



SRI VENKATESWARA COLLEGE OF ENGINEERING,
(An Autonomous Institution, Affiliated to Anna University, Chennai – 600025)

B.E., Mechanical Engineering

CURRICULUM AND SYLLABUS
REGULATION – 2022
CHOICE BASED CREDIT SYSTEM

| Curriculum Revision No: | 00 | Board of Studies recommendation date : | 06.10.2022 | Academic Council Approved date: | 08.10.2022 |
|--------------------------------|-----|---|------------|---------------------------------|------------|
| Salient Points of the revision | 01. | The courses "Scientific Thoughts in Tamil" in Semester I and "Heritage of Tamil" in Semester II are introduced as per the recommendations of Anna University/Government of Tamil Nadu. | | | |
| | 02. | In the subject Engineering Drawing the topic "Intersection of surfaces has been included so as to have a better visualization of interpenetrated surfaces. | | | |
| | 03. | In the course "Production Drawing Laboratory", instead of giving the assembly drawing sheet, the cut section of the model will be given where the students have to physically measure the dimensions of the component and also do the 2D drafting using AutoCAD / Fusion 360. This will enable the students to enrich their measuring skills and also will gain skill in various tolerances | | | |
| | 04. | Analytical calculations has been included in the Manufacturing Processes | | | |
| | 05. | The Manufacturing processes theory and laboratory is taught in II semester itself. | | | |

SRI VENKATESWARA COLLEGE OF ENGINEERING,
(An Autonomous Institution, Affiliated to Anna University, Chennai – 600025)

REGULATIONS 2022

B. E. MECHANICAL ENGINEERING

CHOICE BASED CREDIT SYSTEM

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- I. The graduates of Mechanical Engineering program will possess technical knowledge, skill and ethical values for working effectively as individual or team member in their career and reach higher technical, Managerial or leadership role offering solutions to engineering, environmental and societal issues in reputed organizations.
- II. The graduates of Mechanical Engineering program will acquire higher education and emerge successful.
- III. The graduates of Mechanical Engineering program will venture into entrepreneurship and become job creators.

PROGRAM OUTCOMES (POs)

PO GRADUATE ATTRIBUTES

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

- and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
 10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
 11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
 12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

1. Apply the knowledge of applied mathematics and industrial standards to design, model and analyze the machine elements and systems in the field of Mechanical Engineering using latest tools.
2. Apply the knowledge of various processes in manufacturing and industrial engineering practices for the fabrication of various engineering components.
3. Apply the knowledge acquired in the field of thermal science to solve the engineering problems related to design of thermal equipment and evaluating their performance.

PEO's – PO's& PSO's MAPPING: (Example)

| POs | PEOs | | | | |
|-----|------|----|-----|----|---|
| | I | II | III | IV | V |
| 1. | ✓ | | | | |
| 2. | | ✓ | | | |
| 3. | | | ✓ | | |
| 4. | | ✓ | ✓ | | |
| 5. | ✓ | ✓ | | | |
| 6. | | ✓ | ✓ | | |
| 7. | | ✓ | | | |
| 8. | | ✓ | | | |
| 9. | | | ✓ | | |
| 10. | | ✓ | | | |
| 11. | | ✓ | | | |
| 12. | ✓ | | | | |
| 13. | | | ✓ | | |
| 14. | ✓ | | | | |
| 15. | ✓ | | ✓ | | |

SRI VENKATESWARA COLLEGE OF ENGINEERING,
(An Autonomous Institution, Affiliated to Anna University, Chennai – 600025)

REGULATIONS 2022
CHOICE BASED CREDIT SYSTEM

B.E. MECHANICAL ENGINEERING

CURRICULUM AND SYLLABI FOR SEMESTERS I AND II

SEMESTER I

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY [#] | PERIODS PER WEEK | | | | TOTAL Hours | Prereq uisite | Position |
|---------------------------|-------------|--|------------------------|------------------|----------|----------|-------------|-------------|---------------|----------|
| | | | | L | T | P | C | | | |
| 1. | IP22151 | Induction Program | - | - | - | - | - | - | - | - |
| Theory Subjects | | | | | | | | | | |
| 2. | HS22151 | Tamil Language and Heritage of Tamil Society (Common to all Branches) | HS | 1 | 0 | 0 | 1 | 1 | Nil | F |
| 3. | HS22152 | Communicative English (Common to all Branches) | HS | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 4. | MA22151 | Applied Mathematics – I (Common to all Branches except MR) | BS | 3 | 1 | 0 | 4 | 4 | Nil | F |
| 5. | PH22152 | Engineering Physics (Common to AE, CE, ME, MN, MR) | BS | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 6. | CY22152 | Engineering Chemistry (Common to AE, ME, MN) | BS | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 7. | CS22151 | Programming in C (Common to ME, MN) | ES | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 8. | ME22101 | Engineering drawing (Common to ME, MN, MR) | ES | 2 | 0 | 2 | 3 | 4 | Nil | F |
| Practical Subjects | | | | | | | | | | |
| 9. | PH22161 | Physics Laboratory (Common to all Branches except BT) | BS | 0 | 0 | 2 | 1 | 2 | Nil | F |
| 10. | CY22161 | Chemistry Laboratory (Common to all Branches except AD, CS, IT) | BS | 0 | 0 | 2 | 1 | 2 | Nil | F |
| 11. | CS22161 | Programming in C Laboratory (Common to ME, MN) | ES | 0 | 0 | 3 | 1.5 | 3 | Nil | F |
| Total | | | | 18 | 1 | 9 | 23.5 | 28 | | |

SEMESTER II

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY# | PERIODS PER WEEK | | | | TOTAL Hours | Prereq uisite | Position |
|---------------------------|-------------|--|------------|------------------|----------|----------|-------------|-------------|---------------|----------|
| | | | | L | T | P | C | | | |
| Theory Subjects | | | | | | | | | | |
| 1. | HS22251 | Science and Technology in Ancient Tamil Society (Common to all Branches) | HS | 2 | 0 | 0 | 2 | 2 | Nil | F |
| 2. | HS22252 | Technical English (Common to all Branches) | HS | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 3. | MA22251 | Applied Mathematics – II (Common to all Branches except MR) | BS | 3 | 1 | 0 | 4 | 4 | Nil | F |
| 4. | PH22253 | Engineering Materials (Common to AE, ME, MN) | BS | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 5. | ME22201 | Engineering Mechanics (Common to ME, MN, MR) | ES | 2 | 1 | 0 | 3 | 3 | Nil | F |
| 6. | EE22151 | Basic Electrical and Electronics Engineering (Common to all Branches except CH, EE, EC) | ES | 3 | 0 | 0 | 3 | 3 | Nil | F |
| 7. | ME22202 | Manufacturing Processes | PC | 3 | 0 | 0 | 3 | 3 | Nil | F |
| Practical Subjects | | | | | | | | | | |
| 8. | ME22211 | Production Drawing Laboratory (Common to ME, MN) | ES | 0 | 0 | 4 | 2 | 4 | Nil | F |
| 9. | ME22212 | Manufacturing Processes Laboratory | PC | 0 | 0 | 3 | 1.5 | 3 | Nil | F |
| 10. | EE22111 | Basic Electrical and Electronics Engineering Laboratory (Common to all Branches except EC) | ES | 0 | 0 | 2 | 1 | 2 | Nil | F |
| Total | | | | 19 | 2 | 9 | 25.5 | 30 | | |

பாடத்தின் நோக்கங்கள் :

- ❖ தமிழ் மொழியின் தோற்றம் பற்றியும், திணை கருத்துக்கள் வாயிலாக வாழ்வியல் முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.
- ❖ இந்திய தேசிய சுதந்திர இயக்கத்தில் தமிழர்களின் பங்களிப்பு மற்றும் தமிழர்களின் மேலாண்மை முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்

அலகு 1 தமிழுக்கும் தொழில் நுட்ப கல்விக்கும் உள்ள தொடர்பு (3)
மொழி மற்றும் பாரம்பரியம்::

இந்தியாவில் உள்ள மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழில் செம்மொழி இலக்கியம் - உ.வே. சுவாமிநாத ஐயர்., ஆறுமுக நாவலர் ஆகியோரின் பங்களிப்பு - தொழில் நுட்ப கல்வியில் தமிழ் மொழிக் கல்வியின் முக்கியத்துவம்.

