microscope (Non-Uniform / Uniform) | 5 |
| 4 | He-Ne/Diode laser (red), Grating | 5 |
| 5 | Air Wedge Apparatus | 5 |
| 6 | Diode laser (green or red), fiber optic Kit | 5 |
| 7 | Ultrasonic interferometer apparatus with high-frequency wave generator | 5 |
| 8 | Lee's Disc Apparatus | 2 |
| 9 | Vernier Calliper, Screw Gauge | 5 |
| 10 | Melde's String Kit | 1 |

**Course Outcomes:**

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

CO1: Explain the mechanical properties of materials like brittle and ductile.

CO2: Discuss different types of oscillation and its applications.

CO3: Summarize the acoustic properties and its applications.

CO4: Discuss the thermal properties of materials and their applications.

CO5: Summarize the principle of operation, characteristics, and application of laser and optics.

CO6: Explain the concepts of quantum physics and its applications.

**Text Books:**

T1: D. Halliday, R. Resnick and J. Walker, "Principles of Physics" John Wiley & Sons, 2012 ISBN 978-1-118-23072-5

T2: N. Garcia, A. Damask and S. Schwarz, "Physics for Computer Science Students", Springer Verlag, 2012. ISBN-13: 978-0-387-97656-3

**References**

R1: D. Kleppner and R. Kolenkow. "An Introduction to Mechanics", McGraw Hill Education, 2014. ISBN: 978-0-521-19811-0

R2: K. Thyagarajan and A. Ghatak. "Lasers: Fundamentals and Applications". Springer, 2012 ISBN: 978-1-4419-6441-0

**Web links and Video Lectures (e-Resources):**

1. https://youtu.be/aQf6Q8t1FQE?si=HKYtEGMgu-y7WnLB - Unit-1
2. https://youtu.be/yBC-PuCMMWw?si=lZ4sz88U33vD55To - Unit-2
3. https://youtu.be/DPK1z3QSY_8?si=J04HysWSvmQJwRFo - Unit-3
4. https://youtu.be/PK4yFaGHSFc?si=rrPgMVbD6fMPAPql - Unit-4
5. https://youtu.be/TcmGYe39XG0?si=hBMV6uBRAIa3eHE3 - Unit-5

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 | 1 |
| 2 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 | 1 |
| 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 | 1 |
| 4 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| 5 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| 6 | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| AVG | 3 | 1.83 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 | 1 |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# ENGINEERING CHEMISTRY
**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24CH101 | **Course Type** | Integrated |
| **Teaching Periods/Week (L:T:P)** | 3:0:0 | **Credits** | 3 |
| **Total Teaching Periods** | 75 | **IAT + ESE Marks** | 50 + 50 |
| **Teaching Department** | Chemistry | | |

**Course Objectives:**

1. To impart knowledge on treatment of water for potable and industrial purposes.
2. To introduce the basic concepts and applications of phase rule and composites.
3. To explain the applications of energy sources and storage devices.
4. To facilitate the understanding of different types of fuels, their properties and combustion characteristics.
5. To acquaint the students with the basics of nanomaterials, their properties, and applications.

**Unit: I WATER TECHNOLOGY 9**

Sources and impurities in Water, Water quality parameters and its significance (color, odour, turbidity, PH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic). Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break–point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment/conditioning (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT & Demonstration
**RBT Level:** L1, L2, L3

**Unit: II PHASE RULE AND COMPOSITE MATERIALS 9**

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, application: Pattinson process. Composites: Introduction: Definition & Need for composites; Constituents: Matrix materials, and Reinforcement. Classification of Matrix materials, properties, and its applications: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Types of Reinforcement, properties, and its applications: fiber, particulates, flakes, and whiskers. Properties and applications of: Hybrid composites – definition and examples.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: III ENERGY SOURCES AND STORAGE DEVICES 9**

Energy sources: Nuclear fission and nuclear fusion. Nuclear energy: Light water nuclear power plant and breeder reactor. Solar energy: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy – Geothermal energy. Storage devices: Batteries – types of batteries – primary battery (dry cell), secondary battery (lead acid battery, lithium–ion–battery), fuel cells – H2 –O2 fuel cell, microbial-fuel cell, and super capacitors. E-Vehicle

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: IV FUELS AND COMBUSTION** **9**

Fuels: Introduction and Classification. 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, cetane number; Power alcohol and biodiesel. Gaseous fuels – Natural gas, CNG and LPG.
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.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1, L2, L3

**Unit: V NANOMATERIALS** **9**

Introduction–Distinction between molecules, nanomaterials, and bulk materials; Size–dependent properties of nanomaterials: optical, electrical, mechanical, and magnetic properties; Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Synthesis of nanomaterials: sol–gel, solvo thermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics, and catalysis.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1, L2, L3

**Total** **45**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Model Making – Municipal Water treatment |
| Unit 2: | Poster Presentation – Composite Materials |
| Unit 3: | Pick one and Talk More |
| Unit 4: | Problems – Theoretical Calculation of Calorific Value |
| Unit 5: | Seminar on Applications of Nanomaterials |

**PRACTICAL (Any seven experiments)** **30**

1. Preparation of $Na_2CO_3$ 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 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. Determination of strength of given hydrochloric acid using pH meter.
8. Determination of strength of acids in a mixture of acids using conductivity meter.
9. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
10. Estimation of iron content of the given solution using potentiometer.

**Equipment required**

| S.No | Description of Equipment | Required Numbers for Batch of 30 students |
|---|---|---|
| 1 | pH Meter | 15 |
| 2 | Conductivity Meter | 15 |
| 3 | Potentiometer | 15 |
| 4 | Electronic balance (Four Digit) | 1 |
| 5 | Hot Plate with Magnetic Stirrer | 1 |
| 6 | Hot Air Oven | 1 |
| 7 | Muffle Furnace | 1 |
| 8 | Burette, Pipette, Conical Flask & Other glassware. | 30 |

**Course Outcomes:**

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

CO1: Summarize the water quality parameters and explain various methods to produce soft water for industrial and potable use.
CO2: Apply the knowledge of phase rule and composites for material selection requirements.
CO3: Discuss various energy resources, storage devices and their uses in household and industrial applications.
CO4: Differentiate various types of fuels based on their state, characteristics and calorific value for Engineering processes and applications.
CO5: Differentiate the nano and bulk materials, their synthesis and its applications in various fields.

**Text Books:**


T1: P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.ISBN 9789383186773.
T2: Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008. ISBN 9780070669321.
T3: S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018. ISBN 9788121903592.
T4: S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT. LTD, New Delhi, 2013.ISBN 9788126543342.


**References**


R1: B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018. ISBN 9783642280290.
R2: O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017. ISBN 9789352605774.
R3: Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014. ISBN 9789381714522.
R4: Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019. ISBN 9781108724449.
R5: O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013. ISBN 9781461442615.
R6: Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015. ISBN 9788131526699.

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=ugDRuS8dtY4 – Unit 1
2. https://www.youtube.com/watch?v=SaJ749CkypA – Unit 3
3. https://www.youtube.com/watch?v=YSRs3PuYT_k – Unit 5

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | - | - | 2 | - | 2 | 2 | - | - | - | - | 2 | - | - | 1 |
| 2 | 3 | 1 | - | - | - | 1 | 2 | - | - | - | - | 1 | - | - | 1 |
| 3 | 3 | 2 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 1 |
| 4 | 3 | 1 | - | - | - | 2 | 2 | - | - | - | - | - | - | - | 1 |
| 5 | 3 | 1 | - | - | - | 2 | 2 | - | - | - | - | 1 | - | - | 1 |
| AVG | 3 | 1.2 | - | 1.5 | - | 1.8 | 1.8 | - | - | - | - | 1.4 | - | - | 1 |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# PROGRAMMING IN C

(Common to CSE / IT / AIDS / CSBS / CSCS / AIML / EEE / ECE)

| | | | |
|---|---|---|---|
| **Course Code** | 24CS111 | **Course Type** | Integrated |
| **Teaching Periods/Week (L:T:P)** | 2:0:4 | **Credits** | 4 |
| **Total Teaching Periods** | 90 | **IAT + ESE Marks** | 50 + 50 |
| **Teaching Department** | Computer Science and Engineering | | |

**Course Objectives:** To equip the students with the knowledge in

1. C programs using fundamental programming structures.
2. C programs utilizing arrays and strings.
3. Applications of C using functions and pointers.
4. Advanced features of the C programming language, including structures and unions.
5. File operations in C

**Unit: I INTRODUCTION AND BASICS OF C PROGRAMMING 6**

Introduction - Structured programming - Problem solving techniques: Algorithms, Flowcharts, Pseudo code - Structure of a C program - Compiling and executing a C program - Data types and Variables – operators and expressions – Input and output functions -Control Structures: decision making and looping statements

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk
**RBT Level:** L1, L2, L3, L4

**Unit: II ARRAYS AND STRINGS 6**

Arrays: One dimensional array: declaration, initialization and operations - Two & Multi-dimensional arrays. Strings: Strings vs Character arrays - String operations – String Functions – Arrays of Strings

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3, L4

**Unit: III FUNCTIONS AND POINTERS 6**

Need for Modular programming - Functions: declaration and definition – Function call - Call by value - Call by reference - Recursive functions - Pointers: Introduction - Pointers to primitive data types – Arrays and pointers - Array of pointers - Storage classes - Dynamic Memory Allocation

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3, L4

**Unit: IV STRUCTURES AND UNIONS 6**

Structures: Need, declaration, Accessing Structure elements – Nested structures - Arrays of structures – Self-referential structures – Pointers to structures - Unions: declaration and accessing

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3, L4

**Unit: V FILES AND PREPROCESSOR DIRECTIVES 6**

Files: Introduction, Types of file processing – Sequential and Random Access - Read /Write of binary and text files. - Preprocessor directives – Command line arguments

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1, L2, L3, L4

**Total 30**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | To draw a flowchart and a write algorithm for the following problems<br>i) sum of two numbers ii) largest among three numbers |
| Unit 2: | Perform basic operations on arrays<br>i) Find the largest element in the array ii) Calculate the sum of all elements in the matrix |
| Unit 3: | Program for swapping two integers using call by value and call by reference |
| Unit 4: | Create a student information system,<br>i) Declare a structure Student with members: name, age and Roll number.<br>ii) To calculate the GPA and CGPA from the student's marks |
| Unit 5: | Programs for file operations |

**Practical Exercises: 60**

1. Programs for demonstrating the use of different types of operators like arithmetic, logical, relational, and ternary operators (Sequential structures)
    a) To find the area of a triangle
    b) To Convert temperatures from Celsius to Fahrenheit or vice versa using the appropriate formula
2. Write a C program to demonstrate the use of "scanf" and "printf" statements to "read" and "print" values of variables of different data types.
3. Programs using decision making statements like 'if', 'else if', 'switch', conditional and unconditional 'goto' (Selective structures)
    a) To find the Largest among three numbers
    b) To print day of the week by giving a integer using switch Statement
    c) To find Roman number of a given number
4. Programs for demonstrating repetitive control statements like 'for', 'while', and 'do-while' (Iterative structures):
    a) Check whether the given number is Armstrong or not.
    b) To find the Sum of squares of first n numbers.
    c) To Check the given number is prime or not.
    d) To print the Multiplication table
    e) To convert the Octal number to decimal number.
5. Implement the following programs in C using one-dimensional array
    a) To Calculate the sum and average of elements
    b) To Find the min and max values of the given set of numbers
    c) To Reverse the elements
    d) To arrange the given set of number by using Bubble sort
    e) To find the given number from the list of elements by using Linear Search.
6. Write a C program using two-dimensional arrays for a) Matric Addition b) Matrix Multiplication

7. Programs to demonstrate modular programming concepts using user-defined functions
    a) Swapping two integers using call by value and call by reference
    b) Create a recursive function to calculate the factorial of a number and for binary search
8. Implement various character and string operations with and without using built-in functions in C.
    a) Find length of a string
    b) String Concatenation
    c) To Check whether the given string is Palindrome or not
9. Write a C program using pointers for the following:
    a) Swapping two numbers
    b) Greatest and the smallest among three numbers
    c) Reverse of a string
    d) Linear searching in array
10. Programs to illustrate the use of user-defined data types using Structures:
    a) Employee Payroll
    b) Student information system
11. Write a C program to implement various file operations listed below:
    a) Copy the contents from one file to another file
    b) Merging two files
12. Programs to demonstrate the use of pre-processor directives and command line arguments for the following:
    a) Finding area of circle and area of a square using #define
    b) Simple arithmetic operations using #include
    c) Program that accepts two file names as command-line arguments and copy the contents from one file to another file.

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system / Linux Ubuntu 20 or higher | 30 |
| 3. | Systems with Linux Operating System with GNU Compiler / Windows with Turbo C compiler | 30 |

**Course Outcomes:**

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

| |
|---|
| CO1: Develop simple applications in C using basic constructs |
| CO2: Design and implement applications using arrays and strings |
| CO3: Create applications in C using functions and pointers |
| CO4: Utilize advanced features of the C programming with structures and unions |
| CO5: Develop applications using file operations in C |

**Text Books:**

T1: E. Balaguruswamy, "Programming in ANSI in C", Tata McGraw Hill, Eight Edition, 2019

T2: Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016

T3: Pradip Dey, Manas Ghosh, "Programming in C", First Edition, Oxford University Press, 2018

**References**

R1: R G Dromey, "How to Solve it using Computer", Pearson,2006

R2: Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition Pearson Education,2015

R3: Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011

R4: Byron S Gottfried, "Programming with C", Schaum's Outlines, Third Edition, Tata McGraw Hill, 2010

**Web links and Video Lectures (e-Resources):**

1. https://www.udemy.com/course/c-programming-for-beginners/ - All Units
2. https://en.wikibooks.org/wiki/C_Programming - Unit 1, 2 & 3
3. https://www.coursera.org/specializations/c-programming - Unit 2 & 3
4. https://onlinecourses.nptel.ac.in/noc22_cs40/preview - All units

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 1 | 1 |
| 2 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 1 | 1 |
| 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 1 | 1 |
| 4 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 1 | 1 |
| 5 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 1 | 1 |
| AVG | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 1 | 1 |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# ENGINEERING VISUALIZATION

(Common to all branches)

| | | | |
|---|---|---|---|
| **Course Code** | 24GE121 | **Course Type** | Integrated |
| **Teaching Periods/Week (L:T:P)** | 1:0:4 | **Credits** | 3 |
| **Total Teaching Periods** | 75 | **IAT + ESE Marks** | 60 + 40 |
| **Teaching Department** | Mechanical Engineering | | |

**Course Objectives:** To Equip the students with the knowledge in

1. BIS conventions and specifications for engineering drawing and constructing the conic curves, involutes, and cycloids
2. Projections of lines and planes.
3. Orthographic projection of solids and sections of solids.
4. Projection of sectioned solids and Development of surfaces
5. Isometric projections of simple solids.

**Unit: I PLANE CURVES 3+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of Ellipse, Parabola & Hyperbola using eccentricity method – Construction of Cycloid – Construction of Involutes of circle, Square and polygons – Tangent and Normal to the above curves.

**Practical component:** AutoCAD – Solid modeling tool - Basics.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT, NPTEL
**RBT Level:** L1-L4

**Unit: II PROJECTION OF POINTS, LINES AND PLANE SURFACE 3+12**

Orthographic projection - First angle projection –Principal planes - Projection of points – Projection of Lines (Only First angle projection) inclined to both principal planes – Determination of true length and true inclinations by rotating line method – Projection of planes (Circle and polygons) inclined both principal planes by rotating object method.

**Practical component:** AutoCAD – Lines and Plane.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT, NPTEL
**RBT Level:** L1-L4

**Unit: III PROJECTION OF SOLIDS 3+12**

Projection of simple solids like prisms, pyramids, cones and cylinders, and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

**Practical component:** AutoCAD – Projection of simple solids

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT, NPTEL
**RBT Level:** L1-L4

**Unit: IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 3+12**

Sectioning of solids in the simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – Obtaining the true shape of the section. Development of the lateral surfaces of simple sectioned solids – Prisms, Pyramid, Cylinder, and Cone.

**Practical component:** AutoCAD – Section of simple solids and surfaces

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, NPTEL
**RBT Level:** L1, L2, L3, L4

**Unit: V** **ISOMETRIC PROJECTIONS** **3+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.

**Practical component:** AutoCAD – Isometric projections of simple solids and truncated solids

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, NPTEL

**RBT Level:** L1,L2,L3,L4

**Total** **75**

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL-based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system | 30 |
| 3. | Auto-CAD | 30 |

**Course Outcomes:**

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

CO1: Use BIS conventions and specifications for engineering drawing and constructing the conic curves, involutes, and cycloid

CO2: Solve practical problems involving the projection of lines and Planes.

CO3: Sketch the orthographic projection of simple solids.

CO4: Draw the Sectional view of solids and development of simple surfaces.

CO5: Sketch the isometric projections of simple solids.

**Text Books:**


T1: Gopalakrishna K. R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27thEdition, 2017. ISBN – 9788184245686

T2: Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019. ISBN - 978-9380358963


**References**


R1: Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019. ISBN - 978-1259062889

R2: Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015. ISBN - 9780199455397

R3: Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15th Edition, 2018.ISBN - 9788122430422


**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in/courses/112103019 - Unit 1
2. https://www.youtube.com/watch?v=72EGcYdx7sA&t=16s - Unit 2
3. https://www.youtube.com/watch?v=8w--gcrCsuY – Unit 3
4. https://www.youtube.com/watch?v=yKYivtPembM – Unit 4
5. https://www.youtube.com/watch?v=qhOffFTIsV0 – Unit 5

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 1 | 2 | 2 | - | - | - | - | 1 | - | 2 | 2 | 1 | - |
| 2 | 3 | 2 | 1 | 2 | 2 | - | - | - | - | 1 | - | 2 | 2 | 1 | - |
| 3 | 3 | 2 | 1 | 2 | 2 | - | - | - | - | 1 | - | 2 | 2 | 1 | - |
| 4 | 3 | 2 | 3 | 2 | 2 | - | - | - | - | 1 | - | 2 | 2 | 1 | - |
| 5 | 3 | 2 | 1 | 2 | 2 | - | - | - | - | 1 | - | 2 | 2 | 1 | - |
| **AVG** | 3 | 2 | 1.4 | 2 | 2 | - | - | - | - | 1 | - | 2 | 2 | 1 | - |
| '1' – Low , '2' – Medium , '3'- High, '-' – No correlations | | | | | | | | | | | | | | | |

# ENGLISH FOR ENHANCING SELF COMPETENCE

(Common to all branches)

| | | | |
|---|---|---|---|
| **Course Code:** | 24EN121 | **Course Type:** | Practical |
| **Teaching Periods/Week (L:T:P):** | 0:0:2 | **Credits:** | 1 |
| **Total Teaching Periods:** | 30 | **IAT + ESE:** | 60 + 40 |
| **Teaching Department:** | English | | |

**Course Objectives:**

1. To articulate and learn various social behaviors and etiquette.
2. To develop writing and speaking skills for professional requirements.
3. To acquire techniques of fundamental communication skills.

**Unit: I PERSONALITY TRAITS** **6**

Self-Introduction, Ways to Identify Self (SWOT Analysis- Johari Window), Concepts of Self-Management and Self-Motivation, Self-Assessment.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: II COMMUNICATION SKILLS** **6**

Effective Communication Skills, Interpersonal & Social Skills

**Teaching-Learning Process** **Pedagogy:** PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: III SOCIAL BEHAVIOUR** **6**

Time Management, Personal Grooming, Making Small Talk, Inter-Cross-Cultural Communication, Professional Presentation Techniques.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: IV CULTURAL ETIQUETTE** **6**

Formal Presentation, Sensitivity towards multi-cultural work spaces, Presentation skills –Formal Presentation - Just a minute

**Teaching-Learning Process** **Pedagogy:** PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: V JOB-RELATED COMMUNICATION** **6**

Resume & Cover Letter, Formal E-mails, Framing Requests, Greetings, Salutations, Close, Interview-Types-Interview Questions-Techniques, Introduction to Interviews-FAQ's

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Total** **30**

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system | 30 |
| 3. | Hot Potatoes / Globarina | 30 |

**Course Outcomes:**

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

**CO1:** To listen to and comprehend general as well as complex academic information
**CO2:** To speak fluently and accurately in formal and informal communicative contexts
**CO3:** To express their opinions effectively in both formal and informal discussions.