LANGUAGE AND HERITAGE: Language families in india – Dravidan Languages – Tamil as a Classical language – Classical Literature in Tamil – Contribution of U. Ve. Saminathaiyar. Arumuka Navalar – Importance of Tamil language in technical education

அலகு 2 திணை கருத்துக்கள் (9)

திணை கருத்துக்கள்: - ஐந்து வகை நிலங்கள், தமிழர்களின் தாவரங்கள் மற்றும் விலங்கினங்கள், கடவுள்கள், தொழில்கள் , வாழ்க்கை முறை, பண் , கூத்து , உணவு முறை - தொல்காப்பியம் மற்றும் சங்க இலக்கியங்களில் இருந்து அகம் மற்றும் புறம் கருத்து - தமிழ் அறம் கருத்து - சங்க காலத்தில் கல்வி மற்றும் எழுத்தறிவு - பண்டைய நகரங்கள் மற்றும் சங்க காலத்தில் துறைமுகங்கள் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - சோழ மன்னர்களின் வெளிநாட்டு வெற்றிகள்.

Thinai concepts : -Five types of lands, animals, Gods, occupation, life styles, music, dance , food style, Floara and Fauna of Tamils - Agam and puram concept from Tholkappiyam and Sangam Literature – Aram concept of Tamil – Education and Literacy during Sangam Age – Ancient cities and Ports of Sangam Age – Export and Import during Sangam Age - Overseas Conquest of Cholas

அலகு 3 தமிழரின் மரபு (3)

இந்திய தேசிய சுதந்திர இயக்கம் மற்றும் இந்திய கலாச்சாரத்திற்கு தமிழர்களின் பங்களிப்பு:- சுப்ரமணிய பாரதி, வாஞ்சிநாதன், சுப்பிரமணிய சிவா, வீரபாண்டிய கட்டபொம்மன், வா.. ஊ சிதம்பரம் பிள்ளை, தீரன் சின்னமலை, மருது பாண்டிய சகோதரர்கள், பூலி தேவர், திருப்பூர் குமரன், வீர மங்கை வேலுநாச்சியார் - தமிழர் இலக்கியங்களில் மேலாண்மை கருத்துக்கள் (கி. மு. 500 முதல் கி. பி 200 வரை) – அகநானூறு, புறநானூறு, திருக்குறள் ஆகியவற்றில் மேலாண்மைக் கருத்துகள்..

Contribution of Tamils to Indian National Freedom Movement and Indian Culture : Contrinutions of Subramanya Bharathi, Vanchinathan, Subramaniya Siva, Veerapandiya Kattabomman, V O Chidambaram Pillai, Dheeran Chinnamalai, The Maruthu Pandiyar, Puli Thevar, Tiruppur Kumaran, Veera Mangai Velunachiyar

பாடநெறி முடிவுகள் :

| பா .வெ . எண் CO | பாடத்திட்டத்தின் வெளிப்பாடு Course Outcomes | RBT Level |
|-----------------|--|-----------|
| CO - 1 | மாணவர்கள் தமிழ் மொழி தோற்றம் பற்றி தெரிந்து கொள்வார்கள் Students will learn about the origin of the Tamil language | 1 |
| CO - 2 | தமிழர்களின் வாழ்வியல் முறைகளை தெரிந்து கொள்வார்கள் They will know the ways of life of Tamils. | 2 |
| CO - 3 | தமிழர்களின் சுதந்திர போராட்ட வீரர்களை பற்றியும், மேலாண்மை முறைகளை பற்றியும் தெரிந்து கொள்வார்கள் They will know about the freedom fighters of Tamils and the management of Tamils | 2 |

பாட நூல்கள்:

1. பொன். முத்துகுமாரன் (2002), “**தமிழ் மரபு**”, காந்தளகம், 68, அண்ணா சாலை, சென்னை 600 002
2. பி. டி ஸ்ரீனிவாச ஜயங்கார் (**தமிழக்கமும் திறனாய்வும்**) புலவர் கா. கோவிந்தன் (1988), “**தமிழர் வரலாறு (முதல் பகுதி)**”, திருநெல்வேலி தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்பு கழகம் ,154, TTK சாலை, சென்னை 18.
3. டாக்டர் கே கே பிள்ளை (2009), “**தமிழக வரலாறு மக்களும் பண்பாடும்**”, உலக தமிழாராய்ச்சி நிறுவனம், தரமணி , சென்னை 600113
4. முனைவர். ச. இராஜேந்திரன் (2004), “**தமிழில் சொல்லாக்கம்**”, தஞ்சாவூர் தமிழ் பல்கலைக் கழகம் வெளியீடு

HS22152

COMMUNICATIVE ENGLISH
(Common to all Branches)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

1. Enable learners to interact fluently on everyday social contexts.
2. Train learners to engage in conversations in an academic/scholarly setting.
3. Instil confidence in learners to overcome public speaking barriers.
4. Develop learners' ability to take notes and in the process, improve their listening skills
5. Enhance learners' reading skill through reading text passages for comprehension and contemplation.
6. Improve learners' skills to write on topics of general interest and drafting correspondences for general purposes

UNIT I

9

Listening - short video clips - conversational scenes from movies, celebrities' speeches/interviews. **Speaking** - several ways of introducing oneself at several situations, introducing others at several situations, inviting people for several occasions, describing people and their places. **Reading** - short comprehension passages - making inferences, critical analysis. **Writing** - completing the incomplete sentences - developing hints from the given information. Grammar - Wh-Questions and Yes or No questions - Parts of speech. Vocabulary development - prefixes - suffixes - articles - countable / uncountable nouns.

UNIT II

9

Listening - customer care voice files, short narratives - identifying problems and developing telephone etiquettes. **Speaking** - speaking over skype/WhatsApp, making business calls, making self- recorded informative videos, inquiring about a concept/activity, describing a concept/activity. **Reading** - reading the headlines on news magazines - slogans and taglines from advertisements. **Writing** - free writing - writing - headlines, slogans and taglines individual inspirations. Grammar - conjunctions, idioms, phrases, quotes. Vocabulary development - guessing the meanings of words in various different contexts

UNIT III

9

Listening - courtroom scenes from movies, debates and talks from news channels, notes taking. **Speaking** - language and tone for arguments, discussion, deliberation, contemplation, expressing opinions, reacting to different situations in an alien country. **Reading** - language used in instruction manuals of household appliances, cookery and other basic instructions. **Writing**- understanding the structure of texts - use of reference words, discourse markers-coherence, rearranging the jumbled sentences. Grammar - adjectives - degrees of comparison, framing direct and indirect questions. Vocabulary development - concise approach, single word substitution.

UNIT IV

9

Listening - Sports commentaries, advertisements with users' criticisms; **Speaking** - for social causes, for promoting a concept, negotiating and bargaining; **Reading** - review of a product, movie, movement or a system; **Writing** - writing for advertisements, selling a product; Grammar - Tenses - Simple Past, Present and Future, Continuous - Past, Present and Future; Vocabulary Development - synonyms,

antonyms and phrasal verbs.

UNIT V

9

Listening - video lectures, video demonstration of a concept; **Speaking** - presenting papers/concepts, delivering short speeches, discourses on health, suggesting natural home remedies, cleanliness, civic sense and responsibilities; **Reading** - columns and articles on home science; **Writing** - correspondences of requests, basic enquiry/observation and basic complaints; Grammar - modal verbs, perfect tenses - Vocabulary development - collocations.

TOTAL : 45 PERIODS

OUTCOMES:

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

| CO | STATEMENT | RBT LEVEL |
|------|--|-----------|
| CO1. | <i>Acquire adequate vocabulary for effective communication</i> | 3 |
| CO2. | <i>Listen to formal and informal communication and read articles and infer meanings from specific contexts from magazines and news papers.</i> | 3 |
| CO3. | <i>Participate effectively in informal/casual conversations; introduce themselves and their friends and express opinions in English.</i> | 4 |
| CO4. | <i>Comprehend conversations and short talks delivered in English.</i> | 6 |
| CO5 | <i>Write short write-ups and personal letters and emails in English</i> | 6 |

REFERENCES:

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers". Orient Black Swan, Chennai, 2017.
2. Downes, Colm, "Cambridge English for Job-hunting", Cambridge University Press, New Delhi. 2008.
3. Murphy, Raymond, "Intermediate English Grammar with Answers", Cambridge University Press 2000.
4. Thomson, A.J., "Practical English Grammar 1 & 2", Oxford, 1986.

Web Link:

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>
3. <https://owl.english.purdue.edu/owl/>
4. www.learnenglishfeelgood.com/esl-printables-worksheets.html

Software:

1. Face2Face Advance – Cambridge University Press, 2014
2. English Advance Vocabulary- Cambridge University Press
3. IELTS test preparation – Cambridge University Press 2017
4. Official Guide to the TOEFL Test With CD-ROM, 4th Edition
5. CAMBRIDGE Preparation for the TOEFL TEST- Cambridge University Press, 2017

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | | | | | | | | | | 3 | | | | | |
| 2. | | | | | | | | | | 3 | | | | | |
| 3. | | | | | | | | | | 3 | | | | | |
| 4. | | | | | | | | | | 3 | | | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)



MA22151

APPLIED MATHEMATICS I
(Common to all Branches except MR)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

COURSE OBJECTIVES:

The student should be made to:

1. Compute Eigen values and Eigen vectors and use in diagonalization and in classifying real quadratic forms.
2. Study differential calculus and its applications to relevant Engineering problems.
3. Compute derivatives using the chain rule or total differentials.
4. Understand the rotation of two-dimensional geometry using definite integrals.
5. Acquaint with the Mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES

9+3

Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors - Statement and Applications of Cayley-Hamilton Theorem - Diagonalization of matrices - Reduction of a quadratic form into canonical form by orthogonal transformation - Nature of quadratic forms.

UNIT II APPLICATION OF DIFFERENTIAL CALCULUS

9+3

Curvature and radius of Curvature - Centre curvature - Circle of curvature - Evolutes - Envelopes - Evolute as Envelope of Normals.

UNIT III DIFFERENTIAL CALCULUS FOR SEVERAL VARIABLES

9+3

Limits and Continuity - Partial derivatives - Total derivatives - Differentiation of implicit functions - Jacobians and properties - Taylor's series for functions of two variables - Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT IV APPLICATION OF DEFINITE INTEGRALS

9+3

Integration by Parts - Bernoulli's formula for integration - Definite integrals and its Properties - Solids of Revolution - Disk Method - Washer Method- Rotation about both x and y axis and Shell method.

UNIT V MULTIPLE INTEGRALS

9+3

Double integrals in Cartesian and polar coordinates - Change of order of integration - Area enclosed by plane curves - Change of variables in double integrals - Triple integrals - Volume of solids.

TOTAL(L:45+T:15): 60 PERIODS

OUTCOMES:

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

| CO | Statements | RBT Level |
|-----|--|-----------|
| CO1 | Solve the Eigen value problems in matrices. | 3 |
| CO2 | Apply the basic notion of calculus in Engineering problems and to tackle for different geometries. | 3 |

| | | |
|------------|---|----------|
| CO3 | Perform calculus for more than one variable and its applications in Engineering problems. | 3 |
| CO4 | Apply definite integrals for design of three-dimensional components. | 3 |
| CO5 | Evaluate multiple integral in Cartesian and polar coordinates | 3 |

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2018.
2. Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2018

REFERENCES:

1. Bali. N.P, and Manish Goyal, "A Text book of Engineering Mathematics", Ninth Edition, Laxmi Publications Pvt. Ltd., 2014.
2. Glyn James, "Advanced Modern Engineering Mathematics", 4th Edition, Pearson Education, 2016.
3. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2013.

Web Link:

1. <https://home.iitk.ac.in/~peeyush/102A/Lecture-notes.pdf>
2. <https://www.sydney.edu.au/content/dam/students/documents/mathematics-learning-entre/integration-definite-integral.pdf>

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----------|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | | | | | | | | | | 3 | 2 | | | | |
| 2. | | | | | | | | | | 3 | | | | | |
| 3. | | | | | | | | | | 3 | 2 | | | | |
| 4. | | | | | | | | | | 3 | 1 | | | | |
| 5. | | | | | | | | | | 3 | 1 | | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

PH22152

ENGINEERING PHYSICS
(Common to AE, CE, ME, MN, MR)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to Streams of Engineering.

UNIT I MECHANICS

9

Moment of inertia (M.I) - Radius of gyration - Theorems of M. I - M.I of circular disc, solid cylinder, hollow cylinder, solid sphere and hollow sphere - K.E of a rotating body - M.I of a diatomic molecule - Rotational energy state of a rigid diatomic molecule - centre of mass - conservation of linear momentum - Relation between Torque and angular momentum - Torsional pendulum.

UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS

9

Fluid - definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers-forces on planes - centre of pressure - buoyancy and floatation.

Modes of heat transfer - thermal conductivity - Newton's law of cooling - Linear heat flow - Lee's disc method - Radial heat flow - Rubber tube method - conduction through compound media (series and parallel).

UNIT III ACOUSTICS AND ULTRASONICS

9

Classification of Sound- decibel- Weber-Fechner law - Sabine's formula- derivation using growth and decay method - Absorption Coefficient and its determination -factors affecting Acoustics of buildings and their remedies. Production of Ultrasonics by Magnetostriction and Piezoelectric methods - Acoustic grating - Non-Destructive Testing - pulse echo system through transmission and reflection modes - A, B and C - scan displays, medical applications - Sonogram.

UNIT IV PHOTONICS AND FIBER OPTICS

9

Photonics: population of energy levels, Einstein's A and B coefficients derivation - resonant cavity, optical amplification (qualitative) - Nd-YAG laser - CO₂ Laser - Applications. **Fiber optics:** principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, and mode) - losses associated with optical fibers - Fiber optic communication - fibre optic sensors: pressure and displacement- Endoscope.

UNIT V CRYSTAL PHYSICS

9

Single crystalline, polycrystalline and amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices - interplanar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structure (qualitative) - crystal imperfections: point defects, line defects - Burger vectors, stacking fault.

TOTAL: 45 PERIODS

OUTCOMES:

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

| CO | Statements | RBT Level |
|------------|--|------------------|
| CO1 | Gain knowledge in Mechanics | 2 |
| CO2 | Evaluate the concepts of properties of matter and thermal physics. | 3 |
| CO3 | Learn to solve the issues related to defects in the buildings due to acoustic design and the significance of ultrasonic waves. | 3 |
| CO4 | Develop an understanding about photonics and Fiber Optic communication system. | 2 |
| CO5 | Classify and demonstrate the fundamentals of crystals and their defects. | 3 |

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L, "Engineering Physics", Dhanput Publications, 2015.
2. Shatendra Sharma and Jyotsna Sharma, "Engineering Physics", Pearson, 2006.
3. Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.
4. Arumugam M, "Materials Science", Anuradha Publications, 2015

REFERENCES:

1. David Halliday, Robert Resnick, Jearl Walker, "Principles of Physics", 10th Edition, Wiley, 2015.
2. Peter Atkins and Julio De Paula, "Physical Chemistry", 10th Edition, Oxford University Press, 2014.
3. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, "Concepts of Modern Physics", 7th Edition, McGraw Hill Education, 2017.
4. Raghavan V, "Materials Science and Engineering", PHI Learning Pvt. Ltd., 2010.

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|------------|------------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-------------|-----------|-----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 2 | | 2 | | | | | | 1 | | | 3 | 2 | |
| 2. | 3 | 2 | | 2 | | | | | | 1 | | 2 | 2 | 2 | |
| 3. | 3 | | 2 | | 3 | 2 | 1 | | | 1 | | | | | |
| 4. | 3 | | 2 | | 3 | 2 | 1 | | | 1 | | 2 | 2 | 2 | |
| 5. | 3 | 2 | 2 | | | | | | | 1 | | | 1 | | |

1.Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

CY22152

ENGINEERING CHEMISTRY
(Common to AE, ME, MN)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

1. To make the students to understand the importance of electrochemistry.
2. To appreciate the concepts of photochemistry and spectroscopy.
3. To impart knowledge on nanotechnology.
4. To understand the applications of engineering materials.
5. To familiarize the manufacture of fuels.

UNIT I ELECTROCHEMISTRY 9

Electrodes and electrochemical cells - electrode potential, standard electrode potential, single electrode potential and its determination, types of electrodes - calomel, quinhydrone and glass electrode. Nernst equation - determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Batteries - Primary (dry battery) and secondary batteries (Lead - acid storage battery and Lithium ion battery) and next generation batteries.

UNIT II PHOTOCHEMISTRY 9

Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert Beer Law - determination iron by spectrophotometer. Quantum efficiency - Photo physical processes - internal conversion, inter-system crossing, fluorescence, phosphorescence and photo-sensitization-quenching of fluorescence and its kinetics, Stern-Volmer relationship. Applications of photochemistry.

UNIT III NANOCHEMISTRY 9

Basics and scale of nanotechnology, different classes of nanomaterials, Distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Synthesis of nanomaterials, fabrication (lithography) and its applications - Basics of nanophotonics and quantum confined materials (surface plasmon resonance).

UNIT IV ENGINEERING MATERIALS 9

Abrasives: definition, classification, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties - refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Lubricants – classification, properties and applications. Basics of composite materials, properties and applications.

UNIT V FUELS AND COMBUSTION 9

Fuel: Introduction - classification of fuels- calorific value - higher and lower calorific values - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - refining - manufacture of synthetic petrol (Bergius process)- knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - producer gas - water gas. Combustion of fuels: introduction - theoretical calculation of calorific value - calculation of stoichiometry of fuel and air ratio - flue gas analysis (ORSAT Method) - Uses of catalytic converters.