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | 2 | 1 | 1 | 1 |
| 2 | - | - | - | - | - | - | - | - | 2 | 3 | - | 3 | 1 | 1 | 1 |
| 3 | - | - | - | - | - | - | - | - | 2 | 3 | - | 2 | 1 | 1 | 1 |
| **AVG** | - | - | - | - | - | - | - | - | 2 | 3 | - | 2.3 | 1 | 1 | 1 |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlation

# PRODUCT TINKERING LAB
**(Common to all)**

| | | | |
|---|---|---|---|
| **Course Code** | 24GE122 | **Course Type** | Practical |
| **Teaching Periods/Week (L: T:P)** | 0:0:2 | **Credits** | 1 |
| **Total Teaching Periods** | 30 | **IAT + ESE Marks** | 60 + 40 |
| **Teaching Department** | Civil Engineering and Mechanical Engineering | | |

**Course Objectives:** To equip the students with

1. Hands-on experience in Mechanical Equipments.
2. Design of simple components using computer-aided design.
3. Basic concept of 3D Printing.
4. Hands-on training on basic plumbing works

**Practical Exercises** **30**

1. Exercise on the usage of a hand-drilling machine
2. Demonstration of Centrifugal pumps.
3. Demonstration of two-wheeler and four-wheeler maintenance and repairs,
4. 3D Modelling of a single component.
5. Exercise on CAD Data Exchange and Generation of .stl files.
6. Identification of a product for Additive Manufacturing and its AM process plan
7. Printing of identified product on an available AM machine.
8. Demonstration on how to change the Tap fittings.
9. Preparing plumbing line sketches.
10. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows, and other components that are commonly used in households.
11. Laying pipe connection to the suction and delivery side of a pump
12. Connecting pipes of different materials: Metal, plastic, and flexible pipes used in household appliances.

**Equipment required**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | Hand Drilling Machine | 5 nos. |
| 2. | Centrifugal pump Assembly | 1 no. |
| 3. | Two-Wheeler (Four Stroke Petrol Engine) | 1 no. |
| 4. | Four-Wheeler (Four Stroke Diesel Engine) | 1 no. |
| 5. | Pipe Vice | 5 nos. |
| 6. | Die Holder with Die set | 5 nos. |
| 7 | Valves, Taps, Coupling, Unions, Reducers, and Elbows (Metal and Plastics) | 5 nos. each |
| 8 | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17” or higher TFT Monitor, Keyboard and mouse | 5 Nos |
| 9 | 3D Printer | 2 Nos |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Perform the basic maintenance and servicing of mechanical equipments. |
| CO2: | Design simple components using computer-aided design. |
| CO3: | Develop a 3D component using additive manufacturing. |
| CO4: | Sketch and perform the plumping for the house's different connections. |

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 2 | - | - | - | 2 | - | - | - | - | - | - | 1 | 2 | - | 1 |
| **2** | 2 | - | - | - | 3 | - | - | - | - | - | - | 1 | 2 | - | 1 |
| **3** | 2 | - | - | - | 3 | - | - | - | - | - | - | 1 | 2 | 1 | 1 |
| **4** | 2 | - | - | - | 2 | - | - | - | - | - | - | 1 | 2 | - | 1 |
| **AVG** | 2 | - | - | - | 2.5 | - | - | - | - | - | - | 1 | 2 | 1 | 1 |

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

# TAMILS AND TECHNOLOGY

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24TA201 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 1:0:0 | **Credits** | 1 |
| **Total Teaching Periods** | 15 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | Tamil | | |

**Course Objectives:**

1. To familiarize about the Pottery, Weaving Technology in sangam age.
2. To teach about the Construction Technology of Ancient Tamils
3. To impart knowledge of ship building and manufacturing Technologies in ancient Tamil culture.
4. To teach about main features of ancient Tamils Agriculture, Agro-Processing and irrigation technology
5. To provide insight about the Tamil Software Development.

**Unit: I WEAVING AND CERAMIC TECHNOLOGY 3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: II DESIGN AND CONSTRUCTION TECHNOLOGY 3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: III MANUFACTURING TECHNOLOGY 3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3**

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.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**Unit: V** **SCIENTIFIC TAMIL & TAMIL COMPUTING** **3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1, L2, L3

**Total** **15**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Clay Modal Task |
| Unit 2: | Sculptures and Heritage Symbols Drawing task |
| Unit 3: | Group Discussion |
| Unit 4: | Debate about Ancient Irrigation Technology |
| Unit 5: | Thorough analysis of Scientific Tamil |

**Course Outcomes:**

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

CO1: Describe the weaving technology and pottery making in sangam age
CO2: Explain the construction technologies used in ancient times
CO3: Discuss the technologies used by ancient Tamils in minting coins, ship, metallurgical areas.
CO4: Describe the methods used in our ancient Tamils agriculture and irrigation technologies
CO5: Summarize the development of scientific Tamil and Tamil computing

**Text Books:**

T1: 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)

T2: Dr.K.K.Pillay "Studies in the History of India with Special Reference to Tamil Nadu"

**References**

R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies)

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

**Web links and Video Lectures (e-Resources):**

1. https://youtu.be/fecWlhoPPYY?feature=shared – Unit V
2. https://youtu.be/vsLuw8Q3vA?feature=shared – Unit III

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | 3 | - | 3 | - | 3 | - | - | - | - | - |
| 2 | - | - | - | - | - | 3 | - | 3 | - | 3 | - | - | - | - | - |
| 3 | - | - | - | - | - | 3 | - | 3 | - | 3 | - | - | - | - | - |
| 4 | - | - | - | - | - | 3 | - | 3 | - | 3 | - | - | - | - | - |
| 5 | - | - | - | - | - | 3 | - | 3 | - | 3 | - | - | - | - | - |
| **AVG** | - | - | - | - | - | 3 | - | 3 | - | 3 | - | - | - | - | - |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# தமிழரும் தொழில்நுட்பமும்

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24TA201 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 1:0:0 | **Credits** | 1 |
| **Total Teaching Periods** | 15 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | Tamil | | |

**Course Objectives:**

1. பழந்தமிழரின் பானை மற்றும் நெசவுத் தொழில் நுட்பம் குறித்து விளக்குவது
2. பண்டைய தமிழர்களின் கட்டுமான தொழில்நுட்பம் பற்றி தெரியப்படுத்துவது
3. பண்டைய நாட்களில் கப்பல் கட்டுதல் மற்றும் உற்பத்தி தொழில்நுட்பங்கள் பற்றிய அறிவை வழங்குதல்.
4. பண்டைய தமிழர்களின் விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில்நுட்பத்தின் முக்கிய அம்சங்களைப் பற்றி கற்பித்தல்
5. தமிழ் மென்பொருள் மேம்பாடு பற்றிய நுண்ணறிவை வழங்குதல்.

**அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம்** **3**

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பமும் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்** **3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்த தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசோனிக் கட்டிடக் கலை

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு – III உற்பத்தித் தொழில் நுட்பம்** **3**

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எ..கு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாகும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள், - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1, L2, L3

**அலகு – IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம் 3**

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக்கு முழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைக்களுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1, L2, L3

**அலகு – V அறிவியல் தமிழ் மற்றும் கணித்தமிழ் 3**

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1, L2, L3

**Total 15**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Clay Modal Task |
| Unit 2: | Sculptures and Heritage Symbols Drawing task |
| Unit 3: | Group Discussion |
| Unit 4: | Debate about Ancient Irrigation Technology |
| Unit 5: | Thorough analysis of Scientific Tamil |

**Course Outcomes:**

இந்த பாடத்திட்டத்தை வெற்றிகரமாக முடித்த பிறகு, மாணவர்களால்

CO1: சங்க காலத்தில் நெசவுத் தொழில்நுட்பம் மற்றும் மட்பாண்டங்கள் செய்தல் ஆகியவற்றை விவரிக்க முடியும்

CO2: பண்டைய காலத்தில் பயன்படுத்தப்பட்ட கட்டுமான தொழில்நுட்பங்களை பற்றி விளக்க முடியும்

CO3: பண்டைய தமிழர்களின் மணிகள், கப்பல்கள், உலோகவியல் பகுதிகளில் பயன்படுத்தப்பட்ட தொழில்நுட்பங்களைப் பற்றி விவாதிக்க முடியும்.

CO4: பண்டைய தமிழர்களின் விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பங்களில் பயன்படுத்தப்பட்ட முறைகளை விவரிக்க முடியும்

CO5: அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறியின் வளர்ச்சியை கூற முடியும்

**Text Books:**


T1: 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)

T2: Dr.K.K.Pillay "Studies in the History of India with Special Reference to Tamil Nadu"

**References**


R1: Dr.K.K.Pillay "Social Life of Tamils A joint publication of TNTB & ESC and RMRL – (in print)

R2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

R3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies)

R4: The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

R5: Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

R6: Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

R7: Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

R8: Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)


**Web links and Video Lectures (e-Resources):**

1. https://youtu.be/fecWlhoPPYY?feature=shared – Unit V
2. https://youtu.be/vsLuw8Q3vA?feature=shared – Unit III

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 2 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 4 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| 5 | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |
| **AVG** | - | - | - | - | - | - | - | 1 | - | 2 | - | - | - | - | - |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# TECHNICAL COMMUNICATION -II

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24EN201 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 3:0:0 | **Credits** | 3 |
| **Total Teaching Periods** | 45 | **IAT + ESE Marks** | 40+60 |
| **Teaching Department** | English | | |

**Course Objectives:**

1. To facilitate students to improve vocabulary for a better communication.
2. To enable learners to understand and reproduce language.
3. To aid students to write technical reports using appropriate formats and terminologies.
4. To expose students to different sentence structures.
5. To equip learners to present ideas in a required manner.

**Unit: I VOCABULARY FOR BETTER COMMUNICATION 9**

**Listening:** Telephonic Conversation and Telephonic Etiquette **Reading:** Newspapers and Magazines-Articles **Speaking**: Conversational Practice: Speaking in a given situation-Short Presentation **Writing:** Response to complaints / Complaints Letter, Permission Letter **Grammar:** Mixed Tenses- Use of Preposition **Vocabulary:** Guessing meanings of words in different contexts.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: II FUNCTIONAL LANGUAGE ASPECTS 9**

**Listening**: Listening – Listening to Longer Dialogues / TED Talks **Reading**: Introduction to Reading Reports - Newspaper, Technical Journal **Speaking**: Using Polite Expressions Writing: Precis Writing - Summary Writing-Internship application, Essay **Grammar**: Subject and Verb Agreement, Regular and Irregular Verbs, Degrees of Comparison **Vocabulary**: Numerical Adjectives

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: III TECHNICAL REPORT WRITING 9**

**Listening:** Listening to Speeches– Giving Solutions to Problems **Reading:** Deductive – Inductive Reading **Speaking:** Interviewing Celebrities / Leaders / Sports persons, Introduction to Small GD **Writing:** Job Application Letter and Resume , Email Writing- Email Etiquette, letter to Editor, Essay **Grammar:** Infinitives , Gerund, If conditionals **Vocabulary:** Modal Verbs

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: IV STRUCTURAL GRAMMAR 9**

**Listening:** Listening for Comprehension **Reading:** Intensive Reading for specific information – Reading Technical Reports **Speaking:** Presenting oral report **Writing:** Report Writing-Survey, Accident report, Recommendations **Grammar:** Reported speech, Embedded Sentences **Vocabulary:** Synonyms and Antonym, Connotative and Denotative Words.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1, L2, L3

**Unit: V** **PRESENTATION SKILLS** **9**

**Listening:** Listening – Types **Reading:** Short Stories-Role Play **Speaking:** Paired Presentation **Writing:** Checklists**,** Data Interpretation- Picture, Chart, Graphs, Minutes of the meeting-Memos-Notices **Grammar:** Error Correction, Punctuation **Vocabulary:** Numerical Adjectives, Relative Clause **,** Conjunction

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1, L2, L3

**Total** **45**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Speaking task |
| Unit 2: | Reading task |
| Unit 3: | Speaking task |
| Unit 4: | Speaking task |
| Unit 5: | Speaking task |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Communicate using appropriate vocabulary in different situations. |
| CO2: | Use the acquired language skills to comprehend various types of language contents. |
| CO3: | Evaluate different texts and write effective technical content. |
| CO4: | Use appropriate sentence structures to convey thoughts in varied contexts. |
| CO5: | Express the concepts and ideas in a skillful manner |

**Text Books:**


T1: Anna University English Department, "English for Engineers and Technologists", Orient Black Swan, ISBN-978-93-5442-067-2, Third Edition, 2022 –Vol-II.

T2: M.Raman & Sangeeta S., "Technical Communication" Third Edition, Oxford University Press, 2015

T3: Anne Burns and Christine ChuenMeng Goh, "Teaching Speaking: A Holistic Approach", Cambridge University Press 2012; ISBN-110701123X, 9781107011236; Length, 301 pages. 2012


**References**


R1: Addison Wesley Longman, "Technical English", Pearson, ISBN:978-1292042862, 8th Edition 2013.

R2: Dale Carnegie, "The Art of Public Speaking", Prabhat Prakashan Pvt. Ltd.; ISBN-978-8184302615, First Edition 31st December 2020

R3: Jack C. Richards & Theodore S. Rodgers, " Approaches and Methods in Language Teaching", Second Edition, Cambridge University Press, ISBN: 978-1107675964, 2017.

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=Y4TbGPhQ7Ik&list=PLp02GGDX5DIoMkblgrYhq91rF7_JZsf4- - Unit I & Unit II
2. https://www.youtube.com/watch?v=nyXeDFq8&list=PLAyDjaXmCbog1yZWhMx0OdsUya_6YTfTG – Unit IV

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | - | 1 | 3 | - | 2 | 1 | 1 | 1 |
| 2 | - | - | - | - | - | - | - | - | 1 | 3 | - | 2 | 1 | 1 | 1 |
| 3 | - | - | - | - | - | - | - | - | 1 | 3 | - | 2 | 1 | 1 | 1 |
| 4 | - | - | - | - | - | - | - | - | 1 | 3 | - | 3 | 1 | 1 | 1 |
| 5 | - | - | - | - | - | - | - | - | 1 | 3 | - | 3 | 1 | 1 | 1 |
| **AVG** | - | - | - | - | - | - | - | - | 1 | 3 | - | 2.4 | 1 | 1 | 1 |

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

# TRANSFORMS AND NUMERICAL METHODS

(Common to - CSE, IT, AIDS, CSBS, AIML, CYB, EEE, CIVIL, MECH)

| | | | |
|---|---|---|---|
| **Course Code** | 24MA201 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 3:1:0 | **Credits** | 4 |
| **Total Teaching Periods** | 60 | **IAT + ESE Marks** | 40 + 60 |
| **Teaching Department** | Mathematics | | |

**Course Objectives:**

1. To introduce the concepts of Laplace transforms and inverse Laplace transforms.
2. To familiarize the concepts of Z-transform and its properties.
3. To illustrate the application of transforms in solving differential equations.
4. To explain Numerical methods for handling ordinary differential equations.
5. To acquaint the students with the knowledge of numerical techniques for interpolation, differentiation and integration.

**Unit: I LAPLACE TRANSFORMS** **12**

Laplace transforms – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions – Derivatives and integrals of transforms –Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (Statement only). Solution of linear ordinary differential equation of second order with constant coefficients and first order simultaneous equations with constant coefficients using Laplace transform

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1 **-** L3

**Unit: II Z – TRANSFORMS** **12**

Z-transforms – Elementary properties – Inverse Z-transforms – partial fractions method – residues method – Convolution theorem. Solution of first and second order difference equations with constant coefficients using Z-transform.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL Videos
**RBT Level:** L1 **-** L3

**Unit: III SOLUTION OF DIFFERENTIAL EQUATIONS** **12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters –Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL Videos
**RBT Level:** L1 **-** L3

**Unit: IV SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS** **12**

Solution of algebraic and transcendental equations by Newton Raphson method - Solution of linear system of equations – Gauss elimination method – Gauss Jordan method – Gauss Seidel Iterative method– Eigenvalues of a matrix by Power method.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT
**RBT Level:** L1 **-** L3

**Unit: V** **NUMERICAL DIFFERENTIATION AND INTEGRATION** **12**

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.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL Videos

**RBT Level:** L1 - L3

**Total** **60**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Apply Laplace transforms to a real-world problem |
| Unit 2: | Apply Z-transform in real-world problem |
| Unit 3: | Present a real-world problem involving differential equations with solution. |
| Unit 4: | Analyze the significance of eigenvalues and eigenvectors in the context of the applications |
| Unit 5: | Visualizing the numerical differentiation and integration problem in real time applications. |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Apply Laplace transform, and inverse Laplace transform to solve linear ordinary differential equation and first order simultaneous equations with constant coefficients. |
| CO2: | Apply Z- transform and its properties to solve difference equations. |
| CO3: | Solve a variety of differential equation. |
| CO4: | Compute the solutions to algebraic, transcendental equations and systems of linear equations using numerical techniques. |
| CO5: | Apply numerical method techniques to differentiate and integrate a given function. |

**Text Books:**


T1: Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2015. ISBN: 9789385509183

T2: Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015. ISBN: 9788174091956

T3: Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2016. ISBN: 9789382332300


**References**


R1: Jain R.K. & Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, NewDelhi, 4th Edition, 2007.ISBN : 9788173198059.

R2: Erwin.K, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016. ISBN: 9788126567880

R3: Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012. ISBN: 9781259064917

R4: Mathews. J. H. "Numerical Methods for Mathematics, Science & Engineering", 2nd Edition, Prentice Hall,1992. ISBN: 9780136249904

**Web links and Video Lectures (e-Resources):**

1. https://archive.nptel.ac.in/courses/111/106/111106139/ - Unit I
2. https://archive.nptel.ac.in/courses/111/106/111106111/ - Unit II
3. https://archive.nptel.ac.in/courses/111/106/111106100/ - Unit III
4. https://archive.nptel.ac.in/courses/111/107/111107105/ - Unit IV & Unit V
5. http://acl.digimat.in/nptel/courses/video/111107105/L01.html - Unit V

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 4 | 3 | 2 | 1 | - | - | - | - | - | -- | - | - | 1 | 2 | 1 | - |
| 5 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | 1 | - |
| AVG | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | 1 | - |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# PYTHON PROGRAMMING

(Common to CSE, IT, CSBS, AIDS, AIML, CSCS, CE, EEE, ECE, MECH, VLSI and ACT)

| | | | |
|---|---|---|---|
| **Course Code** | 24CS211 | **Course Type** | Integrated |
| **Teaching Periods/Week (L: T:P)** | 2:0:4 | **Credits** | 4 |
| **Total Teaching Periods** | 90 | **IAT + ESE Marks** | 50 + 50 |
| **Teaching Department** | Computer Science and Engineering | | |

**Course Objectives:** To equip students with the knowledge in

1. Fundamentals of algorithmic problem solving.
2. Python conditionals and loops to solve problems
3. String manipulation, control flow, and functions in Python.
4. Python data structures, including lists, tuples, and dictionaries, for complex data representation.
5. Various file operations using Python.

**Unit: I COMPUTATIONAL THINKING AND PROBLEM SOLVING 6**

Fundamentals of Computing– Identification of Computational Problems Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flowchart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion)

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3,L4

**Unit: II DATATYPES, EXPRESSIONS, STATEMENTS 6**

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string and list; variables, expressions, statements, tuple assignment, precedence of operators, comments

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3, L4

**Unit: III CONTROL FLOW, FUNCTIONS, STRINGS 6**

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 array

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3, L4

**Unit: IV LISTS, TUPLES, DICTIONARIES 6**

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

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3,L4

**Unit: V FILES, MODULES and PACKAGES** **6**

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Multithreading, Thread Life Cycle, Creating Thread - Python Libraries – NumPy and Pandas

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1, L2, L3,L4

**Total** **30**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Developing Pseudocodes and flowcharts for real life activities such as railway ticket booking, admission process to undergraduate course, academic schedules during a semester etc. |
| Unit 2: | Developing algorithms for basic mathematical expressions using arithmetic operations: Swapping two numbers, circulate the values of n variables, distance between two points. |
| Unit 3: | Implementation of a simple calculator |
| Unit 4: | Implementing python program using lists, tuples, sets for the following scenario: Student Examination Report |
| Unit 5: | Developing modules using Python to handle files and apply various operations on files like word count, copy file etc. |

**Practical Exercises:** **60**

1. Implement simple python programs using interactive and script mode.
2. Develop python programs using id() , type() and range() functions.
3. Implement various control statements in python.
4. Develop python programs to perform various string operations like concatenation, slicing, and indexing.
5. Demonstrate string functions using python.
6. Develop python programs to perform operations on a list
7. Develop programs to work with Tuples
8. Create programs to solve problems using various data structures in python.
9. Implement python programs using modules and packages.
10. Case study: Data science with Numpy, Pandas

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17” or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system / Linux Ubuntu 20 or higher | 30 |
| 3. | Python 3.10 or later, Anaconda Distribution | 30 |

**Course Outcomes:**

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

CO1: Analyze problems and devise algorithmic solutions using pseudocode and flowcharts
CO2: Implement Python conditionals effectively to control program flow.
CO3: Design and implement reusable functions to modularize code and improve maintainability
CO4: Employ lists, tuples, and dictionaries to store and manipulate data effectively.
CO5: Apply Python's file handling techniques to interact with files.

**Text Books:**

T1: Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
T2: Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017

**References**

R1: Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021
R2: Eric Matthes, "Python Crash Course, A Hands on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019
R3: G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021

**Web links and Video Lectures (e-Resources):**

1. https://www.python.org/ - Unit 3, 4 & 5
2. www.mhhe.com/kamthane/python - Unit 2 , 3 & 4
3. https://www.edx.org/course/introduction-to-python-fundamentals-1 - All Units
4. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview - All units

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| 2 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| 4 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| 5 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| **AVG** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# COMPUTATIONAL THINKING

(Common to CSE / IT / AIDS / CSBS / CSCS / AIML / EEE / ECE)

| | | | |
|---|---|---|---|
| **Course Code** | 24CS112 | **Course Type** | Integrated |
| **Teaching Periods/Week (L: T:P)** | 1:0:2 | **Credits** | 2 |
| **Total Teaching Periods** | 45 | **IAT + ESE Marks** | 50 + 50 |
| **Teaching Department** | Computer Science and Engineering | | |

**Course Objectives:** To Equip the students with the Knowledge in

1. Problems in a way that enables a computer to solve them.
2. Organising and analysing data using logical approaches.
3. Developing solutions through algorithmic thinking.
4. Identifying, analysing, and implementing possible solutions to achieve the most efficient and effective combination of steps and resources.
5. Generalising and transferring the problem-solving process to a wide variety of problems.

**Unit: I INTRODUCTION TO COMPUTATIONAL THINKING 1+4**

Understanding the concepts: Decomposition, pattern recognition/data representation, generalization, abstraction, and algorithms, Representation, automation, Analysis, visualization. Logical thinking - reasoning

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk

**RBT Level:** L1, L2, L3, L4

**Unit: II UNDERSTANDING DATA 2+6**

Performing analytics on numeric data using any spreadsheet software and representing the data using charts, histograms, scatter plots, graphs etc. Understanding patterns in data sequences, puzzles, and nonograms. Data Encryption – ciphering sentences and Compression.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1, L2, L3, L4

**Unit: III DECOMPOSITION AND PATTERN RECOGNITION 3+8**

The divide and Conquer, pattern recognition, Algorithmic thinking - creating oral algorithms for everyday tasks – visualizing algorithms through sequence of steps, pseudocode, flow charts, selection, iteration, functions, procedures and parameters.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1, L2, L3, L4

**Unit: IV ABSTRACTIONS AND SCRATCH 3+6**

Understanding Abstraction Object Description, Abstraction and Modeling, Objects and Objects based modeling -Repair, Reuse, Recycle, Scratch / equivalent - Motion, events, control

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1, L2, L3, L4

**Unit: V FILES AND PREPROCESSOR UNDERSTANDING COMPLEXITY 6+6**

Understanding complexity, sorting algorithms, search algorithms, AI and Turing Test, FSA (Finite State Automata), Debugging, Enhancing the clarity of a program - documentation, style, idioms, Automation and Simulation, generalizing a solution.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1, L2, L3, L4

**Total 45**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Explore algorithm design by creating oral algorithms. |
| Unit 2: | Decompose a complex problem into discrete steps and Design a simple algorithm for solving the problem |
| Unit 3: | Programming implementation |
| Unit 4: | Develop algorithms for sorting and determine the complexity of the algorithm and how it scales as the number of items to sort increases |
| Unit 5: | External Learning: Study the best practices of documentation, style, idioms, etc that are used to ensure the code can be understood and maintained over a long period. |

**Practical Exercises:**

| | |
|---|---|
| **MODULE I:** | Algorithmic thinking - creating oral algorithms for everyday tasks - Data abstraction and representation - Abstraction and translation of everyday data for use on a computer. |
| **MODULE II:** | Decomposing a complex problem - Strategies for decomposition and algorithm design - Divide and conquer - Simple program implementations. |
| **MODULE III:** | Overall data representation, abstraction, analysis and algorithm design. Program implementations. |
| **MODULE IV:** | Measuring the complexity of an algorithm - sorting algorithms - the notion of unsolvable problems. Programming illustrations. |
| **MODULE V:** | Enhancing the clarity of a program - documentation, style, idioms. |

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system / Linux Ubuntu 20 or higher | 30 |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Formulate problems for effective computer-based solutions. |
| CO2: | Systematically organize and analyse data. |
| CO3: | Develop solutions using algorithmic approaches. |
| CO4: | Identify, evaluate, and implement optimal solutions by efficiently utilizing steps and resources. |
| CO5: | Apply and adapt the problem-solving process across diverse scenarios. |

**Text Books:**

T1: Karl Beecher, Computational Thinking - A Beginner's Guide to Problem-Solving and Programming, BCS Learning, 2017.

T2: Venkatesh G, Madhavan Mukund, Computational Thinking, Notion Press, 1st Edition, 2021.

T3: Hunt, Kenny A._ Riley, David D, Computational Thinking for the Modern Problem Solver, CRC Press, 2015

**References**

R1: David Clark, Computational and Algorithmic Thinking Book 2, AMT Publishing, 2016.

R2: Paul Curzon, "Computing Without Computers: A Gentle Introduction to Computer Programming, Data Structures, and Algorithms", 2014. https://teachinglondoncomputing.files.wordpress.com/2014/02/booklet-cwc-feb2014.pdf)

R3: Wang Paul S, From computing to computational thinking, CRC Press, 2016.

R4: Peter J. Denning, Matti Tedre, Computational Thinking, MIT Press, 2019.

R5: Paolo Ferragina, Fabrizio Luccio, Computational Thinking_ First Algorithms, Then Code, Springer International Publishing, 2018.

R6: Aman Yadav, Ulf Berthelsen, Computational Thinking in Education_ A Pedagogical Perspective, Routledge, 2021.

R7: Zhiwei Xu, Jialin Zhang, Computational Thinking_ A Perspective on Computer Science, Springer, 2021

R8: Exploring Computational Thinking.https://edu.google.com/resources/programs/exploring-computational- thinking/.

**Web links and Video Lectures (e-Resources):**

1. https://teachinglondoncomputing.org – Unit 1_
2. https://classic.csunplugged.org Unit 3 & Unit 5
3. http://Study.iitm.ac.in/D's/course_pages/bscs1001.html - Unit 3
4. http://Learning.com/blog/defining-computationalthinking - Unit 1
5. https://centre-for-humanities-computing.github.io – Unit 1
6. http://Nptel.ac.in/course/115106121 - All units

**CO-PO & PSO Mapping:**

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

'1' – Low, '2' – Medium, '3'- High, '-' – No correlations

# BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CSE / IT / CSBS / AIDS / AIML / CSCS)

| | | | |
|---|---|---|---|
| **Course Code:** | 24EE111 | **Course Type:** | Integrated |
| **Teaching Periods/Week (L: T:P):** | 3:0:2 | **Credits:** | 4 |
| **Total Teaching Periods:** | 75 | **IAT + ESE Marks:** | 50 + 50 |
| **Teaching Department:** | Electrical and Electronics Engineering | | |

**Course Objectives:**

1. To introduce the basics of electric circuits and its analysis
2. To impart knowledge in the working principles and application of electrical machines
3. To familiarize various types of semiconductor devices and its characteristics
4. To introduce the functional blocks of instruments and working principle of sensors
5. To introduce the working of Biomedical Instruments

## UNIT I ELECTRICAL CIRCUITS 9

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 –Measurement of power by two wattmeter method

**Teaching-Learning Process** **Pedagogy:** Lectures, PPT, NPTEL
**RBT Level:** L1, L2, L3, L4

## UNIT II ELECTRICAL MACHINES 9

Construction, Working principle and characteristics - DC Separately and Self Excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

**Teaching-Learning Process** **Pedagogy:** Lectures, PPT, NPTEL
**RBT Level:** L1, L2, L3, L4

## UNIT III BASICS OF ELECTRONICS 9

Semiconductor materials – Types- Intrinsic and Extrinsic Semiconductor - P-N Junction Diode - Zener Diode – BJT - MOSFET - Principle of operation and VI Characteristics - Display devices – LED - Solar Cell

**Teaching-Learning Process** **Pedagogy:** Lectures, PPT, NPTEL
**RBT Level:** L1, L2, L3, L4

## UNIT IV SENSORS AND TRANDUCERS 9

Functional elements of an instrument – Standards and Calibration - Measurement of Pressure – Torque – Displacement – Velocity – Vibration – Acceleration – Temperature – Flow -- Measurement of Liquid Level – Humidity - Sound.

**Teaching-Learning Process** **Pedagogy:** Lectures & PPT
**RBT Level:** L1, L2, L3, L4

**UNIT V BIOMEDICAL INSTRUMENTATION** **9**

Cardio Vascular system – Pressure pulses in Cardiac Chamber – ECG – Interpretation of ECG - EEG – EMG – Blood Pressure Measurement – Pathological test – CT scan – MRI Scan.

**Teaching-Learning Process** **Pedagogy:** Lectures, PPT, NPTEL
**RBT Level:** L1, L2, L3, L4

**Total** **45**

**Pedagogical Methods:**

| |
|---|
| Unit 1: Tutorials on Kirchhoff's Law |
| Unit 2: Recent development in dc machines |
| Unit 3: Measure the resistance, inductance, and capacitance using a multi-meter. |
| Unit 4: Review on electronic sensors |
| Unit 5: Review on interpretation of ECG |

**Practical Exercises:** **30**

1) Verification Kirchhoff's Law.
2) Study of RL, RC and RLC circuits.
3) Measurements of nonelectrical Parameters-Pressure, Displacement, Temperature and Flow.
4) Characteristics of PN junction Diode and Zener Diode
5) Characteristics of BJT.
6) Measurement of Power by two wattmeter method.
7) Series Resonant circuit.
8) Energy Audit.
9) Study of components and Equipment.
10) Study of biomedical instruments.

**Equipment required**

| Sl. No. | Description of Equipment | Required numbers (for batch of 30 students) |
|---|---|---|
| 1 | Regulated Power Supply: 0 – 15 V D.C | **10 nos** |
| 2 | Function Generator (1 MHz) | 10 nos |
| 3 | Oscilloscope (20 MHz) | 10 nos |
| 4 | Digital Storage Oscilloscope (20 MHz) | 1 no |
| 5 | AC/DC - Voltmeters | 10 nos. |
| 6 | Ammeters | 10 nos. |
| 7 | Multi-meters | 5 nos. |
| 8 | UPF Watt meters | 5 nos. |
| 9 | Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box | 6 nos each |
| 10 | Circuit Connection Boards | **10 nos.** |
| 11 | Pressure, Displacement, Temperature and Flow measurement kit | 2 nos each |
| 12 | Necessary quantities of PN Junction diode, Zener diode and BJT | Adequate quantity |
| 13 | Necessary Quantities of connecting wires, Resistors, Inductors, Capacitors of various capacities. | Adequate quantity |
| 14 | Necessary quantities of biomedical sensors | Adequate quantity |

**Course Outcomes:**

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

CO1: Compute the electrical parameters of simple electric circuits with AC and DC Supply
CO2: Explain the working principle of DC and AC Machines
CO3: Describe the working and characteristics of semiconductor devices
CO4: Discuss the working principle of various sensors and transducers
CO5: Summarise the instruments used for measuring biomedical parameters

**Text Books:**

T1: Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
T2: S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
T3: Sedha R.S., "A text book of Applied Electronics", S. Chand & Co., 2008
T4: James A. Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
T5: A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

**References**

R1: Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
R2: Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
R3: Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
R4: Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
R5: H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

**Web links and Video Lectures (e-Resources):**

1. https://archive.nptel.ac.in/courses/108/102/108102185/- Unit 1
2. https://onlinecourses.nptel.ac.in/noc20_ee60/preview -Unit 2
3. https://archive.nptel.ac.in/courses/108/105/108105188/ -Unit 3
4. https://archive.nptel.ac.in/courses/108/105/108105153/ - Unit 4
5. https://www.youtube.com/watch?v=iK6q4nnmtA&list=PLVsrfTSlZ_42OoOyhzWoDgZrL9iineZx Q&index=1 – Unit 5
6. https://www.youtube.com/watch?v=1K4ASqq0Rhk&list=PLVsrfTSlZ_42OoOyhzWoDgZrL9iineZxQ&index=4 – Unit 5

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 2 | 3 | 2 | 1 | - | 1 | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 3 | 3 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 4 | 3 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 2 | 1 | 1 |
| 5 | 3 | 2 | 1 | - | 1 | - | - | 1 | - | - | - | 1 | 2 | 1 | 1 |
| **AVG** | 3 | 2 | 1 | 2 | 1 | - | - | 1 | - | - | - | 1 | 2 | 1 | 1 |

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

# BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to CSE, IT, AIDS, CSBS, AIML, CSE-CYS, ECE, ACT, VLSI and EEE)

| | | | |
|---|---|---|---|
| **Course Code** | 24GE101 | **Course Type** | Theory |
| **Teaching Periods/Week (L: T:P)** | 3:0:0 | **Credits** | 3 |
| **Total Teaching Periods** | 45 | **IAT + ESE Marks** | 40+60 |
| **Teaching Department** | Civil Engineering and Mechanical Engineering | | |

**Course Objectives:** To Equip the students with the knowledge in

1. Types of civil structures, civil engineering materials, and civil construction.
2. Different types of building plans, foundations, and infrastructures.
3. Parts of IC engines, pumps, and their working principles.
4. Components of the power plant and a detailed explanation of their working principles.
5. Parts of the Refrigeration & Air-conditioning system and their working principles and applications.
6. Additive manufacturing processes and their applications.

**Unit: I INTRODUCTION OF CIVIL ENGINEERING AND CONSTRUCTION MATERIALS** **9**

Civil Engineering – Specialized sub-disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation, and Water Resources Engineering Types of buildings: Residential buildings, Industrial buildings.

Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel – Timber – Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building components (brief discussion only)

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1, L2, L3

**Unit: II BUILDING COMPONENTS AND INFRASTRUCTURE** **9**

Building plans – Setting out of a Building – Foundations: Types of foundations –Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering. Types of Bridges and Dams – Water Supply Network –Introduction to Highways and Railways – Introduction to Green Buildings - Stress prediction by AIML.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1, L2, L3

**Unit: III INTERNAL COMBUSTION ENGINES** **9**

Internal combustion engines as an automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two-stroke engines - Concept of hybrid engines - Electric Vehicles – Components, Accessories, and working of electric vehicles.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT, Youtube Videos

**RBT Level:** L1, L2, L3

**Unit: IV POWER PLANTS, REFRIGERATION AND AIR CONDITIONING SYSTEM** **9**

Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydroelectric, and Nuclear Power plants- Internal combustion engines as automobile power plants. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator–Window and Split type room Air conditioner.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT, YouTube Videos

**RBT Level:** L1, L2, L3

**Unit: V ADDITIVE MANUFACTURING** **9**

Additive Manufacturing Overview – VAT Photopolymerisation - Material Jetting - Binder Jetting - Material Extrusion - Powder Bed Fusion - Sheet Lamination - Directed Energy Deposition – Merits Demerits and its Applications.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT, YouTube Videos

**RBT Level:** L1, L2, L3

**Total** **45**

**Pedagogical Methods:**

| | |
|---|---|
| Unit 1: | Poster presentation - Civil Engineering Materials |
| Unit 2: | Seminar – Types of Bridges and Dams |
| Unit 3: | Seminar on Components of IC Engines |
| Unit 4: | Role Play – Vapour Compression Refrigeration System |
| Unit 5: | Model Making |

**Course Outcomes:**

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

| | |
|---|---|
| CO1: | Explain the types of civil structures, civil engineering materials, civil construction. |
| CO2: | Discuss about the different types of building plans, foundations, and infrastructures. |
| CO3: | Explain the components of IC engines, pumps, and their working principles. |
| CO4: | Describe the parts of the power plant and a detailed explanation of their working principles. |
| CO5: | Summarize the parts and working principle of refrigeration & air-conditioning system |
| CO5: | Discuss the additive manufacturing processes and their applications |

**Text Books:**


T1: G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018. ISBN - 9789387572317


**References**


R1: Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co.(P) Ltd, 2022. ISBN - 9788187433545

R2: Basic Mechanical Engineering, Pearson Education, 2018, ISBN: 978-9386873293

R3: Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies, 2005.

R4: S.Shiva. Anuj K Shukla, “Additive Manufacturing Technologies” – Wiley Publications, 2024, ISBN - 9789357462419

R5: Basic Civil Engineering by Sateesh Gopi, Pearson Education, 2023, 978-8131729885

R6: Basic Mechanical Engineering, Basant Agrawal, and C.M. Agrawal, Wiley India pvt ltd, 2008 ISBN: 978-81-265-1878-4

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=m4m2AVqQtmk – Unit 1
2. https://www.youtube.com/watch?v=amxCBv2-5b4 – Unit 2
3. https://www.youtube.com/watch?v=8dAbcbAJRw8 – Unit 3
4. https://www.youtube.com/watch?v=IdPTuwKEfmA – Unit 4
5. https://archive.nptel.ac.in/courses/112/103/112103306/ - Unit 5

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 3 | 2 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | - |
| 4 | 2 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | - |
| 5 | 2 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | - |
| 6 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **AVG** | 2 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | - |

"1" – Low, "2" – Medium, "3"- High, "-" – No correlations

# ENGLISH FOR PROFESSIONAL COMPETENCE

(Common to all branches)

| | | | |
|---|---|---|---|
| **Course Code** | 24EN221 | **Course Type** | Practical |
| **Teaching Periods/Week (L: T:P)** | 0:0:2 | **Credits** | 1 |
| **Total Teaching Periods** | 30 | **IAT + ESE Marks** | 60 + 40 |
| **Teaching Department** | English | | |

**Course Objectives:**

1. To enhance employability and career skills.
2. To develop confidence and provide adequate soft skills required for work place.
3. To inculcate professional and corporate skills to compete with workplace challenges.

**Unit: I RECEPTIVE SKILLS** **6**

Listening – Comprehensive Listening – Watching the news – Listening to a peer giving presentation – Critical Listening – Watching a televised debate – Reading – Extensive Reading – One- act Plays – Intensive Reading – Articles, Blog posts on topics like science and technology, arts, etc.

**Teaching-Learning Process** **Pedagogy:** PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: II PRODUCTIVE SKILLS** **6**

Speaking – Demonstrative Speaking – Process description through visual aids – Persuasive Speaking – Writing – Descriptive Writing - Subjective Writing – Autobiography, Opinion Essay – Describing a Product or Mechanisms and interpretations.

**Teaching-Learning Process** **Pedagogy:** PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: III ENGLISH FOR COMPETITIVE EXAMS** **6**

Verbal aptitude- Close test- Error correction- Homonyms and homophones- Spelling British and American words-word order.

**Teaching-Learning Process** **Pedagogy:** PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: IV CORPORATE SKILLS** **6**

Critical Thinking and Problem Solving – Brainstorming, Q & A Discussion – Team work and Collaboration – Activities like Office Debates, Group discussion – Professionalism and Strong Work Ethics –Soft Skills, Teamwork, Adaptability, Empathy and Growth Mind set.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Unit: V PROJECT WORK** **6**

Project Writing- Methodology- Bibliography- Reference- Presentation Techniques- Mini Project

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT, YouTube videos

**RBT Level:** L1, L2, L3

**Total** **30**

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system | 30 |
| 3. | Hot Potatoes / Globarina | 30 |

**Course Outcomes:**

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

**CO1:** Interpret and respond appropriately in listening and reading contexts.

**CO2:** Express proficiently in spoken and written communication.

**CO3:** Apply acquired language skills in professional and corporate discussions.

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | 2 | 1 | 1 | 1 |
| 2 | - | - | - | - | - | - | - | - | 2 | 3 | - | 3 | 1 | 1 | 1 |
| 3 | - | - | - | - | - | - | - | - | 2 | 3 | - | 2 | 1 | 1 | 1 |
| **AVG** | - | - | - | - | - | - | - | - | 2 | 3 | - | 2.4 | 1 | 1 | 1 |
| "1" – Low, "2 " – Medium, "3" - High, "-" – No correlation | | | | | | | | | | | | | | | |

**ENGINEERING MATHEMATICS LABORATORY**
**(Common to CSE, IT, AIDS, CSBS, CYS, AIML, EEE, MECH, CIVIL)**

| | | | |
|---|---|---|---|
| **Course Code:** | 24MA221 | **Course Type:** | Practical |
| **Teaching Periods/Week (L:T:P):** | 0:0:2 | **Credits:** | 1 |
| **Total Teaching Periods:** | 30 | **IAT + ESE Marks:** | 60 + 40 |
| **Teaching Department:** | Mathematics | | |

**Course Objectives:**

1. To demonstrate basic and advanced matrix operations using Sci Lab.
2. To demonstrate basic and advanced differentiation and integration techniques using Sci Lab.
3. To demonstrate transforms and to solve ordinary differential equations using various numerical methods in Sci Lab.