TOTAL: 45 PERIODS

OUTCOMES:

| COURSE OUTCOMES: On the successful completion of the course, students will be able to | | RBT*Level |
|---|---|------------------|
| CO1 | Identify electrochemical cells, corrosion and fundamental aspects of batteries | 2 |
| CO2 | Interpret the photochemical reactions and make use of spectroscopic | 2 |
| CO3 | Realize the structures, properties and applications of nanoparticles. | 2 |
| CO4 | Acquire knowledge on the basic properties of engineering materials and its applications | 2 |
| CO5 | Illustrate the various materials that are important both in industry and domestic | 3 |

TEXT BOOKS:

1. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpet Rai & Sons, New Delhi, 17th Edition, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.

REFERENCES:

1. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
2. B.R. Puri, L.R. Sharma, M.S. Pathania., "Principles of Physical Chemistry", 47th edition, Vishal Publishing C., Jalandhar 2018.
3. P.L. Sony and H.M.Chawla, "Text Book of Organic Chemistry", Sultan Chand and Sons Publishers, New Delhi, 2000.

COURSE ARTICULATION MATRIX

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO-1 | PSO-2 | PSO-3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-------|-------|-------|
| 1. | 3 | 3 | 2 | 3 | | | | | | | | 3 | | | |
| 2. | 3 | 3 | | | | 3 | 3 | | | | | 3 | | | |
| 3. | 3 | 3 | 2 | | | 3 | 3 | 3 | | | | 3 | | | |
| 4. | 3 | 3 | | 3 | | | 3 | 3 | | | | 3 | | | |
| 5. | 3 | 3 | | 3 | | 3 | | 3 | | | | 3 | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

CS22151

PROGRAMMING WITH C
(Common to ME, MN)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

OBJECTIVES

The Student should be made to:

- Learn the basics of computers.
- Learn the different ways of stating algorithms – step-form, Pseudocode and flow chart
- Learn the logical operators and expressions to solve problems in engineering and real-time
- Learn about decision type and looping type control constructs in C
- Understand to store, manipulate and retrieve data in a single and multidimensional array
- Understand about function and its benefits.
- Learn to use arrays, strings, functions, pointers, structures, unions and files in C.

UNIT I INTRODUCTION 9

Number System Conversion, Computer, Evolution of Computers, Anatomy of a Computer – Hardware – Software – Data Representation, Memory Unit, Operating Systems, Computer Networks - Basic elements – Data Transmission mode – Data Transmission Media - Network Topology - Network Devices - Communication Networks(LAN, WAN, MAN), Internet – Uses –Advantages – Limitations - Services (Email, FTP, Telnet), Introduction to Programming, Algorithms and Flow Chart

UNIT II C PROGRAMMING BASICS 9

Introduction to ‘C’ programming – Developing program in C, A Simple C Program, Structure of a C program, Concept of a Variable, Data Types in C, Tokens, Operators and Expressions, Type Conversions, Input and Output functions, Control Statements – Conditional Execution and Selection – Iterative and Repetitive Execution – Nested Loops, Solving simple scientific and statistical problems

UNIT III ARRAYS AND STRINGS 9

One dimensional Array – Declaration - Initialization of Integer Elements - Accessing Array Elements, Searching and Sorting of array elements, Two dimensional arrays – Declaration - Initialization of Integer Elements - Accessing Array Elements, Addition, Subtraction and Multiplication of two dimensional integer elements, Strings, Arrays of strings, Solve problems with and without using string functions

UNIT IV FUNCTIONS AND USER DEFINED DATA TYPES 9

Concept of Function, Using Functions, Mechanism - Call by value, Call by reference, Recursion, - Structures, Unions, Enumerators

UNIT V POINTERS AND FILES 9

Understanding Memory Address, Address Operator, Pointers, void Pointer, NULL Pointer, Arrays and Pointers, Pointers arithmetic, Double Pointers, Using Files in C, Working with Text Files, Sequential and Random Access to Files

TOTAL : 45 PERIODS

ME22101

ENGINEERING DRAWING
(Common to ME, MN, MR)

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 2 | 3 |

COURSE OBJECTIVES:

- This course will introduce students to build their ability to read drawings and interpret the position and form of simple geometries

CONCEPTS AND CONVENTIONS AND GEOMETRIC CONSTRUCTION

(Not for Examination)

Importance of drawing in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning. Geometric construction - to draw perpendiculars, parallel lines, divide a line and circle, to draw equilateral triangle, square, regular polygons.

UNIT I CYCLOIDAL CURVES, INVOLUTE AND PROJECTIONS OF 12
POINTS, LINES

Basic construction of cycloid, epicycloid and hypocycloid - Drawing of tangents and normal to the above curves. Construction of involutes of square, pentagon and circle - Drawing of tangents and normal to the above involutes.

Orthographic projection – Introduction to Principal Planes of projections - First angle projection - projection of points. Projections of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method.

UNIT II PROJECTIONS OF PLANES AND PROJECTIONS OF SOLIDS 12

Projections of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Projections of regular solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

UNIT III SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES 12

Sectioning of regular solids like prisms, pyramids, cylinder and cone in vertical position when the section plane is inclined to one of the principal planes and perpendicular to the other - Drawing of sectional front and top views and true shape of section.

Development of surfaces of simple and sectioned solids - prisms, pyramids cylinders and cones.

UNIT IV ISOMETRIC PROJECTION AND INTERSECTION OF 12
SURFACES

Introduction to Pictorial Projection - Principles of isometric projection - Isometric scale - Isometric projection of regular solids (prisms, pyramids, cylinder, cone), truncated solids and their combination in vertical position.

Line of intersection - Determining the line of intersection between surfaces of two interpenetrating solids with axes of the solids intersecting each other perpendicularly, using line method - Intersection of two square prisms and Intersection of two cylinders are only to be considered.

UNIT V FREE-HAND SKETCHING**12**

Free-hand sketching – Sketching procedures – Steps in sketching - Orthographic views (front, top and side views) of simple blocks from their Isometric view, Isometric view of simple blocks from their Orthographic views (front, top and side views)

TOTAL: 60 PERIODS**OUTCOMES:**

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

| CO | CO statements | RBT level |
|-----|---|-----------|
| CO1 | <i>Construct</i> Engineering curves and sketch the orthographic views of lines as per drawing standards | 3 |
| CO2 | <i>Draw</i> orthographic projections of plane surfaces and simple solids in various positions | 3 |
| CO3 | <i>Draw</i> the various views of sectioned solids and develop the lateral surfaces of simple solids. | 3 |
| CO4 | <i>Draw</i> isometric projections of simple solids and their combinations and the orthographic projection of the intersection of surfaces of simple solids. | 3 |
| CO5 | <i>Sketch</i> the orthographic projections of a given isometric view and vice versa using free hand. | 3 |

TEXT BOOKS:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.
2. Venugopal K. and Prabhu Raja V., “Engineering Drawing AutoCAD”, New Age International (P) Limited, 6th edition, 2022.

REFERENCES:

1. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill, 2nd Edition, 2019.
2. Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009.
4. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.

WEB RESOURCES:

1. <https://nptel.ac.in/courses/112105294>
2. <https://nptel.ac.in/courses/112103019>

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | | | | | | | | | | 1 | | | | | |
| 2. | | | | | | | | | | 2 | | | | | |
| 3. | | | | | | | | | | 2 | | | | | |
| 4. | | | | | | | | | | 3 | | | | | |
| 5. | | | | | | | | | | 3 | | | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

PH22161

PHYSICS LABORATORY
(Common to all Branches except BT)

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

COURSE OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS:

(Any EIGHT Experiments)

- a) Determination of Wavelength, and particle size using Laser.
b) Determination of acceptance angle in an optical fiber.
- Determination of velocity of sound and compressibility of liquid - Ultrasonic Interferometer.
- Determination of wavelength of mercury spectrum - spectrometer grating.
- Determination of thermal conductivity of a bad conductor - Lee's Disc method.
- Determination of Young's modulus by Non uniform bending method.
- Determination of specific resistance of a given coil of wire - Carey Foster's Bridge.
- Determination of Rigidity modulus of a given wire - Torsional Pendulum
- Energy band gap of a Semiconductor
- Determine the Hysteresis loss of a given Specimen
- Calibration of Voltmeter & Ammeter using potentiometer.

TOTAL: 45 PERIODS

OUTCOMES:

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

| CO | Statements | RBT Level |
|-----|---|-----------|
| CO1 | Analyze the physical principle involved in the various instruments; also relate the principle to new application. | 4 |
| CO2 | Comprehend the Experiments in the areas of optics, mechanics and thermal physics to nurture the concepts in all branches of Engineering. | 3 |
| CO3 | Apply the basic concepts of Physical Science to think innovatively and also improve the creative skills that are essential for engineering. | 3 |
| CO4 | Evaluate the process and outcomes of an experiment quantitatively and qualitatively. | 3 |
| CO5 | Extend the scope of an investigation whether or not results come out as expected. | 3 |

REFERENCES:

- Physics Laboratory practical manual, 1st Revised Edition by Faculty members, 2018.