**PRACTICAL** **30**

1. Introduction to SCI LAB through matrices and general syntax.
2. Finding the Eigenvalues and Eigenvectors.
3. Plotting the graph of a quadratic form.
4. Evaluating area using double integral.
5. Evaluating Volume using Triple Integral
6. Evaluating gradient, directional derivative, divergent and curl
7. Finding the Laplace transform and its inverse of a given function.
8. Expand F(s) into linear fraction by partial fraction method by using Laplace Transform
9. Expand F(s) into linear fraction by partial fraction method by using Z-Transform
10. Finding the convolution between two functions using Laplace transform and Z-transform
11. Finding the real roots of algebraic and transcendental equations using Newton Raphson method.
12. Finding the largest Eigenvalue by power method.
13. Solving system of linear equations using Gauss Seidel Method.
14. Finding approximately the missing value using Lagrange interpolation.
15. Evaluating line integrals by trapezoidal rule and Simpson's rule.

**System requirement**

| Sl. No. | Description of Equipment | Required numbers for batch of 30 students |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Windows 8 or higher operating system / Linux Ubuntu 20 or higher | 30 |
| 3. | Scilab 6.0 or later | 30 |

**Course Outcomes:**

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

**CO1:** Solve complex problems involving matrices using Sci lab.

**CO2:** Utilize Sci lab to solve integration and differentiation problems.

**CO3:** Apply Sci lab to calculate transforms and verify the solutions of ordinary differential equations in numerical methods.

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| **2** | 3 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| **3** | 3 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| AVG | 3 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 1 |
| 1 – 'Low', 2 – 'Medium', 3- 'High', '-' – No correlation | | | | | | | | | | | | | | | |

# IT ESSENTIAL SKILLS

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24IT121 | **Course Type** | Practical |
| **Teaching Periods/Week (L: T:P)** | 0:0:2 | **Credits** | 1 |
| **Total Teaching Periods** | 30 | **IAT + ESE Marks** | 60 + 40 |
| **Teaching Department** | Information Technology | | |

**Course Objectives:** To equip students with the knowledge in:

1. PC components, diagnose and resolve common issues to maintain optimal performance.
2. PowerPoint and Word for crafting compelling presentations and professional documents with advanced formatting, multimedia integration, and design techniques.
3. Spreadsheets for the creation, management, and analysis of data across various tasks.
4. Use of ChatGPT for prompt engineering, creative writing, and language translation to enhance communication and content creation.
5. HTML and CSS to design and build well-structured, visually appealing, and interactive web pages.

**Practical Exercises** **30**

**PC Hardware & Software Installation** **6**

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

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

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

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

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

**WORD** **6**

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

**Task 1:** Using Word to create a project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

**Task 2**: Creating project abstract Features to be covered: -Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 3:** Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

**EXCEL** **6**

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

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

**Task 2:** Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,
Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"
Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."
Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

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

**POWER POINT** **4**

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

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

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

**AI TOOLS –Chat GPT** **4**

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

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

**Task 3:** Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.
Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?"

**HTML AND CSS** 

**HTML & CSS Orientation:** The mentor needs to tell the importance of HTML tags as a design tool, give the details of the three tasks and features that would be covered in each. Using HTML – Formatting, List, Header, Table, insert image Using help and resources.

**Task 1:** Create a simple webpage with a title, header, paragraph, and footer for institution.

**Task 2:** Create a form with fields for name, email, password, and a submit button Include radio buttons, checkboxes, and a dropdown menu.

**Task 3:** Create and Apply an External CSS to an HTML Document for your profile.

**System Requirement**

| Sl. No. | Description of Equipment | Required numbers (for batch of 30 students) |
|---|---|---|
| 1. | INTEL based desktop PC with min. 4GB RAM and 500 GB HDD, 17" or higher TFT Monitor, Keyboard and mouse | 30 |
| 2. | Office tools – Word processor, Spread sheet, Presentation tool | 30 |
| 3. | AI TOOLS: Chat GPT | 30 |
| 4. | Mozilla Firefox / Chrome / Microsoft Edge, Notepad ++ | 30 |

**Course Outcomes:**

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

CO1: Identify the components of a PC and troubleshoot PC malfunctions.

CO2: Develop essential skills in PowerPoint and Word to create engaging presentations and professional documents with advanced formatting, multimedia integration, and layout techniques.

CO3: Acquire the ability to create, manage, and analyze data using spreadsheets for various tasks.

CO4: Attain knowledge in using Chat GPT for prompt engineering, creative writing, and language translation, enhancing interaction and content generation capabilities.

CO5: Build foundational skills in HTML and CSS to create structured, styled, and interactive web pages

**References**

R1: Kate J. Chase , PC Hardware - A Handbook, , PHI (Microsoft)

R2: David Anfins on and Ken Quamme, IT Essentials PC Hardware and Software Companion Guide, CISCO Press, Pearson Education, 3rd edition

R3: Patrick Regan, IT Essentials PC Hardware and Software Labs and Study Guide, CISCO Press, Pearson Education, 3rd edition

R4: Vikas Gupta, Comdex Information Technology course tool kit, WILEY Dream tech, 2003

R5: Cheryl A Schmidt, The Complete Computer upgrade and repair book, WILEY Dream tech, 2013, 3rd edition

R6: Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition

R7: Prashant Joshi Introduction to IT Systems, Khanna Book Publishing Co.(P) Limited, New Delhi, 2021 First Edition

| **CO-PO & PSO Mapping:** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| 1 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| 2 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| 3 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| 4 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| 5 | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| **AVG** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| '1' – Low, '2' – Medium, '3'- High, '-' – No correlations | | | | | | | | | | | | | | | |

# ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE

**(Common to all branches)**

| | | | |
|---|---|---|---|
| **Course Code** | 24GE221 | **Course Type** | Practical |
| **Teaching Periods/Week (L:T:P)** | 0:0:2 | **Credits** | 1 |
| **Total Teaching Periods** | 30 | **IAT + ESE Marks** | 60 +40 |
| **Teaching Department** | Electrical and Electronics Engineering | | |

**Course Objectives:**

1. To equip students with a comprehensive understanding of electronic equipment and practical soldering skills.
2. To develop students' proficiency in making electrical wiring connections using appropriate techniques and perform energy audit.
3. To provide students with practical exposure in installation and maintenance of household electrical appliances.

**PRACTICAL** **30**

1. Study of components - R, L, C, Diode, Transistor and IC's.
2. Study of equipment's – RPS, Function Generator, CRO, Multimeter, Ammeter, Voltmeter, Wattmeter and Energy meter.
3. Measurement of voltage, current, frequency, time period for sine, square and triangular waves.
4. Soldering practice and breadboard practice.
5. Study of wires and cables.
6. Basic switchboard wiring with lamp, fan and three pin socket.
7. Fluorescent Lamp Wiring and Staircase Wiring.
8. Residential House wiring using Switches, Fuse, Indicator, Lamp and Energy meter.
9. Measurement of Energy and Earth Resistance.
10. Energy Audit.
11. Installation and Maintenance of Electrical Appliances –I Iron box, Emergency Lamp, Fan regulator.
12. Installation and Maintenance of Electrical Appliances –II Water heater, Stabilizer and UPS.

**List of Equipment:**

| S.No | Name of the Equipment | Quantity |
|---|---|---|
| 1 | Single phase house wiring setup (Fuse, Lamp, Socket, Switch, PVC Pipe, Lamp Holder, Energy Meter) | 2 |
| 2 | Staircase wiring setup (Lamp, Two-way Switch, Socket, Switch, PVC Pipe, Lamp Holder) | 2 |
| 3 | Fluorescent lamp wiring setup (Fluorescent Lamp, Socket, Switch, PVC Pipe, Fluorescent Lamp Holder, Choke, Starter) | 2 |
| 4 | Water heater (1500W, 230V) | 2 |
| 5 | Stabilizer (500W, 160 – 290V) | 2 |
| 6 | UPS (600 VA) | 2 |
| 7 | Fan regulator | 2 |
| 8 | Iron box setup | 2 |
| 9 | Emergency lamp setup | 2 |
| 10 | Soldering Iron, Lead | 15 |
| 11 | Multi meter (0-600V, 10A) | 15 |

| | | |
|---|---|---|
| 12 | Continuity tester | 2 |
| 13 | Resistors | Adequate Number |
| 14 | Capacitors | Adequate Number |
| 15 | Diodes | Adequate Number |
| 16 | Transistors | Adequate Number |
| 17 | Inductors | Adequate Number |
| 18 | IC's | Adequate Number |
| 19 | RPS (0-30V) | 5 |
| 20 | Function Generator (0-1MHz) | 5 |
| 21 | CRO (20MHz) | 5 |
| 22 | Ammeter (0-10A) MI | 10 |
| 23 | Voltmeter (0-300V) MI | 10 |
| 24 | Wattmeter (300V,10A, UPF) | 5 |
| 25 | Energy meter (single phase, two wire, (5-30A)/240V, 50Hz) | 5 |
| 26 | Wires, Cables | Adequate Number |
| 27 | Clamp meter (0-1000A), (0-750V) | 2 |
| 28 | Megger (500V, 100Mohms) | 1 |

**Course Outcomes:**

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

**CO1:** Identify various electronic components and assemble simple electronic circuits using soldering.

**CO2:** Make wiring connections for household and conduct energy audit.

**CO3:** Install and maintain household electrical appliances.

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 | 1 |
| 2 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 | 1 |
| 3 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 | 1 |
| **AVG** | 3 | 2 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 | 1 |

1 –„Low“ , 2 – „Medium“ , 3- „High“, „-„ – No correlations

# DISCRETE MATHEMATICS

| Course Code | 24MA301 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | Common to ISE | | | | |
| Total Teaching Periods | 45 | L:T:P | 3:0:0 | Credits | 3 |
| Handled by | Mathematics | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite :** Basic Mathematics Knowledge and Fundamental Logical Reasoning Skills.

**Course Objectives:** To Impart the knowledge of

1. Propositional logic, predicates, and proof techniques for constructing valid mathematical arguments.
2. Combinatorial techniques such as counting principles, permutations, combinations, recurrence relations, and generating functions.
3. Graph theory concepts including connectivity and isomorphism for modeling network-related problems.
4. Algebraic structures including semigroups, monoids, groups, subgroups, and homomorphisms.
5. Lattices, posets, and Boolean algebra for representing and analyzing ordered and logical structures.

**Unit: I LOGIC AND PREDICATES** **9**

Propositional logic - Propositional equivalences - Predicates and quantifiers - Nested quantifiers - Rules of inference - Introduction to proofs - Proof methods and strategy.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk
**RBT Level:** L1-L3

**Unit: II COMBINATORICS** **9**

Mathematical induction - Strong induction and well ordering the basics of counting - The pigeonhole principle - Permutations and combinations - Recurrence relations - Solving linear recurrence relations - Generating functions - Inclusion and exclusion principle and its applications.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: III GRAPHS AND ITS APPLICATIONS** **9**

Graphs and graph models - Graph terminology and special types of graphs - Matrix representation of graphs and graph isomorphism - Connectivity - Euler and Hamilton paths.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: IV ALGEBRAIC STRUCTURES** **9**

Algebraic systems - Semi groups and monoids - Groups - Subgroups - Homomorphism‘s - Normal subgroup and cosets - Lagrange‘s theorem.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: V LATTICES AND BOOLEAN ALGEBRA** **9**

Partial ordering - Posets -Hasse diagram- Lattices as posets - Properties of lattices - Lattices as algebraic systems - Sub lattices - Direct product and homomorphism.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Total** **45**

**Suggested activities:** Class test, Case study, MCQ, Assignment/ Explanation and report submission, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Verify the validity of mathematical arguments using propositional and predicate logic rules.

CO2: Apply permutations, combinations, and recurrence relations to solve complex combinatorial problems.

CO3: Represent and solve real-world connectivity problems using graph theory and matrix representations.

CO4: Identify and categorize algebraic systems like groups and monoids based on their fundamental properties.

CO5: Construct Hasse diagrams and simplify Boolean expressions using lattice theory principles.

**Text Books:**

T1: Tremblay, J.P. and Manohar. R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2017.

T2: Rosen, K.H., "Discrete Mathematics and its Applications", 8th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2021.

T3: Oscar Levin, Discrete Mathematics an Open Introduction 5th Edition 2021

**References**

R1: Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2014.

R2: Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

R3: Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

R4: Harry Lewis and Rachel Zax, Essential Discrete Mathematics for Computer Science, Princeton Asia (Beijing) Consulting Co., Ltd., 2019

**Web links and Video Lectures (e-Resources):**

1. http://acl.digimat.in/nptel/courses/video/111107058/L01.html
2. https://archive.nptel.ac.in/courses/106/108/106108227/
3. http://www.digimat.in/nptel/courses/video/111106102/L01.html
4. https://drmcet.digimat.in/nptel/courses/video/106105192/L49.html
5. https://archive.nptel.ac.in/courses/111/107/111107127/

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 1 | 1 | – | – | – | – | 1 | – | 2 | 3 | 2 | 2 |
| 2 | 3 | 3 | 2 | 2 | 1 | – | – | – | 1 | – | 2 | 3 | 3 | 2 |
| 3 | 3 | 3 | 3 | 2 | 2 | – | – | 1 | 1 | – | 2 | 3 | 3 | 3 |
| 4 | 3 | 2 | 2 | 2 | 1 | – | – | – | 1 | – | 2 | 3 | 2 | 3 |
| 5 | 3 | 2 | 2 | 1 | 1 | – | – | – | 1 | – | 2 | 3 | 2 | 3 |
| **AVG** | **3** | **3** | **1** | **1** | **–** | **–** | **–** | **–** | **1** | **–** | **2** | **3** | **2** | **2** |
| 1 – “Low”, 2 – “Medium”, 3 – “High”, – “No correlations” | | | | | | | | | | | | | | |

# JAVA PROGRAMMING

| Course Code | 24CS303 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | Common to ISE | | | | |
| Total Teaching Periods | 45 | L:T:P | 3:0:0 | Credits | 3 |
| Handled by | CSE | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite :** Basic knowledge of programming and computer fundamentals.

**Course Objectives:** To Impart the knowledge of

1. Object-Oriented Programming principles and core Java features to design and develop modular, structured, and reusable applications..
2. Inheritance, packages, interfaces and polymorphism for developing well-structured Java applications..
3. Exception handling and multithreading techniques for developing reliable and efficient Java applications.
4. Java I/O streams, generics, and string handling mechanisms for developing flexible and efficient applications.
5. Developing interactive GUI applications using JavaFX.

**Unit: I INTRODUCTION TO OOP AND JAVA 9**

Overview of OOP–Object oriented programming paradigm–Features of Object-Oriented Programming–Java Buzzwords - Overview of Java – Data Types, Variables and Arrays –Operators – Control Statements – Programming Structures in Java – Defining classes in Java –Constructors-Methods -Access specifiers - Static members- Java Doc comments

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk
**RBT Level:** L1-L3

**Unit: II INHERITANCE, PACKAGES AND INTERFACES 9**

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages –Packages and Member Access –Importing Packages – Interfaces.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: III EXCEPTION HANDLING AND MULTITHREADING 9**

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication-Suspending –Resuming, and Stopping Threads – Multithreading. Wrappers – Auto boxing.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: IV I/O, GENERICS, STRING HANDLING 9**

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: V JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS 9**

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, Toggle Button – Radio Buttons – List View – Combo Box – Choice Box – Text Controls –Scroll Pane. Layouts – Flow Pane – HBox and VBox – Border Pane – Stack Pane – Grid Pane. Menus– Basics – Menu – Menu bars – Menu Item.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Total 45**

**Suggested Activities:** Code Debug Challenge, Puzzle Activity, Code Tracing Worksheet, Case study, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Apply object-oriented programming concepts and basic Java constructs to solve simple programming problems

CO2: Develop Java programs using inheritance, packages, interfaces, and polymorphism concepts.

CO3: Implement exception handling and multithreading mechanisms in Java applications.

CO4: Develop Java applications using I/O streams, generics, and string handling techniques.

CO5: Design and develop GUI-based applications using JavaFX event handling and controls.

**Text Books:**

T1: Herbert Schildt, "*Java: The Complete Reference*", 11th Edition, McGraw Hill Education, New Delhi, 2019

T2: Herbert Schildt, "Introducing JavaFX 8 Programming", 1st Edition, McGraw Hill Education, New Delhi, 2015

**References**

R1: Cay S. Horstmann, "Core Java, Volume I: Fundamentals",13th Edition, published by Oracle Press in 2024.

**Web links and Video Lectures (e-Resources):**

1. **https://docs.oracle.com/en/java/**
2. **https://www.w3schools.com/java/**
3. **https://www.geeksforgeeks.org/java/**
4. **https://www.tutorialspoint.com/java/**
5. **https://nptel.ac.in/courses/106105191/**

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 2 | 2 | 1 | 2 | - | - | 1 | - | - | 2 | 3 | 2 | - |
| **2** | 3 | 3 | 2 | 1 | 2 | - | - | 1 | - | - | 2 | 3 | 2 | - |
| **3** | 3 | 3 | 3 | 2 | 2 | - | - | 1 | - | - | 2 | 3 | 3 | - |
| **4** | 3 | 3 | 3 | 2 | 3 | - | - | 1 | - | - | 2 | 3 | 3 | - |
| **5** | 3 | 3 | 3 | 1 | 3 | - | - | 1 | - | - | 2 | 3 | 3 | 1 |
| **AVG** | **3** | **3** | **3** | **1** | **2** | **-** | **-** | **1** | **-** | **-** | **2** | **3** | **3** | **1** |
| 1– "Low",2– "Medium",3- "High', – "No correlations" | | | | | | | | | | | | | | |

# DATA STRUCTURES AND ALGORITHMS

| Course Code | 24IT301 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | IT, CSBS & CSCS | | | | |
| Total Teaching Periods | 45 | L:T:P | 3:0:0 | Credits | 3 |
| Handled by | IT | Assessment Methods | | IAT | ESE |
| | | | | 60 Marks | 40 Marks |

**Prerequisite :** Basic knowledge of programming and problem-solving techniques**.**

**Course Objectives:** To provide knowledge of

1. Basic concepts of data structures and linear data structures such as arrays, linked lists, stacks, and queues.
2. Non-linear data structures including trees, heaps, and graphs with their applications.
3. Searching and sorting algorithms used for efficient data processing.
4. Algorithm analysis techniques including time and space complexity and asymptotic notations..
5. Advanced algorithm design techniques such as divide and conquer, greedy method, dynamic programming, and backtracking.

**Unit: I INTRODUCTION & LINEAR DATA STRUCTURES 9**

Introduction to Data Structures: Need, Types (Primitive, Non-Primitive), ADTs - Arrays and Linked Lists: Single, Double, Circular Linked Lists - Stacks: Operations, Applications (Expression Evaluation, Parentheses Matching) Queues: Simple, Circular, Priority Queues, Dequeue.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk
**RBT Level:** L1-L4

**Unit: II NON-LINEAR DATA STRUCTURES 9**

Trees: Binary Trees, Tree Traversals; In order, Preorder, Post order - Binary Search Trees (BST), AVL Trees. -Heaps and Heap Sort -Graphs: Representation, BFS and DFS, Applications.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Unit: III SEARCHING AND SORTING ALGORITHMS 9**

Searching: Linear Search, Binary Search. - Sorting: Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Counting Sort, Radix Sort.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Unit: IV ALGORITHM ANALYSIS** **9**

Time and Space Complexity- Asymptotic Notation: Big O, Omega, Theta - Recurrence Relations and Analysis using Substitution and Master Method.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Unit: V ADVANCED ALGORITHMIC TECHNIQUES** **9**

Divide and Conquer: Merge Sort, Quick Sort. - Greedy Algorithms: Activity Selection, Huffman Coding. -Dynamic Programming: Fibonacci, Knapsack, Longest Common Subsequence. - Backtracking: N-Queens, Subset Sum. - Introduction to Graph Algorithms: Minimum Spanning Tree (Kruskal, Prim), Shortest Path (Dijkstra, Floyd- War shall).