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 3 | 2 | 3 | 2 | | | | 3 | 1 | | 2 | 1 | 1 | |
| 2. | 3 | 3 | | 3 | | 2 | | | 3 | 1 | | 2 | 1 | 1 | |
| 3. | 3 | 3 | 2 | 3 | 2 | 2 | | | 3 | 1 | | 2 | 1 | 1 | |
| 4. | 3 | 3 | | 3 | | | | | 3 | 1 | | 2 | 1 | 1 | |
| 5. | 3 | 3 | | 3 | 2 | | | | 3 | 1 | | 2 | 1 | 1 | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)



CY22161

CHEMISTRY LABORATORY
(Common to all Branches except AD, CS, IT)

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

COURSE OBJECTIVES:

The objective of the Chemistry Laboratory is to acquaint the students with the basic phenomenon/concepts of chemistry, the student face during course of their study in the industry and engineering field.

1. To appreciate the need and importance of water quality parameters for industrial and domestic use.
2. To gain the knowledge on electrochemical instrumentation techniques like potential and current measuring used in electrochemistry applications
3. To impart knowledge on separation of components using paper chromatography.
4. To enhance the thinking capability about polymer and properties like molecular weight.

LIST OF EXPERIMENTS: (Minimum 8 Experiments)

1. Determination of DO content of water sample by Winkler's method.
2. Determination of strength of given hydrochloric acid using pH meter
3. Determination of strength of acids in a mixture using conductivity meter
4. Estimation of iron content of the water sample using spectrophotometer (phenanthroline/thiocyanate method)
5. Determination of total, temporary & permanent hardness of water by EDTA Method.
6. Estimation of iron content of the given solution using potentiometer.
7. Determination of alkalinity in water sample.
8. Determination of Single electrode potential.
9. Separation of components from a mixture of red and blue inks using Paper chromatography.
10. Determination of molecular weight of polymer by using Ostwald's/Ubbelohde viscometer.

TOTAL: 45 PERIODS

OUTCOMES:

| COURSE OUTCOMES: On the successful completion of the course, students will be able to | | RBT*Level |
|---|---|------------------|
| CO1 | Distinguish hard and soft water, solve the related numerical problems on water, purification and its significance in industry and daily life. | 3 |
| CO2 | Interpret the knowledge of instruments to measure potential and current related parameters. | 2 |
| CO3 | Demonstrate the basic principle for separation of components using paper chromatography. | 3 |

| | | |
|----------|--|---|
| CO4 1 | Evaluate the molecular weight of polymer using Ostwald's/Ubbelohde viscometer. | 3 |
|----------|--|---|

TEXT BOOKS:

1. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., “Vogel’s Textbook of practical organic chemistry”, LBS Singapore 1994.
2. Jeffery G.H., Bassett J., Mendham J. and Denny Vogel’s R.C, “Text book of quantitative analysis chemical analysis”, ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.

REFERENCES:

1. Daniel R. Palleros, “Experimental organic chemistry” John Wiley & Sons, Inc., New York 2001.
2. Kolthoff I.M., Sandell E.B. et al. “Quantitative chemical analysis”, Mcmillan, Madras 1980

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Common apparatus: Pipette, Burette, conical flask, porcelain tile, dropper (each 30 nos)

| | | |
|----|-----------------------------|--------|
| 1. | Iodine flask | 30 Nos |
| 2. | pH meter | 5 Nos |
| 3. | Conductivity meter | 5 Nos |
| 4. | Spectrophotometer | 5 Nos |
| 5. | Oswald/Ubbelohde Viscometer | 30 Nos |

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
| 1. | 3 | 2 | | | | 3 | 3 | 3 | 1 | | | 1 | 2 | | | |
| 2. | 3 | 2 | 1 | | | 3 | 3 | 3 | | | | | | | | |
| 3. | 3 | | | | | 3 | 3 | | | | | 2 | | | | |
| 4. | 3 | | | 1 | | 3 | 3 | 3 | | | | | | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

CS22161

PROGRAMMING WITH C LABORATORY
(Common to ME, MN)

| L | T | P | C |
|---|---|---|-----|
| 0 | 0 | 3 | 1.5 |

OBJECTIVES

- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

List of Experiments

1. **Programs using IO functions and Command line arguments** – scanf(), printf(), gets(), puts(), Format specifier separated with space/comma, input through terminal
2. **Programs to evaluate the expression using operators in C** – Arithmetic, Logical, Relational, Bitwise, conditional and sizeof() operators
3. **Scientific problem solving using decision making and looping** – Find largest/smallest among numbers, Even or Odd number, Factorial, Krishnamurthy number, Armstrong number, Prime number or not, Grade of students based on marks, Leap year or Not, Fibonacci series and the sum of Geometric series
4. **Simple programming for one-dimensional and two-dimensional arrays** – Searching, Sorting, Replacing and Two-dimensional Matrix Operations
5. **Solving problems using Strings** – Palindrome, Cipher a string and Sorting the names
6. **Programming using user-defined functions (Pass by value and Pass by reference)** – Swapping numbers, Convert a temperature from F to C, Average of marks by passing n subject marks in an array
7. **Programming using Recursion** – Find factorial, sum of N numbers, sum of x^y , Number Conversion using recursion,
8. **Programming using Pointers** – Swapping three numbers without temporary variable, double pointers
9. **Programming using structures and union**
10. **Programming using enumerated data types**
11. **Programming using macros** - #define, #ifdef, #if, #else and #endif
12. **Programming using Files** – Display the content of file and Copy from one file to other

TOTAL: 45 PERIODS

OUTCOMES:

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

| CO | Statements | RBT Level |
|-----|---|-----------|
| CO1 | Use various arithmetic and logic operators in C | 1 |
| CO2 | Implement control statements of C language to solve scientific problems | 2 |
| CO3 | Develop programs using array and string operations to solve problems. | 3 |

HS 22251

அறிவியல் மற்றும் தொழில் நுட்பத்தில் தமிழ்
Science and Technology in Ancient Tamil Society
(Common to all branches)

L T P C

2 0 0 2

பாடத்தின் நோக்கங்கள் :

- ❖ அறிவியலில் தமிழின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள்.
- ❖ தொழில்நுட்பத்தில் தமிழ் பாரம்பரியத்தின் தாக்கம் பற்றி அறிந்து கொள்வார்கள்

அலகு 1 அறிவியல் தமிழ்

(5)

கருவி உருவாக்கம் - ஆராய்ச்சி மேம்பாடு - கல்வி வளர்ச்சி - அறிவியல் தமிழ் சொற்கள் உருவாக்கம்.

Scientific Tamil : Tool Development - Research Development - Educational Development - Scientific Tamil words Creation.

அலகு 2 தொழில் நுட்பத்தில் தமிழ்

(25)

வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம் : சங்க காலத்தில் கட்டுமானப் பொருட்கள் - சோழர்களின் பெரிய கோவில்கள் மற்றும் பிற வழிபாட்டு தலங்கள் - பல்லவர்களின் சிற்பங்கள் மற்றும் கோவில்கள் (மாமல்லபுரம்) - நாயக்கன் கால கோவில்கள் (மதுரை மீனாட்சி அம்மன் கோவில்), திருமலை நாயக்கர் மஹால், செட்டி நாட்டு வீடுகள்.

Design and Construction Technology : Building materials in Sangam age – Great temples of Cholas and other workshop places – Sculptures and Temples of Pallavas (Mamallapuram) – Temples of Nayakas period (Madurai Meenakshi amman temple), Thirumalai Nayakar Mahal, Chetti Nadu Houses.

உற்பத்தி தொழில்நுட்பம் : கப்பல் கட்டும் கலை, உலோகவியல் ஆய்வுகள், தங்கம், தாமிரம், இரும்பு பற்றிய அறிவு - தொல்பொருள் சான்றுகள் - சுட்டக் களிமண் மணிகள், சங்கு மணிகள், எலும்பு மணிகள்.

Manufacturing Technology : Art of Ship building, Metallurgical studies, Knowledge about Gold, Copper, Iron – Archeological evidences – Terracotta beads, Shell beads, Bone beads.

விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பம் : அணைகள், ஏரிகள், குளங்கள், மதகுகள், சோழர் கால குழுவி தூம்பு ஆகியவற்றின் முக்கியத்துவம் - கால்நடை பராமரிப்பு, கால்நடைகளின் பயன்பாட்டிற்காக வடிவமைக்கப்பட்ட கிணறுகள். விவசாயம் மற்றும் வேளாண் செயலாக்கம் - கடல் பற்றிய அறிவு - மீன்பிடித்தல், முத்து குளித்தல், சங்கு சேகரித்தல்.

Agriculture and Irrigation Technology: Dams, Tank, ponds, sluice, Significance of Kumuzhi Thoombu of Cholas period- Animal Husbandry, Wells designed for cattle use. Agriculture and Agro processing, - Knowledge about Sea – Fisheries, Pearl, Conche diving.