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Total** **45**

**Suggested Activities:** Code Debug Challenge, Puzzle Activity, Code Tracing Worksheet, Case study, Review of GATE questions

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Apply linear data structures such as arrays, linked lists, stacks, and queues in problem solving.

CO2: Design and implement non-linear data structures including trees, heaps, and graphs.

CO3: Analyze and compare searching and sorting algorithms using time and space complexity.

CO4: Evaluate algorithm efficiency using asymptotic analysis and recurrence relations.

CO5: Develop solutions using advanced algorithmic techniques such as divide and conquer, greedy algorithms, dynamic programming, backtracking, and graph algorithms.

**Text Books:**

T1: Mark Allen Weiss, “Data Structures and Algorithm Analysis in C", Pearson, 2nd Edition Reprint 2023 ISBN**:** 9789332549449

T2: Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms" , MIT Press, 4th Edition, 2022, ISBN**:** 9780262046305

T3: Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", Career Monk Publications, Latest Reprint 2024, **ISBN:** 9788193245279

**References**

R1: Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, “Introduction to Algorithms", Third Edition, PHI Learning, 2010.

R2: Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Fourth Edition, Pearson Education, 2014

R3: Aho, Hopcroft, and Ullman, “Data Structures and Algorithms”, Pearson Education India, 2002.

**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in/courses/106102064
2. https://www.geeksforgeeks.org/binary-tree-data-structure/
3. https://www.geeksforgeeks.org/sorting-algorithms/
4. https://www.geeksforgeeks.org/analysis-of-algorithms-set-1-asymptotic-analysis/
5. https://online.stanford.edu/courses/soe-ycsalgorithms1-algorithms-design-and-analysis-part-1

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 2 | 2 | 1 | 2 | - | - | 1 | - | - | 2 | 3 | 2 | 2 |
| **2** | 3 | 3 | 3 | 2 | 2 | - | - | 1 | - | - | 2 | 3 | 3 | 3 |
| **3** | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | - | 3 | 3 | 3 | 2 |
| **4** | 3 | 3 | 2 | 3 | 1 | - | - | 1 | - | - | 2 | 2 | 3 | 2 |
| **5** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | 1 | - | 2 | 3 | 3 | 3 |
| **AVG** | **3** | **3** | **2** | **2** | **2** | **-** | **-** | **1** | **1** | **-** | **2** | **3** | **3** | **2** |
| 1– “Low”,2– “Medium”,3- “High’, – “No correlations” | | | | | | | | | | | | | | |

# DIGITAL SYSTEM DESIGN

| Course Code | 24EC312 | Course Type | | INTEGRATED | |
|---|---|---|---|---|---|
| Course Offered to | Common to ISE, ECE & EEE | | | | |
| Total Teaching Periods | 75 | L:T:P | 2:1:2 | Credits | 4 |
| Handled by | ECE | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite:** Basic knowledge of mathematics, digital electronics, and programming concepts.

**Course Objectives:** To impart the knowledge of

1. Number systems, Boolean algebra, and basic digital logic design using Verilog HDL
2. Realization of logic circuits using different logic families (TTL, CMOS) and Verilog HDL modeling..
3. Design and operation of combinational and sequential digital circuits.
4. Design and operation of registers, counters, and synchronous sequential machines
5. Finite state machines (FSM), minimization and asynchronous circuit design techniques.

**Unit: I** **DIGITAL LOGIC DESIGN AND VERILOG HDL FUNDAMENTALS** **11+4**

**Number Systems: N**umber systems - Complements of Numbers - Codes- Weighted and Non-weighted codes and its Properties - Parity check code and Hamming code.

**Boolean algebra:** Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations. **Verilog HDL –** Structural Modeling – Data flow modeling – Behavioral Modelling.

**PRACTICALS:**

1. Simulation of basic gates, Universal gates and Multi level NAND / NOR realization using HDL.
2. Simulation of Boolean equation using gates.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL/YouTube videos, Peer Learning, Tutorials
**RBT Level:** L1-L4

**Unit: II** **PHASE RULE AND COMPOSITE MATERIAL BOOLEAN FUNCTION MINIMIZATION AND LOGIC FAMILY REALIZATIONS** **8+2**

**Minimization of Boolean functions:** Karnaugh Map Method - Up to five Variables, Don't Care Map Entries.

**Realization of Logic Gates Using Diodes & Transistors:** AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs interfacing- TTL driving CMOS & CMOS driving TTL.

**PRACTICALS:**

1. Characteristics of TTL and CMOS logic families.

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL videos, Peer Learning, Tutorials
**RBT Level:** L1-L4

**Unit: III COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS 10+8**

**Combinational Logic Circuits:** Adders, Subtractors, Comparators, Multiplexers, De-multiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

**Sequential Circuits Fundamentals:** Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

**PRACTICALS:**

1. Design and Simulation of Shift Register
2. Design and Simulation of Synchronous and Asynchronous Counters
3. Design and Simulation of Sequence Detector and Parity Bit generator.
4. Design and Simulation of Modulo N Counter

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL videos, Peer Learning, Tutorials
**RBT Level:** L1-L4

**Unit: IV REGISTERS, COUNTERS, AND SEQUENTIAL MACHINE DESIGN 12+8**

**Registers and Counters:** Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

**Sequential Machines:** Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N –Counters.

**PRACTICALS:**

1. Design and Simulation of Shift Register
2. Design and Simulation of Synchronous and Asynchronous Counters
3. Design and Simulation of Sequence Detector and Parity Bit generator.
4. Design and Simulation of Modulo N Counter

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL videos, Peer Learning, Tutorials, Case studies
**RBT Level:** L1-L4

**Unit: V FINITE STATE MACHINES AND ASYNCHRONOUS CIRCUIT DESIGN 10+2**

**Finite state machine:** capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs. Asynchronous design-modes of operation, Hazards, synthesis of SIC fundamental mode circuits, synthesis of burst mode circuits. Introduction to ASM Charts.

**PRACTICALS:**

1. Design and Simulation of Mealy and Moore models

**Teaching-Learning Process** **Pedagogy:** Lecture, NPTEL videos, Peer Learning, Tutorials, Case studies
**RBT Level:** L1-L4

**Total 75**

**Suggested activities :** Review of GATE questions, Case study, Mini Project.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Develop and simulate basic digital circuits using HDL effectively
CO2: Analyze the optimizing Boolean functions and implementing circuits using TTL, CMOS, and other logic families.
CO3: Design and analyze circuits like adders, multiplexers, and flip-flops for practical applications
CO4: Implement and simulate shift registers, counters, and sequence detection circuits.
CO5: Design, simplify, and simulate Mealy/Moore models and asynchronous circuits

**Text Books:**

T1: S.Salivahanan and S.Arivazhagan, "Digital Circuits and Design" 5th Edition 2022. Oxford University Press.
T2: M.Morris Mano, Michael D.Clietti, "Digital Design", 6th Edition, 2022, Pearson India Education Pvt Ltd
T3: Thomas L.Floyd, "Digital Fundamentals" 11th Edition, 2023, Pearson India Education Pvt Ltd

**References**

R1: Samir Palnitkar, "Verilog HDL". 2nd Edition, 2011, Pearson Education.
R2: Botros, "HDL Programming Fundamentals"1st Edition, 2014, Da Vinci Engineering Press (Cengage).
R3: Malvino, and Leach, "Digital Principles and Applications" 7th Edition, 2013, TMH, New Delhi

**Web links and Video Lectures (e-Resources):**

1. https://www.vlab.co.in
2. https://nptel.ac.in/courses/117105080
3. https://www.youtube.com/watch?v=Qzi5j3jOgNw
4. https://www.youtube.com/watch?v=AnAQ-o0d_i4
5. https://www.youtube.com/watch?v=8S1kvCJRfvc

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 2 | – | – | – | – | – | – | – | 1 | 3 | 2 | 3 |
| 2 | 3 | 3 | 2 | – | – | – | – | – | – | – | 1 | 3 | 2 | 2 |
| 3 | 3 | 3 | 3 | – | 2 | – | – | – | – | – | 1 | 3 | 3 | 2 |
| 4 | 3 | 3 | 3 | – | 2 | – | – | – | – | – | 1 | 3 | 3 | 2 |
| 5 | 3 | 3 | 3 | – | 2 | – | – | – | – | – | 1 | 2 | 3 | 2 |
| **AVG** | **3** | **2** | **2** | **–** | **–** | **–** | **–** | **–** | **–** | **–** | **1** | **3** | **2** | **3** |
| 1 – “Low”, 2 – “Medium”, 3 – “High”, – “No correlations” | | | | | | | | | | | | | | |

# INNOVATION AND DESIGN THINKING

| Course Code | 24ES321 | Course Type | | INTEGRATED | |
|---|---|---|---|---|---|
| Course Offered to | Common to all | | | | |
| Total Teaching Periods | 45 | L:T:P | 1:0:2 | Credits | 2 |
| Handled by | Training & Placement | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite :** Basic problem-solving and creative thinking skills.

**Course Objectives:** To enhance knowledge on

1. The principles and stages of **Design Thinking** for identifying and solving real-world problems.
2. Empathetic research methods to understand user needs through observation, interviews, and fieldwork.
3. Problem definition techniques and framing design challenges using user insights.
4. Creative ideation methods to generate and evaluate innovative solutions.
5. Prototyping, testing, and presenting solutions effectively through project demonstrations and presentations.

**Module: I THE DESIGNER'S MINDSET & PROBLEM SCOPING** **9**

Objective: Cultivate a growth mindset and launch the real-world project.

1. Introduction to Design Thinking: From Problem to Solution.
2. Fixed vs. Growth Mindset for Innovators (Toolkit: Mindset Reflection Worksheet).
3. Launching the Capstone Project: Team Formation & Problem Context Selection (Local Panchayat, NGO, Small Industry, Campus Community).
4. Project Planning & Introduction to Field Research (Toolkit: Project Brief Canvas).

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk

**RBT Level:** L1- L4

**Module: II EMPATHISE — DEEP USER UNDERSTANDING** **9**

Objective: Learn and apply empathetic methods in a real-world context.

1. The Art of Empathy and User-Centricity.
2. Planning Field Research (Toolkit: Research Plan Template).
3. Conducting Empathetic Interviews & Observations (Toolkit: Interview Guide, Observation Log).
4. FIELDWORK: Students conduct research in their chosen context. (Video recording of key interactions is encouraged).
5. Synthesising Data: Finding Insights (Toolkit: Empathy Map Canvas).
6. Visualising the User Experience (Toolkit: Journey Map Template).

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Module: III DEFINE — FRAMING THE CORE PROBLEM** **9**

Objective: Synthesise research findings into a powerful and focused problem statement.

1. From Insights to User Needs.
2. Creating User Personas (Toolkit: Persona Canvas).
3. Unpacking the Problem Root Cause (Toolkit: 5 Whys Worksheet).
4. Crafting a Point-of-View (POV) (Toolkit: POV Statement Template).
5. Framing the Design Challenge (Toolkit: "How Might We..." Questions

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Module: IV IDEATE — GENERATING CREATIVE SOLUTIONS** **9**

Objective: Generate a wide range of innovative solutions and select the most promising one.

1. Principles of Divergent and Convergent Thinking.
2. Brainstorming for Quantity and Creativity (Toolkit: Brainstorming Rules).
3. Structured Ideation Techniques (Toolkit: SCAMPER, Crazy 8s).
4. Clustering and Evaluating Ideas (Toolkit: Affinity Clustering).
5. Selecting the Winning Idea (Toolkit: Feasibility-Impact Matrix).

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Module: V PROTOTYPE & TEST — LEARNING BY MAKING** **9**

Objective: Build tangible representations of the idea and learn from user feedback.

1. The Purpose of Prototyping: To Learn, Not to Perfect.
2. Building Low-Fidelity Prototypes (Toolkit: Paper Prototyping, Storyboarding).
3. Planning and Conducting User Tests (Toolkit: User Test Script).
4. Gathering and Interpreting Feedback (Toolkit: Feedback Capture Grid).
5. The Iteration Cycle: Using feedback to refine the solution.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1-L3

**Module: VI INTEGRATE & PITCH — FROM IDEA TO IMPACT**

Objective: Prepare for implementation and communicate the solution persuasively.

1. Storytelling for Innovation: Crafting a Compelling Narrative.
2. Building a Persuasive Pitch (Toolkit: Pitch Deck Structure).
3. Ethical, Societal, and Sustainability Check (Toolkit: Ethics & Sustainability Checklist).
4. Introduction to Scalability and Intellectual Property (Overview only).
5. Capstone Project Consolidation & Presentation Rehearsal.

**Assessment Framework :**

**a) Formative Assessments (Continuous)**

**1. Field Research & Deliverable**: **20 Marks**

- A documented research report including Empathy Maps, Journey Maps, and supporting evidence (e.g., key quotes, photos, short video clips).
- Focus: Depth of user understanding, quality of research, and synthesis of insights.

**2. Ideation & Concept Selection Assessment : 20 Marks**

- Deliverable: An "Ideation Logbook" showing the breadth of ideas generated (using SCAMPER, Crazy 8s, etc.) and a rationale for the final selected concept using the Feasibility-Impact Matrix.
- Focus: Creativity, diversity of ideas, and logical selection process.

**b) Summative Assessment (End-of-Term)**

**3. Capstone Project Portfolio & Viva Voce : 60 Marks**

This is the core of the course evaluation, assessing the end-to-end project.

- **Comprehensive Project Portfolio - 30 Marks**: A single document walking through the entire process for the team's real-world problem—from initial research and POV to final prototype and iteration plan.
- **Final Pitch Presentation & Demo - 20 Marks:** A compelling live presentation (10-12 mins per team) of their solution, including a demo of their prototype and their proposed implementation plan.
- **Viva Voce - 10 Marks:** A brief individual interview to assess personal contribution, understanding of the process, and ability to reflect on the learning journey.

**Total** **45**

**Suggested Activities :** Case Study, Quiz, Coding Task, Group Task, Coding Challenge

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Explain the principles of design thinking and identify real-world problems using a designer's mindset.

CO2: Apply empathy-based research methods to collect user insights through interviews, observations, and field studies.

CO3: Analyze research findings and formulate clear problem statements using design thinking tools.

CO4: Generate and evaluate innovative ideas using structured ideation techniques to select feasible solutions.

CO5: Develop prototypes, test solutions with users, and present innovative solutions through demonstrations and project presentations.

**Text Books:**

T1: Jain, A. The science and art of design thinking. Penguin Enterprise, 2021

T2: Jain, A. From teenager to achiever: The power of 5 minds. Penguin Enterprise,2022

**References**

R1: Liedtka, J., Ogilvie, T., & Brozenske, R. Designing for growth: A design thinking toolkit for managers. Columbia Business School Publishing, 2020

R2: Lewrick, M., Link, P., & Leifer, L. The design thinking toolbox: A guide to mastering the most popular and valuable innovation methods. Wiley, 2020

**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in/courses
2. https://designthinking.ideo.com/
3. https://www.interaction-design.org/literature/topics/design-thinking
4. https://dschool.stanford.edu/resources/design-thinking-bootleg

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | – | – | – | – | – | – | – | – | 2 | 2 | – | – |
| 2 | 2 | 3 | – | 2 | – | – | – | 2 | – | – | – | 2 | 2 | – |
| 3 | – | 3 | 2 | 2 | – | – | – | 2 | – | – | – | 3 | 2 | – |
| 4 | – | 2 | 3 | – | 2 | – | – | 3 | – | – | – | 3 | 2 | 2 |
| 5 | – | – | 3 | 2 | 2 | 2 | 2 | 3 | 3 | – | 2 | 3 | 3 | 2 |
| **AVG** | 3 | 2 | – | – | – | – | – | – | – | – | 2 | 2 | – | – |

‘1’ – Low , ‘2’ – Medium , ‘3’- High, ‘-‘ – No correlations

# UNIVERSAL HUMAN VALUES AND ETHICS

| Course Code | 24GE311 | | Course Type | | INTEGRATED |
|---|---|---|---|---|---|
| Course Offered to | Common to All | | | | |
| Total Teaching Periods | 45 | L:T:P | 1:0:2 | Credits | 2 |
| Handled by | MECH | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite:** Basic awareness of human values, ethical behavior, and social responsibility**.**

**Course Objectives:** To enhance knowledge of

1. Universal human values and develop the ability for self-exploration and right understanding.
2. Harmony within the human being, including the relationship between the self ('I') and the body.
3. Harmony in family and society through values such as trust, respect, justice, and cooperation.
4. Harmony in nature and existence, promoting sustainable and responsible living.
5. Applying human values and ethical principles in professional life for socially responsible and environmentally conscious decision-making.

**Unit: I INTRODUCTION** **9**

Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration – Its content and process; 'Natural acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

**PRACTICALS:**

- Include sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

  **PS-1:** Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcomings in your life? Observe and analyze them.

  **PS-2:** Now-a-days, there is a lot of voice about many techno-genic maladies such as energy and natural resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. — all these seem to be man-made problems threatening the survival of life on Earth — What is the root cause of these maladies & what is the way out in your opinion?

  On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships,

generation gap, depression & suicidal attempts, etc — what do you think, is the root cause of these threats to human happiness and peace — what could be the way out in your opinion?

**PS 3:** Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of

- What is Naturally Acceptable to you in relationship- Feeling of respect or disrespect?
- What is Naturally Acceptable to you — to nurture or to exploit others?
- Is your living the same as your natural acceptance or different?

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1 – L4

**Unit: II HARMONY IN THE HUMAN BEING** **9**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.

**PRACTICALS :**

- Include sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

**PS-4:** List down all your desires. Observe whether the desire is related to Self (I) or Body. If it appears to be related to both, see which part of it is related to Self (I) and which part is related to Body.

**PS-5:**

- Observe that any physical facility you use, follows the given sequence with time: Necessary and tasteful unnecessary and tasteful unnecessary and tasteless intolerable.
- In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want it continuously and if not acceptable, you do not want it any moment!

**PS-6:**

- Chalk out programs to ensure that you are responsible to your body- for free nurturing, protection and right utilization of the body.
- Find out the plants and shrubs growing in and around your campus and residence. Find out their use for curing different diseases. If not, what initiative has been taken by you to implant the shrubs?

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1 – L4

**Unit: III HARMONY IN THE FAMILY AND SOCIETY 9**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and coexistence as comprehensive Human Goals, Visualizing a universal harmonious order in society, Undivided Society, Universal Order-from family to world family.

**PRACTICALS :**

- Include sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

  **PS 7:** Form small groups in the class and in that group initiate dialogue and ask the eight questions related to trust. The eight questions are:

  1. Do I want to make myself happy?
  2. Do I want to make the other happy?
  3. Does the other want to make him happy?
  4. Does the other want to make me happy?
     - What is the answer?
     - Intention (Natural Acceptance)
  1. Am I able to make myself always happy?
  2. Am I able to make the other always happy?
  3. Is the other able to make him always happy?
  4. Is the other able to make me always happy?
     - What is the answer?
     - Competence

  **PS 8:**

  - Observe on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
  - Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

  **PS 9:**

  - Write a note in the form of story, poem, skit, essay, narration, dialogue to educate a child. Evaluate it in a group.
  - Develop three chapters to introduce 'social science- its need, scope and content in the primary education of children

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1 – L4

**Unit: IV HARMONY IN THE NATURE AND EXISTENCE 9**

Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Coexistence of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence.

**PRACTICALS :**

- Include sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

  **PS 10:** List down units (things) around you. Classify them in four orders. Observe and explain the mutual fulfillment of each unit with other orders.

  **PS 11:**

  - Make a chart for the whole existence. List down different courses of studies and relate them to different units or levels in the existence.
  - Choose any one subject being taught today. Evaluate it and suggest suitable modifications to make it appropriate and holistic.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1 – L4

**Unit: V IMPLICATIONS OF HARMONY ON PROFESSIONAL ETHICS 9**

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.
b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
b. At the level of society: as mutually enriching institutions and organizations, Sum up.

**PRACTICALS :**

Include Exercises and Case Studies will be taken up in Sessions E.g. To discuss the conduct as an engineer or scientist etc

**PS 12:** Choose any two current problems of different kind in the society and suggest how they can be solved on the basis of natural acceptance of human values. Suggest steps you will take in present conditions.

**PS 13:**

- Suggest ways in which you can use your knowledge of Technology/Engineering/Management for universal human order, from your family to the world family.
- Suggest one format of humanistic constitution at the level of nation from your side.

**PS 14:** The course is going to be over now. Evaluate your state before and after the course in terms of

- Thought
- Behavior and
- Work
- Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

**Teaching-Learning Process** **Pedagogy:** Lecture, PPT

**RBT Level:** L1 – L4

**Total** **45**

**Suggested Activities :** Group Discussion, Presentation, Quiz, Case study, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Become more aware of themselves, and their surroundings (family, society, nature);

CO2: Have more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO3: Have better critical ability.

CO4: Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

CO5: Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

**Text Books:**

T1: A Foundation Course in Human Values and Professional Ethics by GP Bagaria Rr Gaur R Sangal, 2023

**References**

R1: Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 3rd revised edition, 2023

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/playlist?list=PLFW6lRTa1g83uYgRiZEy_F4pzedPNWpew

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | - | - | - | - | 2 | - | - | - | 1 | 1 | - | - |
| 2 | 1 | 1 | - | - | - | - | 2 | - | - | - | 1 | 1 | - | - |
| 3 | - | 1 | - | - | - | - | 3 | 2 | 1 | - | - | - | 1 | 1 |
| 4 | - | 1 | - | - | - | 3 | 2 | - | - | - | - | - | 1 | - |
| 5 | - | 1 | - | - | 2 | 2 | 3 | 1 | 1 | - | - | 1 | 1 | 2 |
| **AVG** | 1 | 1 | - | - | - | - | 2 | - | - | - | 1 | 1 | - | - |

'1' – Low , '2' – Medium , '3'- High, '-' – No correlations

# DATA STRUCTURES AND ALGORITHMS LAB

| Course Code | 24IT321 | Course Type | | PRACTICAL | |
|---|---|---|---|---|---|
| Course Offered to | IT, CSBS & CSCS | | | | |
| Total Teaching Periods | 30 | L:T:P | 0:0:4 | Credits | 2 |
| Teaching Department | IT | Assessment Methods | | IAT | ESE |
| | | | | 60 Marks | 40 Marks |

**Prerequisite :** Basic knowledge of arrays and problem-solving techniques.

**Course Objectives:** To provide knowledge of

1. Fundamental data structures such as arrays, linked lists, stacks, queues, trees, and graphs..
2. Implementation techniques for performing operations such as insertion, deletion, traversal, and searching on various data structures.
3. Searching and sorting algorithms and their applications in solving computational problems.
4. Algorithm design techniques including recursion, divide and conquer, dynamic programming, and backtracking.
5. Methods for analyzing algorithm performance and selecting appropriate data structures and algorithms for problem solving.

**PRACTICALS:**

1. Implement array operations (insertion, deletion, traversal, searching).
2. Create a program for singly linked list with basic operations (insert, delete, display).
3. Implement doubly and circular linked list with all operations.
4. Implement a stack using arrays and linked list.
5. Solve infix to postfix conversion and evaluate postfix expression using stack.
6. Implement a queue using arrays and linked list.
7. Implement circular queue and double-ended queue (deque).
8. Implement binary tree with traversal methods (preorder, in order, post order).
9. Implement Binary Search Tree (BST) with insertion, deletion, and traversal.
10. Create AVL Tree and demonstrate rotation techniques (LL, RR, LR, RL).
11. Implement Min-Heap and Max-Heap, and perform heap sort.
12. Represent a graph using adjacency list and adjacency matrix.
13. Implement BFS (Breadth First Search) and DFS (Depth First Search) traversal on graphs.
14. Implement linear search and binary search on a sorted array.
15. Implement and analyze Bubble Sort, Selection Sort, and Insertion Sort.
16. Implement Merge Sort using recursion.
17. Implement Quick Sort using divide-and-conquer.
18. Implement Counting Sort and Radix Sort for integer arrays.
19. Analyze time complexity of linear and binary search (empirical analysis).
20. Compare sorting algorithms (Bubble, Merge, Quick) based on execution time.
21. Solve recursive problems like factorial, Fibonacci with time complexity analysis

22. Implement merge sort and quick sort (repetition for divide and conquer technique).
23. Solve 0/1 Knapsack problem using dynamic programming.
24. Implement Dijkstra's algorithm for shortest path.
25. Implement Prim's and Kruskal's algorithm for minimum spanning tree.
26. Solve N-Queens problem using backtracking.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBTLevel:** L1-L4

**Total** **30**

**Suggested Activities:** Brainstorming, Real World Mapping, Debug the Code, Code Analysis

**Evaluation Methods:** Performance in Suggested and day to day activities, Model practical and End Semester Examinations.

**Course Outcomes:** Students performance / Student presentations, Lab performance and observation records

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

**CO1:** Apply linear data structures such as arrays, linked lists, stacks, and queues in problem solving.

**CO2:** Design and implement non-linear data structures including trees, heaps, and graphs.

**CO3:** Analyze and compare searching and sorting algorithms using time and space complexity.

**CO4:** Evaluate algorithm efficiency using asymptotic analysis and recurrence relations.

**CO5:** Develop solutions using advanced algorithmic techniques such as divide and conquer, greedy algorithms,

**Web links and Video Lectures (e-Resources):**

1. **https://nptel.ac.in/courses/106102064**
2. **https://www.geeksforgeeks.org/data-structures/linked-list/**
3. **https://nptel.ac.in/courses/106106127**
4. **https://www.geeksforgeeks.org/sorting-algorithms/**
5. **https://nptel.ac.in/courses/106105164**

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 2 | 2 | 1 | 2 | - | - | 1 | - | - | 2 | 3 | 2 | 2 |
| **2** | 3 | 3 | 3 | 2 | 2 | - | - | 1 | - | - | 2 | 3 | 3 | 3 |
| **3** | 3 | 3 | 2 | 2 | 1 | - | - | 1 | - | - | 3 | 3 | 3 | 2 |
| **4** | 3 | 3 | 2 | 3 | 1 | - | - | 1 | - | - | 2 | 2 | 3 | 2 |
| **5** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | 1 | - | 2 | 3 | 3 | 3 |
| **AVG** | **3** | **3** | **2** | **2** | **2** | **-** | **-** | **1** | **1** | **-** | **2** | **3** | **3** | **2** |
| 1– "Low",2– "Medium",3- "High', – "No correlations" | | | | | | | | | | | | | | |

# JAVA PROGRAMMING LAB

| Course Code | 24CS322 | Course Type | | PRACTICAL | |
|---|---|---|---|---|---|
| Course Offered to | Common to ISE | | | | |
| Total Teaching Periods | 30 | L:T:P | 0:0:4 | Credits | 2 |
| Handled by | CSE | Assessment Methods | | IAT | ESE |
| | | | | 60 Marks | 40 Marks |

**Prerequisite:** Basic knowledge of programming concepts and problem-solving skills.

**Course Objectives:** To enhance knowledge of

1 Basic Java programming concepts including operators, arrays, control structures, classes, and objects.
2 Object-oriented programming principles such as constructors, method overloading, inheritance, polymorphism, abstraction, and interfaces.
3 Advanced Java features including packages, exception handling, multithreading, wrapper classes, and generics.
4 File handling and string processing techniques using Java I/O streams and string classes
5 Developing simple graphical user interfaces using JavaFX controls and event handling.

**PRACTICALS:**

1. Create a Java program to perform arithmetic operations using operators.
2. Write a java program using Arrays and Control Structures
3. Define a class `Student` with attributes and methods, create objects, and display details.
4. Write a program to demonstrate method overloading with different parameter lists.
5. Implement a program to demonstrate passing arguments to methods and returning values.
6. Create a class with both instance and static members and show their usage.
7. Develop a Java class that includes constructors (default and parameterized) and create multiple objects.
8. Develop a program with static variables and methods to calculate interest or employee salary.
9. Create a program with static block to initialize static data before object creation.
10. Write a program to demonstrate method overloading using different types and numbers of parameters
11. Find the sum of given two complex numbers using object as parameter and return as an object.
12. Develop a program to demonstrate single inheritance using a Person and Employee class.
13. Write a program to implement multilevel inheritance and display member access from derived classes.
14. Implement a program to demonstrate the use of the super keyword to call superclass constructors and methods.
15. Create a Java program for method overriding, showing runtime polymorphism using base and derived class objects.
16. Create an abstract class Shape with abstract methods and implement it in child classes like Circle, Rectangle.

17. Create a user-defined package, include classes in it, and access them from another package using import.
18. Create a program with **multiple interfaces** and implement them in a single class.
19. Write a Java program to divide two numbers. Handle Arithmetic Exception for division by zero using try-catch-finally.
20. Accept two numbers from the user and perform division. Add array access logic. Handle Arithmetic Exception, Array Index Out of Bounds Exception, and Input Mismatch Exception.
21. 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.
22. Create a program to convert primitive types to wrapper objects and vice versa.
23. Create a Java program to **write a string to a text file** and then **read the contents** of the file back.
24. Implement a program to copy the contents of one file to another, displaying each line as it is written.
25. Write a Java program to count the number of words and characters in a text file.
26. Write a Java program to demonstrate wrapper classes and methods in Generic Programming
27. Create a program to check whether a given string is a palindrome using String methods.
28. Implement a Java program to concatenate and reverse strings using String Buffer or StringBuilder.
29. Design a User Information Form using JavaFX Controls and Events.

**Total** **30**

**Suggested Activities:** Code Debug Challenge, Puzzle Activity, Code Tracing Worksheet, Mini Project / Content beyond Syllabus

**Evaluation Methods:** Performance in Suggested and day to day Activities, Model practical and End Semester Examinations.

**Course Outcomes:**

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

CO1: Apply object-oriented programming concepts and basic Java constructs to solve simple programming problems.

CO2: Develop Java programs using inheritance, packages, interfaces, and polymorphism concepts.

CO3: Implement exception handling and multithreading mechanisms in Java applications.

CO4: Develop Java applications using I/O streams, generics, and string handling techniques.

CO5: Design and develop GUI-based applications using JavaFX event handling and controls.

**Web links and Video Lectures (e-Resources):**

1. **https://www.youtube.com/playlist?list=PLxbRjI3sr4mwBHjyTPuEG0poqFGT404dB**
2. **https://www.geeksforgeeks.org/free-java-course-for-beginners/**

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 2 | 2 | 1 | 2 | - | - | 1 | - | - | 2 | 3 | 2 | - |
| **2** | 3 | 3 | 2 | 1 | 2 | - | - | 1 | - | - | 2 | 3 | 2 | - |
| **3** | 3 | 3 | 3 | 2 | 2 | - | - | 1 | - | - | 2 | 3 | 3 | - |
| **4** | 3 | 3 | 3 | 2 | 3 | - | - | 1 | - | - | 2 | 3 | 3 | - |
| **5** | 3 | 3 | 3 | 1 | 3 | - | - | 1 | - | - | 2 | 3 | 3 | 1 |
| **AVG** | **3** | **3** | **3** | **1** | **2** | **-** | **-** | **1** | **-** | **-** | **2** | **3** | **3** | **1** |

1– "Low",2– "Medium",3- "High', – "No correlations"

# CRYPTOGRAPHY AND CYBER SECURITY

| Course Code | 24CY401 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | CSCS | | | | |
| Total Teaching Periods | 45 | L:T:P | 3:0:0 | Credits | 3 |
| Handled by | CSCS | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite :** Basic knowledge of computer networks and mathematics (number theory and algebra).

**Course Objectives: To impart knowledge on**

1. Computer security concepts, security attacks, services, and classical encryption techniques.
2. Symmetric key cryptographic algorithms and their design principles.
3. Asymmetric cryptography and public key algorithms such as RSA and ECC.
4. Authentication mechanisms, hash functions, and digital signature algorithms.
5. Cyber crimes, cyber security threats, and modern security mechanisms.

**Unit: I INTRODUCTION TO SECURITY 9**

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques, Transposition techniques, Steganography – Foundations of modern cryptography: Perfect security – Information Theory – Product Cryptosystem – Cryptanalysis.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk

**RBT Level:** L1- L4

**Unit: II SYMMETRIC CIPHERS 9**

Number theory – Algebraic Structures – Modular Arithmetic - Euclid‘s algorithm – Congruence and matrices – Group, Rings, Fields, Finite Fields SYMMETRIC KEY CIPHERS: SDES – Block Ciphers – DES, Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation –Evaluation criteria for AES – Pseudorandom Number Generators – RC4 – Key distribution.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Unit: III ASYMMETRIC CRYPTOGRAPHY 9**

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler’s totient function, Fermat’s and Euler’s Theorem – Chinese Remainder Theorem – Exponentiation and logarithm ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Hellman key exchange -– Elliptic curve arithmetic – Elliptic curve cryptography.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Unit: IV INTEGRITY AND AUTHENTICATION ALGORITHMS** **9**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function: HMAC, CMAC – SHA – Digital signature and authentication protocols – DSS – Schnorr Digital Signature Scheme – ElGamal cryptosystem – Entity Authentication: Biometrics, Passwords, Challenge Response protocols – Authentication applications – Kerberos MUTUAL TRUST: Key management and distribution – Symmetric key distribution using symmetric and asymmetric encryption – Distribution of public keys – X.509 Certificates

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Unit: V CYBER CRIMES AND CYBER SECURITY** **9**

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security –Wireless Security.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1-L4

**Total** **45**

**Suggested Activities :** Case Study, Quiz, Coding Task, Group Task, Coding Challenge, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Explain security concepts, attacks, services, and classical encryption techniques.

CO2: Apply symmetric key cryptographic algorithms and block cipher techniques.

CO3: Analyze asymmetric cryptographic algorithms and key management techniques

CO4: Evaluate authentication mechanisms, hash functions, and digital signatures.

CO5: Identify cyber crimes and implement security mechanisms for networks, web, and cloud environments.

**Text Books:**

T1: William Stallings, "Cryptography and Network Security - Principles and Practice", Seventh Edition, Pearson Education, 2017

T2: Nina Godbole, Sunit Belapure, “Cyber Security: Understanding Cyber crimes, Computer Forensics and Legal Perspectives”, First Edition, Wiley India, 2011.

**References**

R1: Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.

R2: Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in/courses/106105031
2. https://www.tutorialspoint.com/cryptography/index.htm
3. https://www.w3schools.com/cybersecurity/
4. https://owasp.org/www-project-top-ten/

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 1 | - |
| 2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 2 | 3 | 2 | 1 |
| 3 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 2 | 3 | 2 | 1 |
| 4 | 3 | 3 | 2 | 3 | 1 | - | - | - | - | - | 2 | 2 | 3 | 1 |
| 5 | 2 | 3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 2 | 3 | 2 |
| **AVG** | 3 | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 1 | - |

‘1’ – Low , ‘2’ – Medium , ‘3’- High, ‘-‘ – No correlations

# COMPUTER ORGANIZATION AND ARCHITECTURE

| Course Code | 24CS301 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | CSE, IT, AIML & CSCS | | | | |
| Total Teaching Periods | 45 | L:T:P | 3:0:0 | Credits | 3 |
| Handled by | CSE | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite :** Basic knowledge of Computer Fundamentals and Engineering Mathematics.

**Course Objectives:** To Impart the knowledge of

1. Basic computer organization, including components, instructions, and addressing modes.
2. Arithmetic operations in computers, including integer and floating-point calculations.
3. Processor design, pipelining, and handling hazards and exceptions..
4. Instruction-level parallelism and modern multicore processor techniques..
5. Memory hierarchy, caches, virtual memory, and input/output systems for better performance..

**Unit: I OVERVIEW & INSTRUCTIONS 9**

Eight ideas – Components of a computer system – Technology – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions– Logical operations – control operations – Addressing and addressing modes.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk
**RBT Level:** L1-L3

**Unit: II ARITHMETIC OPERATIONS 9**

Integer arithmetic – Binary Parallel adder – Carry Look– ahead Adder – Carry save adder – Binary multiplier – Booth's multiplier – Bit– pair recoding – Binary division. Floating point arithmetic– Representation – Arithmetic operations on floating point numbers – Parallelism and computer arithmetic.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: III PROCESSOR AND CONTROL UNIT 9**

Basic MIPS implementation – Building data path – Control Implementation scheme – Pipelining – Pipelined data path and control – Handling Data hazards & Control hazards – Exceptions.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: IV PARALLELISM** **9**

Instruction-level-parallelism – Advanced ILP – Dynamic branch prediction – Correlating predictors – Tournament predictors. Dynamic scheduling – Tomasulo's algorithm – Speculation. Multiple issue processors – Static and dynamic. Limitations of ILP – Multithreading – SMT and CMP Architectures – The Multicore era.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Unit: V MEMORY AND I/O SYSTEMS** **9**

Need for a hierarchical memory system – The basics of caches – Measuring and improving cache performance. Virtual memory – Paging and segmentation – TLB – Implementing protection with virtual memory. Associative memories, Introduction to virtual machines. Storage and I/O – Dependability, reliability and availability –Types of storage. Connecting processors, memory and I/O devices – Interfacing I/O devices to the processor, memory and the operating system, Interrupts, DMA, RAID.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L3

**Total** **45**

**Suggested Activities:** Puzzle Activity, Case study, Review of GATE questions.
**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Analyze instruction set architectures and addressing modes to evaluate the performance of various computer system components.

CO2: Perform high speed computer arithmetic using advanced algorithms for integer and floating-point multiplication and division.

CO3: Design pipelined MIPS processors by constructing data paths and implementing schemes to resolve data and control hazards.

CO4: Maximize instruction level parallelism using dynamic scheduling, branch prediction, and multicore architectures like SMIT and CMP.

CO5: Configure hierarchical memory systems and I/O protocols including cache optimization, virtual memory, and RAID configurations.

**Text Books:**

T1: David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann / Elsevier, 2020.

T2: Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.

T3: John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann /Elsevier, 6th edition, 2019.

**References**


R1: William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.

R2: John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 2017.

R3: V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.


**Web links and Video Lectures (e-Resources):**

1. https://www.geeksforgeeks.org/computer-organization-architecture/computer-organization-and-architecture-tutorials/
2. https://www.youtube.com/playlist?list=PLV8vIYTIdSnar4uzz-4TIlgyFJ2m18NE3
3. https://www.youtube.com/watch?v=bM2PyN-EIS0
4. https://www.studocu.com/in/document/anna-university/digital-principles-and-computer-organization/coa-24cs301-unit-ii-arithmetic-operations-in-computer-organization/151763830
5. https://hemanthrajhemu.github.io/CSE3/DOWNLOAD/CO/CO_MOD_4.pdf
6. https://www.youtube.com/watch?v=B7SRkNyaauQ
7. https://www.youtube.com/watch?v=YUHeZ8QWTVo
8. https://en.wikipedia.org/wiki/MIPS_architecture
9. https://en.wikipedia.org/wiki/Instruction-level_parallelism
10. https://www.elsevier.com/books/computer-organization-and-design/patterson/978-0-12-820109-1
11. https://www.youtube.com/watch?v=fpnE6UAfbtU

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | - | - | - | - | - | - | - | - | 1 | 3 | 2 | 1 |
| 2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | 1 | - |
| 3 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 3 | 3 | 2 |
| 4 | 3 | 2 | 3 | 2 | 1 | - | - | - | - | - | 2 | 3 | 3 | 2 |
| 5 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | 2 | 2 | 2 |
| **AVG** | **3** | **2** | **3** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **1** | **3** | **2** | **2** |

1 – "Low", 2 – "Medium", 3 – "High", – "No correlations"

# DATABASE MANAGEMENT SYSTEMS AND SECURITY

| Course Code | 24CY402 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | CSCS | | | | |
| Total Teaching Periods | 45 | L:T:P | 3:0:0 | Credits | 3 |
| Teaching Department | CSCS | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite :** Basic knowledge of database concepts, data organization, and fundamentals of computer systems.

**Course Objectives:** To provide knowledge of

1. Relational database concepts including data models, relational algebra, SQL, ER modeling, and distributed database principles..
2. Eliminate data redundancy using functional dependencies, decomposition, and multi-valued dependency ruledatabase design techniques using ER diagrams, functional dependencies, and normalization methods for efficient database structure.s.
3. Transaction management concepts including ACID properties, concurrency control mechanisms, serializability, and database recovery techniques.
4. Database security issues including vulnerabilities such as SQL injection attacks and techniques for protecting database systems..
5. Database access control mechanisms, role-based authorization models, inference control, and encryption techniques for secure database management..