தமிழ் கணினி: அறிவியல் தமிழ் வளர்ச்சி - தமிழ் கணினி, தமிழ் புத்தகங்களின் டிஜிட்டல் மயமாக்கல், தமிழ் டிஜிட்டல் நூலகம், தமிழ் மென்பொருள் உருவாக்கம் - தமிழ் மெய்நிகர் அகாடமி - சொற்குவை திட்டம்.

Tamil Computing : Development of Scientific Tamil – Tamil Computing, Digitization of Tamil books, Tamil Digital Library, Development of Tamil Softwares – Tamil virtual Academy – Sorkuvai project.

தமிழின் எதிர்காலமும் தகவல் தொழில்நுட்பமும்- உலகமயமாக்கலும் தகவல் தொழில் நுட்பமும் - கணினிக்கு தமிழ் கற்று கொடுத்தல் - தமிழ் மொழித் தொழில் நுட்பத்தில் வளங்கள்.

Future of Tamil and Information Technology- Globalization and Information Technology-Teaching Tamil for Computer-Resources in Tamil Language Technology.

பாடநெறி முடிவுகள் :

| பா .வெ . எண் | பாடத்திட்டத்தின் வெளிப்பாடு | RBT Level |
|-----------------|--|--------------|
| CO - 1 | அறிவியலில் தமிழ் மொழியின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள் They will know about the use of Tamil language in science | 2 |
| CO – 2 | பல்வேறு தொழில்நுட்பத்தில் தமிழ் மொழியின் தாக்கம் பற்றி அறிந்து கொள்வார்கள் They will learn about the influence of Tamil language in various technologies | 3 |

பாட நூல்கள்:

டாக்டர், வா.செ .குழந்தைசாமி (1985), " அறிவியல் தமிழ் " , பாரதி பதிப்பகம், 126/108, உஸ்மான் சாலை, தியாகராய நகர் , சென்னை 600017

சுப. திண்ணப்பன், (1995), “கணினியும் தமிழ் கற்பித்தலும்”, புலமை வெளியீடு, 38-B மண்ணத்தந்தோட்டத் தெரு, ஆழ்வார்பேட்டை, சென்னை 600018

மு. பொன்னவைக்கோ, (2003), “வளர் தமிழில் அறிவியல் – இணையத்தமிழ்”, அனைத்திந்திய அறிவியல் தமிழ்க்கழகம், தஞ்சாவூர் 615 005.

துரை. மணிகண்டன், (2008), “இணையமும் தமிழும்”, நல் நிலம் பதிப்பகம், 7-3, சிமேட்லி சாலை, தியாகராய நகர், சென்னை 600 017

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

- Enable learners to define and understand technical communication and scientific writing
- Expose learners to the technicalities of seminar presentation, group discussion, and public speaking
- Develop learners' writing skills for scientific and documenting purposes
- Improve learners' ability to draft correspondences for business purposes
- Cultivate learners' ability to holistically understand the nuances of job interviews and recruiting process

UNIT I**9**

Listening – AV files pertaining to manufacturing processes of products, scientific documentaries; **Speaking**- syllable division and word stress, intonation, sharing opinions; **Reading** – news articles related to science and technology; **Writing** – definitions, instruction, recommendation, data interpretation, resume; **Grammar** – tenses and their aspects, sentence connectors - discourse markers, sequential words, active and passive voice, subject-verb agreement.

UNIT II**9**

Listening – AV pertaining to marketing strategies, peer reading and pronunciation; **Speaking** - turn taking, sharing opinions; conducting and attending a meeting, understanding the nuances of spoken communication among internal audience and external audience,; **Reading** - analytical documents, descriptive documents; **Writing** - fliers, brochures, resume- letter of application, checklists; **Grammar** - modal verbs, clauses – types and uses, conditional clauses, articles.

UNIT III**9**

Listening – AV related to how to use components, scientific description, **Speaking** - speaking for motivation and initiation, speaking at a seminar presentation; **Reading** – scientific journals, papers; **Writing** – Technical descriptions – process description, purpose and function, PowerPoint, Google forms, user manuals; **Grammar** - phrasal verbs, prepositions, technical and scientific affixes

UNIT IV**9**

Listening - scientific debates, crisis management; **Speaking** - handling conflicts, speaking about the loss of benefits, progress or decline of business, identifying the connotative meanings, **Reading**- documented evidences of uses and functions of a product, review of a product, **Writing** – memos, follow-up letters, reports - proposal, project, progress reports, sales reports, reports on industrial visits, executive summary. **Grammar** - reported speech and tag questions, sentence structure – comparative, imperative, cause and effect, infinitive of result.

UNIT V**9**

Listening – AV of Group discussions, panel discussions, face to face interviews for recruitment purposes; **Speaking**- speaking at group discussions, interviewing a personality, answering at the interviews; **Reading** – WebPages of topnotch engineering companies, **Writing** - blogging, e-mails, letter of complaint, minutes of the meeting ; **Grammar** - one word substitution, collocations, better word/sentence substitution (rephrasing the content/improving ideas).

TOTAL : 45 PERIODS

Course Outcomes:

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

| SL.NO | STATEMENT | RBT LEVEL |
|-------|--|-----------|
| CO1. | Understand the nuances of technical communication and scientific writing | 3 |
| CO2. | Present papers and give seminars | 6 |
| CO3. | Discuss in groups and brainstorm | 6 |
| CO4. | Draft business correspondences and write for documenting purposes | 6 |
| CO5. | Face job interviews with confidence | 6 |

REFERENCES:

1. Orient Blackswan, Chennai. 2012
2. Downes, Colm, Cambridge English for Job-hunting, Cambridge University Press, New Delhi. 2008
3. Murphy, Raymond, Intermediate English Grammar with Answers, Cambridge University Press 2000
4. Thomson, A.J. Practical English Grammar 1& 2 Oxford 1986.
5. Herbert A J, The Structure of Technical English Longman, 1965

Web Link:

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>
3. <https://owl.english.purdue.edu/owl/>
4. www.learnenglishfeelgood.com/esl-printables-worksheets.html

Software

1. Face2Face Advance – Cambridge University Press, 2014
2. English Advance Vocabulary- Cambridge University Press
3. IELTS test preparation – Cambridge University Press 2017
4. Official Guide to the TOEFL Test With CD-ROM, 4th Edition
5. CAMBRIDGE Preparation for the TOEFL TEST- Cambridge University Press, 2017

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | | | | | | | | | | 3 | | | | | |
| 2. | | | | | | | | | | 3 | | | | | |
| 3. | | | | | | | | | | 3 | | | | | |
| 4. | | | | | | | | | | 3 | | | | | |
| 5. | | | | | | | | | | 3 | | | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

(Common to all except MR)

COURSE OBJECTIVES:

The Student should be made to:

- Acquire the concepts of vector calculus needed for problems in all engineering disciplines and compute different types of integrals using Green's, Stokes' and Divergence theorems.
- Skilled at the techniques of solving ordinary differential equations that model engineering problems.
- Extend their ability of using Laplace transforms to create a new domain in which it is easier to handle the problem that is being investigated.
- Explain geometry of a complex plane and state properties of analytic functions.
- Understand the standard techniques of complex variable theory so as to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.

UNIT I VECTOR CALCULUS 12

Gradient, divergence and curl - Directional derivative - Vector identities – Irrotational and solenoidal vector fields - Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Verification and application in evaluating line, surface and volume integrals.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS 12

Differential equations of first order – Equations of the first order and first degree – Linear equations – Higher order linear differential equations with constant coefficients - Method of variation of parameters - Cauchy's and Legendre's linear equations - Simultaneous first order linear equations with constant coefficients – Applications of Linear differential equations – Oscillatory electrical circuit – Deflection of beams.

UNIT III LAPLACE TRANSFORM 12

Conditions for existence - Transform of elementary functions - Transforms of unit step function and impulse functions – Basic properties – Shifting theorems - Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Initial and final value theorems - Transform of periodic functions. Inverse Laplace transforms - Convolution theorem – Application to solution of linear ODE of second order with constant coefficients using Laplace transformation techniques

UNIT IV ANALYTIC FUNCTIONS 12

Analytic functions - Necessary and sufficient conditions (Cauchy-Riemann equations) - Properties of analytic function - Harmonic conjugates - Construction of analytic functions - Conformal mapping – Mapping by functions $W = Z + C$, CZ , $1/Z$, Z^2 – Joukowski's transformation- Bilinear transformation

UNIT V COMPLEX INTEGRATION 12

Cauchy's integral theorem - Cauchy's integral formula - Taylor's and Laurent's series expansions - Singular points - Residues - Cauchy's Residue theorem – Application of residue theorem for evaluation

of real integrals – Use of circular contour and semi-circular contour.

TOTAL: 60 PERIODS

OUTCOMES :

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

| CO | Statements | RBT Level |
|-----|--|-----------|
| CO1 | Interpret the fundamentals of vector calculus and execute evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems. | 3 |
| CO2 | Solve first order linear, homogeneous differential equations and use series solution method to solve second order differential equations. | 3 |
| CO3 | Determine the methods to solve differential equations using Laplace transforms and Inverse Laplace transforms. | 3 |
| CO4 | Explain Analytic functions and Categorize transformations. | 3 |
| CO5 | Perform Complex integration to evaluate real definite integrals using Cauchy integral theorem and Cauchy's residue theorem | 3 |

TEXT BOOKS:

1. Erwin Kreyszing, Herbert Kreyszing, Edward Norminton, “Advanced Engineering Mathematics”, 10th Edition, John Wiley, (2015).
2. Grewal .B.S, Grewal .J.S “Higher Engineering Mathematics”, 43rd Edition, Khanna Publications, Delhi, (2015).

REFERENCE

1. Dass, H.K., and Rajnish Verma, “Higher Engineering Mathematics”, S.Chand Private Ltd., 2011.
2. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2013).
3. Bali N. P and Manish Goyal, “A Text book of Engineering Mathematics”, 9th edition, Laxmi Publications(p) Ltd., 2014.

WEB LINK:

1. <https://nptel.ac.in/courses/111/105/111105134/>
2. <https://nptel.ac.in/courses/111/105/111105121/>

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 3 | | | | | | | | | | 3 | | | |
| 2. | 3 | 3 | 2 | | | | | | | | | 3 | | | |
| 3. | 3 | 3 | 2 | | | | | | | | | 3 | | | |
| 4. | 3 | 3 | | | | | | | | | | 3 | | | |
| 5. | 3 | 3 | | | | | | | | | | 3 | | | |

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

OBJECTIVES:

- To impart the knowledge about the properties of engineering and ceramic materials to the students.
- To enhance the knowledge about the electron behaviour in the semiconductor and dielectric materials.

UNIT I PHASE DIAGRAMS AND NON-FERROUS ALLOYS 8

Solid solutions - Hume Rothery's rules – Phase rule - single component system - one- component system of Iron - binary phase diagrams - Isomorphous systems - Tie-line rule - the Lever rule - application to Isomorphous system - Cu – Ni system - Eutectic phase diagram - Peritectic phase diagram - other invariant reactions - Cu – Zn system - Microstructural change during cooling.

UNIT II FERROUS ALLOYS AND HEAT TREATMENT 10

Fe-C equilibrium diagram : phases, invariant reactions - microstructure of slowly cooled steels - Eutectoid steel, hypo and hypereutectoid steels - effect of alloying elements on the Fe-C system - **Diffusion in solids** : Fick's laws - phase transformations - T-T-T-diagram for eutectoid steel - Pearlite, Bainitic and Martensitic transformations - tempering of Martensitic - **Heat treatment of steels** : Annealing - Normalizing - Quenching and Tempering - Case hardening - Induction, Flame and Laser hardening - Carburizing, Cyaniding, Carbonitriding and Nitriding.

UNIT III SEMICONDUCTING MATERIALS 8

Introduction - classification of materials based on band theory (metals, semiconductors and insulators) - intrinsic and extrinsic semiconductors - carrier concentration in intrinsic semiconductor (derivation) - effect of temperature on Fermi level - compound semiconductors - variation of electrical conductivity in intrinsic semiconductors with temperature - Band gap determination of intrinsic semiconductor (derivation and Expt) - Hall effect (derivation and experiment).

UNIT IV DIELECTRIC, MAGNETIC AND SUPERCONDUCTING MATERIALS 10

Dielectric materials - Dielectric constant - Polarization of dielectric materials - Types of Polarization (Polarisability) - Equation of internal fields in solid (One- Dimensional) (Derivation) - Clausius-Mosotti Relation for elemental dielectric materials - Dielectric Breakdown - Frequency dependence of dielectric constant, Dielectric Losses - Important applications of dielectric material.

Magnetic Materials : Dia, Para and Ferro magnetic material - Domain theory for Ferro magnetic materials - Phenomena of Hysteresis and its applications - Ferrites and its structures.

Introduction to Superconductivity : Meissner effect - Properties of superconductors - Type I and Type II superconductors - BCS theory (Qualitative) - Low T_c and High T_c (alloy) superconductors - Ceramic superconductors (oxide superconductors) - Applications of Superconductors.

UNIT V CERAMIC AND NEW MATERIALS 9

Ceramics : types and applications, **Composites**: Ceramic Fibres - Fibre reinforced Plastics - Fibre reinforced Metal - **Metallic glasses**: preparation, Properties and applications - **Shape memory alloys** : shape memory effect, phases, pseudo elastic effect, NiTi alloy, Properties and applications - **Nanomaterials**: preparation, properties and applications.

TOTAL: 45 PERIODS**OUTCOMES:**

Students will be able

| CO | Statements | RBT Level |
|-----|---|-----------|
| CO1 | to know about the phase diagrams of various alloys | 3 |
| CO2 | to know about the heat treatment of alloys and alloy steels. | 3 |
| CO3 | to understand the behavior of electrons in the semiconductors. | 3 |
| CO4 | to know about the properties and engineering applications of magnetic and dielectric materials. | 3 |
| CO5 | to enhance knowledge about ceramics and smart materials. | 2 |

TEXT BOOKS:

1. Arumugam. M, "Materials Science", Anuradha Publications, 2015.
2. Rajendran. V, "Engineering Physics", Tata McGraw Hill, 2015.
3. Suresh. R and Jayakumar. V, "Materials Science", Lakshmi Publications, 2003.
4. Raghavan. V, "Materials Science and Engineering - A first course", Sixth Edition, PHI publications, 2015

REFERENCES:

1. Gaur. R.K and Gupta. S.L, "Engineering Physics", Dhanpat Publications, 2015.
2. Avadhnalu. M.N and Kshirsagar, "A Text book of Engineering Physics", S. Chand & Co. 2006.
3. Kittel. C, "Introduction to Solid State Physics", 7th Edition, Wiley Eastern Ltd., 2004.
4. Azaroff. L.V and Brophy. J.J, "Electronic Processes In Materials", McGraw Hill., 1963.

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 2 | 2 | | | | | | | 1 | | 2 | | | |
| 2. | 3 | 2 | 2 | 2 | 2 | 2 | | | 2 | 1 | | 2 | | | |
| 3. | 3 | | | | | 2 | | | | 1 | | 2 | | | |
| 4. | 3 | | 2 | | | 2 | | | | 1 | | 2 | | | |
| 5. | 3 | 2 | 2 | 2 | 2 | 2 | | | 2 | 1 | | 2 | | | |

ME22201

ENGINEERING MECHANICS
(Common to ME, MN, MR)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

1. To understand the concept of equilibrium of particles.
2. To understand the concept of equilibrium of rigid bodies.
3. To understand the concept of first and second moment of area.
4. To understand the concept of various types of frictions and applications.
5. To understand the principle of work energy method, Newton's law and impact of elastic bodies.

UNIT I BASICS AND STATICS OF PARTICLES 9

Introduction - Units and Dimensions - Laws of Mechanics - Principle of transmissibility - Parallelogram and triangular Law of forces - Vectorial representation of forces - Vector operations of forces - additions, subtraction, dot product, cross product - Coplanar Forces - rectangular components - Equilibrium of a particle - Lami's theorem - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces

UNIT II STATICS OF RIGID BODIES AND ANALYSIS OF STRUCTURES 9

STATICS OF RIGID BODIES: External, Internal forces - moment of a force - varignon's theorem - moment of a couple - resolution of a force into a force and a couple - reduction of a system of forces - reactions at supports and connections - equilibrium of a two and three force bodies - case studies.
ANALYSIS OF STRUCTURES: Simple trusses - Method of joints, method of sections - joints under special loading conditions - space trusses - analysis of frames.

UNIT III CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA 9

Centroid of areas, composite areas, Centre of Gravity- Theorems of Pappus and Guldinus- Parallel axis theorem and perpendicular axis theorem - determination of moment of inertia of plane figures, polar moment of inertia-radius of gyration - mass moment of inertia of simple solids

UNIT IV FRICTION 9

Laws of dry friction - angles of friction-coefficient of static and kinetic friction - wedges - surface contact friction - belt friction - journal bearings - axle friction - thrust bearings - disc friction - Point contact friction - wheel friction - rolling resistance - case studies.

UNIT V DYNAMICS OF PARTICLES 9

KINEMATICS: Introduction-plane, rectilinear and rotary motion-time dependent motion -rectangular coordinates - projectile motion.

KINETICS: Newton's II law - D'Alembert's principle - Energy - potential energy - kinetic energy - conservation of energy - work done by a force - work energy method.

IMPULSE AND MOMENTUM: Concept of conservation of momentum - Impulse-Momentum principle - Impact - Direct central impact, oblique central impact, impact of a moving train on the spring board.