**Unit: I RELATIONAL DATABASES** **9**

Data Models – Relational Data Models – Relational Algebra – Structured Query Language – Entity-Relationship Model – Mapping ER Models to Relations – Distributed Databases – Data Fragmentation – Replication.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk

**RBT Level:** L1-L4

**Unit: II DATABASE DESIGN** **9**

ER Diagrams – Functional Dependencies – Non-Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation – Boyce Codd Normal Form – Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1-L4

**Unit: III TRANSACTION MANAGEMENT** **9**

Transaction Concepts – ACID Properties – Serializability – Transaction Isolation Levels – Concurrency Control – Need for Concurrency – Lock-Based Protocols – Deadlock Handling – Recovery System – Failure Classification – Recovery Algorithm.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1-L4

**Unit: IV DATABASE SECURITY** **9**

Need for database security – SQL Injection Attacks – The Injection Technique – SQL Attack Avenues and Types.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1-L4

**Unit: V ACCESS CONTROL AND ENCRYPTION** **9**

Database Access Control – SQL based access definition – Cascading Authorizations – Role based access control – Inference – Database encryption.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1-L4

**Total** **45**

**Suggested activities:** Case Study, Group Role Play, Puzzle, Code Review, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Design ER models and execute relational algebra for centralized and distributed databases.

CO2: Apply Normalization from 1*NF* to 5*NF* to eliminate data redundancy and anomalies.

CO3: Manage ACID properties and concurrency control to ensure transaction integrity and recovery.

CO4: Identify SQL injection vulnerabilities and attack techniques to assess database risks.

CO5: Implement role-based access control and encryption to secure sensitive database information.

**Text Books:**

T1: Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2021.

T2: Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.

T3: William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Fourth Edition, Pearson, 2019.

**References**


R1: C.J. Date, A. Kannan and S. Swaminathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.

R2: Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2014.

R3: Narain Gehani and Melliyal Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012.


**Web links and Video Lectures (e-Resources):**

1. https://cse.poriyaan.in/topic/relational-algebra-50852/
2. https://cloud.google.com/discover/what-is-database-normalization
3. https://www.actian.com/what-is-acid-compliance/
4. https://www.cisa.gov/sites/default/files/publications/Practical-SQLi-Identification.pdf
5. https://eoxs.com/new_blog/implementing-access-controls-and-data-encryption/

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 3 | 2 | 2 | 2 | - | - | - | 1 | 1 | 1 | 3 | 2 | 1 |
| **2** | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 1 | 3 | 2 | 1 |
| **3** | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 2 |
| **4** | 2 | 3 | 1 | 3 | 3 | 2 | - | 2 | - | - | 2 | 2 | 3 | 3 |
| **5** | 2 | 2 | 3 | 2 | 3 | 2 | - | 3 | - | - | 2 | 2 | 3 | 3 |
| **AVG** | **3** | **3** | **2** | **2** | **3** | **2** | **-** | **3** | **1** | **1** | **1** | **2** | **2** | **2** |
| 1 – "Low", 2 – "Medium", 3 – "High", – "No correlations" | | | | | | | | | | | | | | |

# STATISTICS AND PROBABILITY

| Course Code | 24MA411 | Course Type | | INTEGRATED | |
|---|---|---|---|---|---|
| Course Offered to | CSE, IT, AIDS, AIML & CSCS | | | | |
| Total Teaching Periods | 75 | L:T:P | 2:1:2 | Credits | 4 |
| Handled by | Mathematics | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite :** Basic knowledge of probability and statistics.

**Course Objectives:** To impart knowledge of

1. Statistical hypothesis testing techniques including tests for means, variances, and chi-square tests for data analysis.
2. Design of experiments methods such as completely randomized design, randomized block design, and Latin square design for experimental data analysis.
3. Random variables, probability distributions, and their statistical measures used in probabilistic modeling..
4. Joint probability distributions, covariance, correlation, and regression for analyzing relationships between variables
5. Queueing models and stochastic processes used to analyze waiting line systems and service performance.

**Unit 1** **TESTING OF HYPOTHESIS** **15**

Sampling distributions – Tests for single mean, difference of two means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

**PRACTICALS:**

1. Perform Z-test for single mean and difference of means.
2. Perform F-test for equality of variances.
3. Perform Chi-square goodness of fit test and test of independent attributes.

**Teaching-Learning Process**

**Pedagogy: Lecture, PPT**

**RBT Level:** L1-L3

**Unit 2** **DESIGN OF EXPERIMENTS** **15**

One way classifications – Completely randomized design – two way classifications- Randomized block design – Latin square design -Three way classification.

**PRACTICALS:**

1. Compute the treatment means and block means in randomized block design.
2. Analyze data using two-way classification by computing row and column means.
3. Compute the grand mean for data arranged in a Latin square design.

**Teaching-Learning Process** **Pedagogy: Lecture, PPT**

**RBT Level:** L1-L3

**Unit 3** **RANDOM VARIABLES AND DISTRIBUTIONS** **15**

Random Variables: Discrete and continuous random variables — Moments — Moment generating functions -Standard Distributions — Discrete: Binomial, Poisson and Geometric distribution – Continuous: Uniform, Exponential and Normal distribution.

**PRACTICALS:**

1. Compute the PMF of a Binomial, Geometric and Poisson Distributions.
2. Compute and plot the PDF of a Uniform, Exponential and Normal Distributions.
3. Compute the mean and variance of a Binomial, Geometric and Poisson Distributions.

**Teaching-Learning Process** **Pedagogy: Lecture, PPT**

**RBT Level:** L1-L3

**Unit 4** **TWO-DIMENSIONAL RANDOM VARIABLES** **15**

Joint distributions —JPMF and JPDF- Marginal and conditional distributions — Covariance — Correlation coefficient and regression.

**PRACTICALS:**

1. Find the marginal distribution from joint distributions.
2. Compute conditional probability distributions.
3. Compute the covariance and correlation coefficient.

**Teaching-Learning Process** **Pedagogy: Lecture, PPT**

**RBT Level:** L1-L3

**Unit 5** **QUEUEING MODELS** **15**

Markovian queues — Birth and death processes — Single and multiple server queueing models — Little's formula — Queues with finite waiting rooms — Queues with impatient customers: Balking and reneging.

**PRACTICALS:**

1. Compute the performance measures of an M/M/1 queueing system and calculate queue length and waiting time for a single-server queue.
2. Compute utilization of a multi-server queueing system and compute blocking probability for a finite-capacity queue.
3. Compute effective service rate with reneging and compare arrival and service rates under balking and reneging.

**Teaching-Learning Process** **Pedagogy: Lecture, NPTEL Videos**

**RBT Level:** L1-L3

**Total** **45**

**Suggested Activities :** Lectures & Problem Solving, Tutorials & Assignments, Sci Lab Practical Sessions, Case Studies / Mini Projects, NPTEL Videos and Seminars, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Apply hypothesis testing techniques for means, variances and attributes.

CO2: Analyze experimental data using appropriate design of experiments methods.

CO3: Identify suitable random variables and probability distributions and compute their characteristics.

CO4: Determine joint, marginal and conditional distributions and analyze correlation and regression.

CO5: Model and evaluate queueing systems and compute performance measures using Scilab.

**Text Books:**


T1: B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th edition, 2017.

T2: Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2014.

T3: Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student edition, 2018.

T4: Arnold O. Allen, Probability, Statistics, and Queueing Theory: With Computer Science Applications (Computer science and applied mathematics series), 1st Edition, Academic Press, 2014.


**References**


R1: Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation",Springer, 3rd Edition, 2012.

R2: Taha. H.A., "Operations Research", Pearson Education, Asia, 10th Edition, 2017.

R3: Trivedi.K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd Edition, 2002.

R4: Yates. R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd.,Bangalore, 2nd Edition, 2012.


**Web links and Video Lectures (e-Resources):**

1. **https://nptel.ac.in/courses/117105085**
2. **https://www.google.com/url?q=https://nptel.ac.in/courses/111106929&sa=D&source=editors&ust=1769507667481044&usg=AOvVaw1qWhkeVXwe48IWue3Nv5KS**
3. **https://www.google.com/url?q=https://nptel.ac.in/courses/111102137&sa=D&source=editors&ust=1769507667440565&usg=AOvVaw0N6ORRo_nJRl4cFwgX5G3e**
4. **https://www.google.com/url?q=https://nptel.ac.in/courses/111102160&sa=D&source=editors&ust=1769507667441353&usg=AOvVaw3uJq78RKMhToQR4UoSpD_f**
5. **https://www.google.com/url?q=https://nptel.ac.in/courses/111102613&sa=D&source=editors&ust=1769507667442084&usg=AOvVaw0CeCKaQPqsAPsHF8FwhgEc**

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | 1 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 2 | - |
| 2 | 3 | 3 | 2 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 2 | - |
| 3 | 3 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 1 | - |
| 4 | 3 | 3 | 2 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 2 | - |
| 5 | 3 | 3 | 3 | 2 | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 3 | - |
| **AVG** | 3 | 3 | 2 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 2 | - |

‘1’ – Low , ‘2’ – Medium , ‘3’- High, ‘-‘ – No correlations

# ENVIRONMENTAL STUDIES AND SUSTAINABLE DEVELOPMENT

| Course Code | 24CH411 | Course Type | | INTEGRATED | |
|---|---|---|---|---|---|
| Course Offered to | CSE, IT, CSBS & CSCS | | | | |
| Total Teaching Periods | 45 | L:T:P | 2:0:2 | Credits | 3 |
| Handled by | CHEMISTRY | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite :** Basic knowledge of environmental studies

**Course Objectives:** To enhance the knowledge of

1. Basic concepts and importance of sustainability and Sustainable Development Goals (SDGs).
2. Environmental sustainability issues such as climate change, pollution, and resource conservation..
3. Social and economic aspects of sustainability including CSR and sustainable development
4. Sustainable practices in information technology and e-waste management.
5. Tools and practices for sustainability such as green buildings and environmental management systems.

**Unit: I INTRODUCTION** **9**

Principles and Historical perspectives, Importance and need for Sustainability in Engineering and Technology, impact and implications. United Nations Sustainability Development Goals (SDG), UN summit- Rio & outcome, Sustainability and development indicators.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT & Demonstration
**RBT Level:** Theory: L1-L4

**Unit: II ENVIRONMENTAL SUSTAINABILITY** **9**

Climate change, Biodiversity loss, Pollution and Waste Management, Renewable vs, Non-Renewable resources, Water and Energy Conservation, Sustainable Agriculture and Forestry. National and International Policies, Environmental Regulations and Compliance, Ecological Footprint Analysis.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1-L4

**Unit: III SOCIAL & ECONOMIC SUSTAINABILITY** **9**

Equity and Justice, Community Development, Smart cities and Sustainable infrastructure, Cultural heritage and Sustainability, Ethical considerations in Sustainable Development. Triple bottom line approach, Sustainable Economic Growth, Corporate Social Responsibility (CSR), Green marketing and Sustainable product design; Circular Economy and Waste Minimization, Green Accounting and Sustainability Reporting.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L4

**Unit: IV SUSTAINABILITY** **9**

Sustainable Software: What, Why and How – Social and Individual Sustainability in SE – Choosing energy– efficient programming languages. Types and sources of e– waste – Environmental and health impacts of e– waste – E– waste regulations and policies – Techniques for recycling IT equipment – Safe disposal methods – E– waste stream management – Concepts of circular economy – Role of IT in promoting circular economy.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** Theory: L1-L4

**Unit: V SUSTAINABILITY PRACTICES** **9**

Suggested Practices not limited to

1. Energy efficiency – how to save energy (energy efficient equipment, energy saving behaviour).
2. Chemical use and storage – the choice of chemicals being procured, the safe disposal of leftover chemicals, the impact of chemicals on the environment and long– term health impacts on humans.
3. Green building, green building materials, green building certification and rating: green rating for integrated habitat assessment (GRIHA), leadership in energy and environmental design (LEED)
4. Tools for Sustainability – Environmental Management System (EMS), ISO14000, life cycle assessment (LCA)
5. Ecological footprint assessment using the Global Footprint Network spreadsheet calculator
6. National/Sub national Status of Sustainable Development Goals.
7. Develop a campus sustainability plan and prototype, integrating sustainable IT practices and energy– efficient solutions.
8. Develop AI– driven solutions for efficient water management, demonstrating the role of IT in smart environmental monitoring.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** Theory: L1-L4

**Total** **45**

**Suggested Activities:** Code Debug Challenge, Puzzle Activity, Case study, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Explain sustainability concepts, SDGs, and development indicators.
CO2: Analyze environmental issues and evaluate conservation methods.
CO3: Assess social and economic sustainability practices including CSR and circular economy.
CO4: Apply sustainable software practices and e-waste management techniques.
CO5: Develop sustainability plans using tools such as LCA, EMS, and ecological footprint assessment.

**Text Books:**

T1: Allen D & Shonnard D R Sustainability Engineering, Concept, design and case studies,Prentice Hall

T2: Munier N, Introduction to sustainability by Springer

T3: Blackburn W R,The Sustainability hand book, The complete management guide to achieving social, economic and environmental responsibility, Routledge.

T4: Clini C., Musu I &Gullino M L Sustainable development and environment management Springer

T5: Bennett m., James P., & Klinkers Sustainable measures: Evaluation and reporting of environmental and social performance, Routledge

**References**

R1: Stark R., Seliger G., & amp; Bonvoisin Sustainable manufacturing, challenge, solution and Implementation perspective. Springer Nature.Netherland

R2: Seliger G Sustainable manufacturing for global value creation (2012)Springer Berlin Heidelberg

R3: Davim J P. Sustainable manufacturing by (2013)John Wiley & sons

R4: Niklas SundbergSustainable IT Playbook for technology Leaders, Design and Implements sustainable IT practices and unlock sustainable business opportunities by (2022), Kindle Edition

R5: Tam V W Y., Le Sustainable Construction Technologies, life cycle Assessment K N (2019 Elsevier science

**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in
2. https://ellenmacarthurfoundation.org
3. https://www.iso.org
4. https://unhabitat.org
5. https://www.iea.org

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 2 | 1 | - | - | - | 2 | 3 | 2 | - | 1 | - | 2 | 1 | - |
| **2** | 2 | 3 | 1 | 1 | - | 3 | 3 | 2 | - | - | - | 2 | 2 | 1 |
| **3** | 2 | 2 | 1 | - | - | 2 | 3 | 3 | 1 | 2 | - | 1 | 2 | 2 |
| **4** | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | - | - | - | 3 | 3 | 2 |
| **5** | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 3 | 2 | 3 |
| **AVG** | **2** | **2** | **1** | **1** | **1** | **2** | **3** | **2** | **1** | **1** | **1** | **2** | **2** | **2** |
| 1– “Low”,2– “Medium”,3- “High’, – “No correlations” | | | | | | | | | | | | | | |

# CYBER FORENSICS

| Course Code | 24CY411 | Course Type | | INTEGRATED | |
|---|---|---|---|---|---|
| Course Offered to | CSCS | | | | |
| Total Teaching Periods | 75 | L:T:P | 3:0:2 | Credits | 4 |
| Handled by | CSCS | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite :** Basic knowledge of computer networks, operating systems, and information security fundamentals.

**Course Objectives:** To provide knowledge of

1. Cybercrime concepts, classifications, and the role of digital forensics in investigating computer-related crimes.
2. Digital evidence collection methods, forensic investigation procedures, and the use of modern computer forensic tools.
3. Techniques for analyzing and validating digital evidence, including network, email, and mobile device forensics along with relevant cyber la
4. Ethical hacking concepts and techniques such as foot printing, scanning, enumeration, and system vulnerability assessment...
5. Web security threats and ethical hacking practices including social engineering, denial of service attacks, SQL injection, and wireless and mobile platform security.

**Unit: I INTRODUCTION TO CYBER CRIME AND FORENSICS 9**

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime - Cyber Forensics - Steps in Forensic Investigation - Forensic Examination Process - Types of CF techniques - Forensic duplication and investigation - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk
**RBT Level:** L1-L4

**Unit: II EVIDENCE COLLECTION AND FORENSICS TOOLS 9**

Processing Crime and Incident Scenes – Digital Evidence - Sources of Evidence -Working with File Systems. - Registry - Artifacts - Current Computer Forensics Tools: Software/ Hardware Tools - Forensic Suite - Acquisition and Seizure of Evidence from Computers and Mobile Devices - Chain of Custody-Forensic Tools

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Unit: III ANALYSIS AND VALIDATION** **9**

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics - Analysis of Digital Evidence - Admissibility of Evidence - Cyber Laws in India - Case Studies

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Unit: IV ETHICAL HACKING** **9**

Introduction to Ethical Hacking – Foot printing and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing – Email Tracking.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**Unit: V ETHICAL HACKING IN WEB** **9**

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT
**RBT Level:** L1-L4

**PRACTICALS:**

1. Study and Explore the following forensic tools: (a) FTK Imager (b) Autopsy (c)EnCase Forensic Imager (d) LastActivityView (e) USBDeview
2. Recover deleted files using FTKImager
3. Acquire forensic image of hard disk using EnCase Forensics Imager and also perform integrity checking/validation
4. Restore the Evidence Image using EnCase Forensics Imager.
5. Study the following: (a) Collect Email Evidence in Victim PC. (b) Extract Browser Artifacts (Chrome History view for Google Chrome)
6. Use USB Deview to find the last connected USB to the system
7. Perform Live Forensics Case Investigation using Autopsy
   Study Email Tracking and Email Tracing and write a report on them.

**Total** **45**

**Suggested Activities:** Case Study, Group Role Play, Puzzle, Code Review, Review of GATE questions

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Evaluate Cybercrime Trends: Identify current threats and the legal implications of electronic crimes.

CO2: Acquire evidence from various devices while ensuring integrity and admissibility

CO3: Operate specialized software and hardware suites to recover and duplicate data.

CO4: Conduct technical investigations into hidden data, emails, and mobile platforms.

CO5: Defend against SQL injection, session hijacking, and malware through ethical hacking practices.

**Text Books:**

T1: Bill Nelson, Amelia Phillips, Christopher Steuart, ―Guide to Computer Forensics and Investigations‖, Cengage Learning, India Sixth Edition, 2019.

T2: CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, Version 11, 2021.

T3: Dejey, S. Murugan - Cyber Forensics, Oxford University Press, India, 2018.

**References**

R1: John R.Vacca, "Computer Forensics ", Cengage Learning, 2005.

R2: MarjieT.Britz, "Computer Forensics and Cyber Crime: An Introduction 3rd Edition, Prentice Hall, 2013.

R3: AnkitFadia " Ethical Hacking, Second Edition, Macmillan India Ltd, 2006.

R4: Kenneth C.Brancik "Insider Computer Fraud‖ Auerbach Publications Taylor &Francis Group– 2008.

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=-sIBz9dLeqQ
2. https://www.youtube.com/watch?v=hdn2rO3XuCk
3. https://www.youtube.com/watch?v=vqOJyB8ZVRk
4. https://www.youtube.com/watch?v=G4SCh85CV3c
5. https://www.youtube.com/watch?v=2nXOxLpeu80

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 2 | 2 | - | - | - | 3 | 2 | - | - | - | 2 | 2 | - | 2 |
| **2** | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | - | 2 | 3 | 2 | 2 |
| **3** | 3 | 2 | 2 | 2 | 3 | - | - | - | - | - | 2 | 3 | 3 | 2 |
| **4** | 3 | 3 | 2 | 3 | 2 | 2 | 2 | - | - | - | 2 | 3 | 2 | 3 |
| **5** | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | - | - | 3 | 3 | 3 | 3 |
| **AVG** | **3** | **2** | **2** | **3** | **3** | **2** | **3** | **2** | **2** | **-** | **2** | **3** | **3** | **2** |
| 1 – "Low", 2 – "Medium", 3 – "High", – "No correlations" | | | | | | | | | | | | | | |

# CRYPTOGRAPHY AND CYBER SECURITY LABORATORY

| Course Code | 24CY421 | Course Type | | PRACTICAL | |
|---|---|---|---|---|---|
| Course Offered to | CSCS | | | | |
| Total Teaching Periods | 30 | L:T:P | 0:0:4 | Credits | 2 |
| Handled by | CSCS | Assessment Methods | | IAT | ESE |
| | | | | 60 Marks | 40 Marks |

**Prerequisite :** Basic knowledge of computer networks, discrete mathematics, and programming fundamentals.

**Course Objectives: To provide knowledge of**

1. Classical cryptographic techniques such as substitution and transposition ciphers used for secure communication.
2. Modern symmetric encryption algorithms including DES and AES for protecting digital data.
3. Public key cryptography concepts including RSA encryption and Diffie–Hellman key exchange mechanisms.
4. Cryptographic hash functions such as SHA-1 and MD5 for generating message digests and ensuring data integrity.
5. Digital signature techniques for authentication, integrity, and non-repudiation in secure communication systems.

**PRACTICALS:**

1. Write a program to implement the following cipher techniques to perform encryption and decryption
   i. Hill Cipher
2. Write a program to implement the following transposition techniques
   i. Rail fence technique –Row major transformation
   ii. Rail fence technique - Column major transformation
3. Write a program to implement DES algorithm
4. Write a program to implement AES algorithm
5. Write a program to implement RSA Encryption algorithm
6. Write a program to implement the Diffie-Hellman Key Exchange mechanism. Consider one of the parties as Alice and the other party as bob.
7. Write a program to calculate the message digest of a text using the SHA-1 algorithm.
8. Write a program to calculate the message digest of a text using the MD-5 algorithm.
9. Write a program to implement digital signature standard.

**Total** **30**

**Suggested Activities:** Code Debug Challenge, Puzzle Activity, Mini Project/content beyond syllabus.

**Evaluation Methods:** Performance in Suggested day to day activities, Model practical and End Semester Examinations.

**Course Outcomes:**

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

CO1: Implement and analyze classical ciphers using substitution and transposition techniques

CO2: Develop and evaluate symmetric-key algorithms (DES, AES) for secure data encryption.

CO3: Apply number theory to implement asymmetric-key systems (RSA) and secure key exchange.

CO4: Generate and verify message digests using hashing algorithms (SHA-1, MD-5) to ensure data integrity.

CO5: Design and execute Digital Signature Standards (DSS) to provide authentication and non-repudiation in communications.

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=bZBVbvNjxKY
2. https://www.youtube.com/watch?v=3MPkc-PFSRI
3. https://www.youtube.com/watch?v=NbIUZZTJq1A
4. https://www.youtube.com/watch?v=Um1cYXxkOuo
5. https://www.youtube.com/watch?v=JqXYmc183v0

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 2 | 2 | 1 | 2 | - | - | - | - | - | 1 | 3 | 2 | 1 |
| **2** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | 2 | 3 | 3 | 2 |
| **3** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | 2 | 3 | 2 | 2 |
| **4** | 2 | 2 | 2 | 2 | 3 | 1 | - | - | - | - | 1 | 2 | 2 | 1 |
| **5** | 3 | 2 | 3 | 2 | 3 | 2 | 3 | - | - | - | 2 | 3 | 3 | 2 |
| **AVG** | **3** | **2** | **3** | **2** | **3** | **2** | **3** | **-** | **-** | **-** | **2** | **3** | **2** | **2** |
| 1 – “Low”, 2 – “Medium”, 3 – “High”, – “No correlations” | | | | | | | | | | | | | | |

# DATABASE MANAGEMENT SYSTEMS AND SECURITY LAB

| Course Code | 24CY422 | Course Type | | PRACTICAL | |
|---|---|---|---|---|---|
| Course Offered to | CSCS | | | | |
| Total Teaching Periods | 30 | L:T:P | 0:0:4 | Credits | 2 |
| Handled by | CSCS | Assessment Methods | | IAT | ESE |
| | | | | 60 Marks | 40 Marks |

**Prerequisite:** Basic knowledge of database fundamentals and data models.

**Course Objectives:** To provide knowledge of

1. Database design concepts including conceptual, logical, and physical data models using ER diagrams, relational schemas, and SQL DDL statements.
2. Relational database operations and SQL queries including data definition, manipulation, joins, aggregation, and nested queries.
3. Database normalization techniques and functional dependencies for designing efficient and consistent relational database schemas.
4. Transaction management concepts including ACID properties, concurrency control mechanisms, and protocols such as Two-Phase Locking and Two-Phase Commit.
5. Database security concepts including authentication mechanisms, SQL injection vulnerabilities, privilege management, encryption, and secure data storage techniques.

**PRACTICALS:**

1. For a **Library Management System**, identify and represent:
   - The **Conceptual Model** using an ER diagram
   - The **Logical Model** using a relational schema
   - The **Physical Model** using SQL DDL statements
2. Design a relational model with appropriate integrity constraints.
3. Create tables for a **College Database** with `Students`, `Departments`, `Courses`, and `Results`. Write SQL queries for:
   - Insert, update, and delete data
   - Select queries with `JOIN`, `GROUP BY`, `HAVING`, `ORDER BY`
   - Aggregate functions (`COUNT`, `SUM`, `AVG`)
   - Subqueries and nested queries
4. Given a relation with partial and transitive dependencies, perform step-by-step normalization up to 3NF. Write SQL to implement each normalized form.
5. Given a relation `R (StudentID, CourseID, InstructorName)` with the following **functional dependencies**:
   - `StudentID → CourseID`
   - `CourseID → InstructorName`

   Perform the following tasks:
   i. **Identify all candidate keys** of the relation.
   ii. **Determine the highest normal form** that the relation satisfies.
   iii. If the relation is **not in BCNF**, decompose it into **BCNF** using **lossless decomposition**.
   iv. Implement the resulting relations using **SQL DDL** statements.
6. Write an SQL script to demonstrate the **ACID properties** of transactions. Perform a bank transaction involving debit and credit operations. Ensure that the transaction is either fully completed or rolled back in case of an error.
7. Design a program to determine whether a given transaction schedule is **conflict serializable**. Build

the **precedence graph** and check for cycles.

8. Simulate the **Two-Phase Locking (2PL)** protocol for two or more transactions accessing shared data items. Show the growing and shrinking phases of each transaction and ensure that the final schedule is serializable.
9. Develop a simulation that demonstrates **deadlock detection** using a **wait-for graph**. Detect cycles in the graph and resolve the deadlock by aborting one or more transactions.
10. Simulate the **Two-Phase Commit Protocol** for a distributed database system involving one coordinator and two participants. Implement the PREPARE and COMMIT/ABORT phases.
11. Create a login form using **HTML and PHP** (or Python Flask/Node.js) that checks username and password against a `User's` table in MySQL.
12. Given a login form, exploit the vulnerability to bypass authentication by injecting payloads into the input field.
13 Use open-source tools like **SQL map** to test a web page for SQL injection vulnerability.
14 Create a stored procedure that takes input and runs a dynamic SQL query.
15 Create a database `BankDB` with tables: `Customers, Accounts`.
   Create two users: `clerk_user` and `manager_user`.
   a) Grant SELECT privilege to `clerk_user` on `Customers`
   b) Grant ALL privileges to `manager_user` on both tables
   c) Revoke UPDATE access from `clerk_user`
16 Create a `User's` table with a `Password` column.
   Store passwords using hashing or encryption (use MySQL's `SHA2(), AES_ENCRYPT ()`).
   a) Insert encrypted passwords
   b) Write queries to retrieve and verify them
17 Use MySQL's `AES_ENCRYPT ()` and `AES_DECRYPT ()` to encrypt the `column of any table`

**Total** **30**

**Suggested Activities:** Case Study, Group Role Play, Puzzle, Code Review

**Evaluation Methods:** Performance in Suggested day to day activities, Model practical and End Semester Examinations.

**Course Outcomes:**

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

CO1: Apply data integrity rules and Normalization techniques (1NF through BCNF) to eliminate redundancy and prevent update anomalies.

CO2: Construct advanced SQL scripts using DML/DDL, nested subqueries, and multi-table JOINs to manipulate and retrieve data.

CO3: Integrate front-end interfaces (PHP/Python/Node.js) with backend databases to create functional, secure application modules.

CO4: Analyze transaction schedules for Conflict Serializability by building and checking precedence graphs.

CO5: Implement security measures including Role-Based Access Control (RBAC) and Data Encryption (AES/SHA) for sensitive records.

**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in/courses/106105175
2. https://www.youtube.com/c/GateSmashers
3. https://www.youtube.com/c/TraversyMedia
4. https://www.youtube.com/c/SimplilearnOfficial

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 3 | 1 | 1 |
| **2** | 3 | 2 | 3 | 1 | 2 | - | - | 1 | - | - | 1 | 3 | 1 | 1 |
| **3** | 2 | 2 | 3 | 2 | 3 | - | - | 2 | 1 | 1 | 2 | 3 | 2 | 2 |
| **4** | 3 | 3 | 2 | 3 | 1 | - | - | - | - | - | 1 | 2 | 2 | 1 |
| **5** | 3 | 3 | 3 | 2 | 2 | 2 | 3 | - | - | - | 2 | 2 | 3 | 3 |
| **AVG** | **3** | **3** | **3** | **2** | **2** | **2** | **3** | **2** | **1** | **1** | **1** | **3** | **2** | **2** |
| 1 – "Low", 2 – "Medium", 3 – "High", – "No correlations" | | | | | | | | | | | | | | |

# DISASTER MANAGEMENT

| Course Code | 24AE401 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | Common to All | | | | |
| Total Teaching Periods | 30 | L:T:P | 2:0:0 | Credits | 0 |
| Handled by | MECH | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite : Basic awareness of environmental and disaster-related issues.**

**Course Objectives:** To provide knowledge of

1. The fundamental concepts of disasters, hazards, vulnerability, resilience, and risk.
2. Different types of disasters and their social, economic, environmental, and health impacts.
3. Disaster risk reduction strategies and the roles of institutions at local, state, and national levels.
4. The relationship between disasters, development activities, and climate change.
5. Disaster management practices using case studies, hazard assessment, and GIS-based technologies.

**Unit: I INTRODUCTION TO DISASTERS 6**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: II APPROACHES TO DISASTER RISK REDUCTION (DRR) 6**

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 6**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: IV DISASTER RISK MANAGEMENT IN INDIA 6**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 6**

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Total 30**

**Suggested Activities :** Case Study, Quiz, Assignment topics, Class Presentation

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Explain the concepts of ethical management, managerial ethics, professional ethics, and social responsibility.

CO2: Analyze ethical decision-making processes and apply ethical principles in crisis management situations.

CO3: Evaluate stakeholder relationships and sustainability issues in ethical management. *(L2, L3)*

CO4: Analyze individual variables such as ethical awareness, judgment, courage, and emotions in managerial decision-making.

CO5: Apply ethical management techniques and skills to resolve dilemmas and promote an ethical organizational culture.

**Text Books:**

T1: Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011.

T2: Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

T3: Singhal J.P. "Disaster Management", Laxmi Publications, 2019. ISBN-10: 9380386427 ISBN-13: 978-9380386423

T4: Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]

**References**

R1: Govt. of India: Disaster Management Act, Government of India, New Delhi, 2025

R2: Government of India, National Disaster Management Policy,2009.

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=TB97oX7ANGo
2. https://www.youtube.com/watch?v=xA6_X74SYEk

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | - | - | - | 2 | 2 | - | 1 | - | 1 | 2 | 1 | 1 |
| 2 | 3 | 3 | 2 | - | 1 | 2 | 2 | - | 1 | - | 1 | 2 | 2 | 2 |
| 3 | 2 | 3 | 2 | - | - | 3 | 3 | - | 1 | - | 1 | 2 | 2 | 3 |
| 4 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | - | 1 | - | 1 | 3 | 3 | 3 |
| 5 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 3 |
| **AVG** | 3 | 3 | 2 | - | - | 2 | 2 | - | 1 | - | 1 | 2 | 2 | 2 |
| '1' – Low , '2' – Medium , '3'- High, '-' – No correlations | | | | | | | | | | | | | | |

# INDUSTRIAL SAFETY

| Course Code | 24AU402 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | Common to All | | | | |
| Total Teaching Periods | 30 | L:T:P | 2:0:0 | Credits | - |
| Handled by | MECH | Assessment Methods | | IAT | ESE |
| | | | | 40 Marks | 60 Marks |

**Prerequisite :** Basic knowledge of engineering workshop practices and mechanical equipment.

**Course Objectives:** To provide knowledge of

1. Industrial safety practices, accident causes, hazard control measures, fire prevention methods, and safety regulations in industrial environments.
2. Maintenance engineering concepts, functions of maintenance departments, types of maintenance, and maintenance cost considerations.
3. Wear and corrosion mechanisms and their prevention using suitable lubrication and protection techniques.
4. Systematic fault tracing methods and diagnostic procedures used in mechanical and electrical equipment.
5. Periodic inspection and preventive maintenance procedures for machine tools, pumps, compressors, motors, and DG sets.

**Unit: I INDUSTRIAL SAFETY 6**

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety color codes. Fire prevention and firefighting, equipment and methods.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: II MAINTENANCE ENGINEERING 6**

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: III WEAR AND CORROSION AND THEIR PREVENTION 6**

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: IV FAULT TRACING** **6**

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Unit: V PERIODIC AND PREVENTIVE MAINTENANCE** **6**

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, Advantages of preventive maintenance. Repair cycle concept and importance.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT
**RBT Level:** L1-L3

**Total** **30**

**Suggested Activities:** Case Study, Quiz, Assignment topics, Class Presentation, Review of GATE questions.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Explain industrial safety concepts, accident causes, hazards, fire prevention methods, and relevant provisions of the Factories Act, 1948.

CO2: Describe maintenance engineering principles, types of maintenance, tools used, and cost-replacement analysis.

CO3: Analyze wear and corrosion mechanisms and recommend suitable prevention and lubrication methods.

CO4: Apply fault tracing techniques using decision tree methods for mechanical, hydraulic, pneumatic, thermal, and electrical systems.

CO5: Develop periodic and preventive maintenance plans for industrial equipment and evaluate their effectiveness.

**Text Books:**

T1: L. M. Deshmukh, Industrial Safety Management, Tata McGraw-Hill Education, 1st Edition, 2005.

T2: Charles D. Reese, Occupational Health and Safety Management: A Practical Approach, CRC Press, 3rd Edition, 2015.

**References**

R1: Edward Ghali, V. S. Sastri, M. Elboujdaini, Corrosion Prevention and Protection: Practical Solutions, John Wiley & Sons, 2007.

R2: Garg, HP, Maintenance Engineering, S. Chand Publishing, 2012.

R3: J Maiti, Pradip Kumar Ray, Industrial Safety Management: 21st Century Perspectives of Asia, Springer, 2017

R4: R. Keith Mobley, Maintenance Fundamentals, Elsevier, 2011.

**Web links and Video Lectures (e-Resources):**

1. https://www.youtube.com/watch?v=v-eltsixu4I
2. https://www.youtube.com/watch?v=jFDWlKayrTc&list=PLbRMhDVUMngdXebaRB59KdKwstzuAovua
3. https://www.youtube.com/watch?v=ZEShNJX3kcg&list=PLbRMhDVUMngdXebaRB59KdKwstzuAovua&index=12

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 2 | - | - | 3 | 2 | 3 | - | 1 | - | 1 | 3 | 3 | 2 |
| 2 | 3 | 3 | 2 | - | 2 | 1 | - | - | 1 | 2 | 1 | 3 | 3 | 2 |
| 3 | 3 | 3 | 2 | 1 | 2 | 3 | - | - | 1 | - | 1 | 3 | 2 | 3 |
| 4 | 3 | 3 | 3 | 2 | 2 | 1 | - | 1 | 1 | - | 1 | 3 | 3 | 3 |
| 5 | 3 | 3 | 3 | 2 | 2 | 2 | - | 1 | 2 | 2 | 2 | 2 | 3 | 1 |
| **AVG** | 3 | 2 | - | - | 3 | 2 | 3 | - | 1 | - | 1 | 3 | 3 | 2 |
| '1' – Low , '2' – Medium , '3'- High, '-' – No correlations | | | | | | | | | | | | | | |

# GENDER SENSITIZATION

| Course Code | 24AU403 | Course Type | | THEORY | |
|---|---|---|---|---|---|
| Course Offered to | Common ton All | | | | |
| Total Teaching Periods | 30 | L:T:P | 2:0:0 | Credits | 2 |
| Handled by | MECH | Assessment Methods | | IAT | ESE |
| | | | | 50 Marks | 50 Marks |

**Prerequisite :** Basic awareness of societal values, ethics, and human relationships.

**Course Objectives:** To provide knowledge of

1. Fundamental concepts of gender studies, gender identity, gender roles, and the social construction of gender in society.
2. Gender relations in society, including patriarchy, intersectionality, and gender representation in education, media, and professional environments.
3. Gender issues and challenges in workplaces and industries, particularly in science, technology, and engineering sectors.
4. Legal provisions, constitutional rights, and policy frameworks that promote gender equality and protect individuals from discrimination and harassment.
5. Inclusive practices, ethical responsibilities, and leadership approaches that support gender diversity and equality in engineering and professional spaces.

**Module: I INTRODUCTION TO GENDER STUDIES**

- Sex and Gender: Conceptual differences
- Gender identity and gender expression
- Social construction of gender
- Gender roles and stereotypes
- Gender and culture
- Overview of global equality principles promoted by the United Nations

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk

**RBT Level:** L1- L4

**Module: II GENDER AND SOCIETY** **6**

- Patriarchy and power structures
- Intersectionality (caste, class, disability, race)
- Gender representation in media
- Gender and education
- Women in STEM fields
- Gender bias in academic institutions
- Case studies from engineering education environments.

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Module: III GENDER IN WORKPLACE & INDUSTRY** **6**

- Gender diversity in corporate environments
- Equal opportunity and pay equity
- Gender bias in recruitment and promotion
- Workplace harassment and prevention
- Role of the International Labour Organization in promoting workplace equality
- Inclusive team building in engineering organizations

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**MODULE: IV LEGAL & POLICY FRAMEWORK** **6**

- Constitutional provisions for equality
- Prevention of Sexual Harassment (POSH) guidelines
- Rights of LGBTQ+ individuals
- Institutional grievance redressal mechanisms
- Regulatory framework guidance from the University Grants Commission (where applicable)
- Students should understand institutional compliance standards aligned with bodies such as the University Grants Commission (if applicable in Indian context).

**Teaching-Learning Process** **Pedagogy:** Chalk and Talk, PPT

**RBT Level:** L1- L4

**Module: V BUILDING INCLUSIVE ENGINEERING SPACES** **6**

- Gender-sensitive communication
- Ethical responsibility of engineers
- Creating inclusive campus culture organizations
- Leadership and ally ship
- Diversity and innovation,
- Case studies from global technology
- Discussion on how inclusive teams improve innovation in tech companies like Google and Microsoft.

**Teaching-Learning Process** **Pedagogy:** Lecture Method, PPT

**RBT Level:** L1,L2,L3

**Total** **30**

**Suggested activities :** Case studies, Group discussions, Role play exercises; Industry case analysis, assignments.

**Evaluation Methods:** Performance in Suggested activities, IAT and End Semester Examinations.

**Course Outcomes:**

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

CO1: Explain the concepts of sex, gender, gender identity, gender roles, and the social construction of gender.

CO2: Analyze gender issues in society, including patriarchy, intersectionality, and gender representation in education and media.

CO3: Examine gender challenges and biases in workplaces, particularly in engineering and technology sectors.

CO4: Explain legal provisions, institutional policies, and regulatory frameworks that support gender equality and protection.

CO5: Apply inclusive practices and ethical principles to promote gender-sensitive communication and inclusive professional environments.

**Text Books:**

T1: Gender in Engineering: Interdisciplinary Approaches, Routledge Publications

T2: Gender Issues in Science and Technology, Allied Publishers.

T3: Gender: Ideas, Interactions, Institutions, W.W. Norton & Company

**References**

R1: Nivedita Menon – Seeing Like a Feminist

R2: Judith Butler – Gender Trouble

R3: UN Women – Gender Equality Reports

R4: Government policy documents on workplace equality

**Web links and Video Lectures (e-Resources):**

1. https://nptel.ac.in/courses
2. https://onlinecourses.nptel.ac.in/
3. https://www.un.org/sustainabledevelopment/gender-equality/

**CO-PO & PSO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | – | – | 2 | 2 | 2 | 1 | 1 | – | 1 | – | – | – |
| 2 | 1 | 2 | – | – | 2 | 2 | 2 | 2 | 1 | – | 1 | – | – | – |
| 3 | 1 | 2 | 1 | – | 2 | 2 | 2 | 2 | 2 | – | 1 | 1 | 1 | 1 |
| 4 | 1 | 1 | – | – | 3 | 2 | 2 | 2 | 1 | – | 1 | – | – | – |
| 5 | 1 | 2 | 1 | – | 2 | 2 | 3 | 3 | 2 | – | 1 | 1 | 1 | 1 |
| **AVG** | 1 | 1 | – | – | 2 | 2 | 2 | 1 | 1 | – | 1 | – | – | – |

‘1’ – Low , ‘2’ – Medium , ‘3’- High, ‘-‘ – No correlations