TOTAL : 45 PERIODS

OUTCOMES:

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

| CO No | Course Outcome | RBT Level |
|-------|--|-----------|
| CO1 | Understand and analyze the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D. | 2 |
| CO2 | Understand and analyze the concept of reaction forces and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. | 2 |
| CO3 | Evaluate centroid, Area moment of Inertia and Mass moment of Inertia of cross section of any structural member. | 3 |
| CO4 | Correlate the engineering problems dealing with force, displacement, velocity and acceleration equations | 3 |
| CO5 | Evaluate the problems in friction and rigid body dynamics | 3 |

TEXT BOOKS:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 11th Edition, 2017.
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.
3. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

REFERENCES:

1. Borens P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeler, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
3. Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4th Edition, Pearson Education Asia Pvt. Ltd., 2005.
4. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
5. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5th Edition, McGraw Hill Higher Education, 2013.

Web Link:

1. NPTEL Course on Engineering Mechanics, IIT Guwahati Prof. U.S. Dixit, Dr. G. Saravana Kumar (<https://nptel.ac.in/courses/112103108>)

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 2 | 2 | 1 | 2 | | | | | | | | 2 | | |
| 2. | 3 | 2 | 2 | 1 | 2 | | | | | | | | 2 | | |
| 3. | 3 | 2 | 3 | 1 | 3 | | | | | | | | 2 | | |
| 4. | 3 | 2 | 3 | 1 | 3 | | | | | | | | 2 | | |
| 5. | 3 | 2 | 3 | 1 | 3 | | | | | | | | 2 | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

EE22151

**BASIC ELECTRICAL AND ELECTRONICS
ENGINEERING**
(Common to all Branches except CH, EE, EC)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

COURSE OBJECTIVES:

1. To understand the basic theorems used in Electrical circuits.
2. To educate on the different concepts and functions of electrical machines.
3. To introduce electron devices and its applications.
4. To explain the principles of digital electronics.
5. To impart knowledge on the principles of measuring instruments.

UNIT I ELECTRICAL CIRCUITS

9

Ohm's Law – Kirchhoff's Laws - Steady State Solution of DC Circuits using Mesh and Nodal Analysis -Introduction to AC Circuits - Waveforms and RMS Value - Power and Power factor - Single Phase and Three Phase AC Balanced Circuits.

UNIT II ELECTRICAL MACHINES

9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single phase induction Motor, Single Phase Transformer.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS

9

Characteristics of PN Junction Diode - Zener Effect - Zener Diode - LED, Photo diode and its Characteristics-Half Wave and Full Wave Rectifiers-Voltage Regulation. Bipolar Junction Transistor-Common Emitter Configuration, Characteristics and CE as an Amplifier - Photo transistors.

UNIT IV DIGITAL ELECTRONICS

9

Number System Conversion Methods-Simplification of Boolean Expression using K-Map – Half and Full Adders – Flip-Flops – Shift Registers - SISO, SIPO, PISO, PIPO and 4-bit Synchronous and Asynchronous UP Counters.

UNIT V MEASURING INSTRUMENTS

9

Types of Signals: Analog and Digital Signals- Construction and working Principle of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters. Instrumentation Amplifier, – R-2R ladder Type D/A Converter - Flash Type and Successive Approximation Type A/D Converter.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

| SL.NO | STATEMENT | RBT LEVEL |
|-------|--|-----------|
| CO1. | Compute the electric circuit parameters for simple problems | 4 |
| CO2. | Understand the construction and characteristics of different electrical machines. | 4 |
| CO3. | Describe the fundamental behavior of different semiconductor devices and circuits. | 4 |
| CO4. | Design basic digital circuits using Logic Gates and Flip-Flops. | 4 |

| | | |
|------|---|---|
| CO5. | Analyze the operating principle and working of measuring instruments. | 4 |
|------|---|---|

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2. SedhaR.S., "A Text Book of Applied Electronics", S.Chand & Co., 2014.

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics Engineering", Tata McGraw Hill, 2013.
2. MehtaVK, "Principles of Electronics", S. Chand & Company Ltd, 2010.
3. M. Morris Mano, "Digital Logic & Computer Engineering", Prentice Hall of India, 2004.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, Fourth Edition, 2007.

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 3 | 3 | 3 | | | 2 | | | | | 2 | | | |
| 2. | 3 | 3 | 3 | 3 | | | 2 | | | | | 2 | | | |
| 3. | 3 | 3 | 3 | 3 | | | 2 | | | | | 2 | | | |
| 4. | 3 | 3 | 3 | 3 | | | 2 | | | | | 2 | | | |
| 5. | 3 | 3 | 3 | 3 | | | 2 | | | | | 2 | | | |

OBJECTIVES:

- To impart the importance of casting and its applications
- To teach the various metal joining process and how to select the process
- To acquaint the various bulk deformation processes
- To teach various sheet metal forming operations and the recent developed forming process for sheet metal
- To understand the processing method available for thermoplastics and thermosetting plastics and also the powder metallurgy process

UNIT I METAL CASTING PROCESSES 10

Introduction, Patterns – Materials, Types and Pattern allowances, Cores – Core Prints, Core making and Types of cores, Moulding sand – Properties, Melting Practices – Cupola and Induction Furnaces, Mould – Expendable and Permanent Mould, Green sand Mould preparation, Special casting Processes – Investment casting, Die casting – Hot chamber and Cold Chamber, Slush Casting, Centrifugal Casting – True, Semi and Centrifuging, Continuous Casting, Shell Moulding, CO₂ Process, Stir Casting Process– Defects in casting – solidification time calculations

UNIT II JOINING PROCESSES 10

Fusion Welding Processes – Types of Gas Welding – Flame Characteristics , Oxy Fuel Gas Welding, Types of Gas welding Technique, Arc Welding – Arc welding Equipment's, Fillers and Flux Materials, Electrodes – Coated electrode designation, Consumable Electrode – Shielded Metal Arc Welding, Submerged Arc Welding, Gas Metal Arc Welding, Flux Cored Arc Welding, Electro slag welding, Electro gas welding, Non Consumable Electrode – Gas Tungsten Arc Welding, Atomic Hydrogen Welding, Plasma Arc Welding, Electron Beam Welding, Laser Beam Welding, Solid State welding – Ultrasonic Welding, Friction Welding – Friction Stir Welding, Resistance welding – Types, Welding defects. Problems related to power calculations in welding

UNIT III BULK DEFORMATION PROCESSES 10

Metal Forming Classification, Hot working, Cold Working and Warm Working of metals, Recrystallization Temperature.

Forging – Outline of Forging and related operations (Edging, Heading, Fullering, Drawing out, Upsetting, Drawing down, Swaging, Blocking, Coining, Trimming), Special forging process - Roll Forging, Iso thermal Forging and Orbital Forging, Defects in Forging

Extrusion Process – Types of Extrusion Process- Direct and Indirect Extrusion, Hydrostatic Extrusion, Impact Extrusion, Side extrusion, Extrusion defects

Rolling Processes – Terminology – Blooms, Billet, Slab, Plate, sheet, Foil, Types of rolling mills, Roll Pass design, Shape rolling operations, Thread Rolling, Ring Rolling, Gear Rolling, Roll piercing process, Rolling defects

Principles of rod, wire and tube drawing- Seamless tubes and Tube drawing methods

Simple problems in bulk deformation process

UNIT IV SHEET METAL FORMING PROCESSES 10

Definitions of Various Press Operations – Blanking, Punching, Shaving, Perforating, Lancing, Slitting, Trimming, Bending, Drawing, squeezing, Press working Terminology, Types of dies for Sheet metal operations, Press Tonnage calculation. Methods to reduce the cutting force - Problems

Sheet Metal Forming operations – Bending and Drawing- Elastic recovery or spring back effect,
Stretch forming, Rubber pad forming, Hydroforming, Metal Spinning – Types,

High Energy Rate Forming Process – Explosive Forming, Magnetic Pulse Forming, Electro Hydraulic Forming, Superplastic Forming,

UNIT V PROCESSING OF PLASTICS AND POWDER METALLURGY 5

Types of plastics – Types of Moulding – Injection Moulding, Blow Moulding, Compression Moulding, Transfer Moulding, Rotational Moulding, Extrusion, Thermoforming, Calendaring

Powder Metallurgy – Production of metal Powders, Compaction – Sintering and Finishing, Advantages and disadvantages of powder metallurgy.

TOTAL : 45 PERIODS

OUTCOMES:

| CO | Statements | RBT Level |
|-----|---|-----------|
| CO1 | Select a suitable casting process for a given engineering component | 3 |
| CO2 | Given a material, the students will Apply a suitable joining process | 3 |
| CO3 | Given a part diagram & its application, students will justify a suitable bulk deformation process | 3 |
| CO4 | Students will identify the necessary operations to be performed on a sheet metal and will select a suitable process for a given application | 3 |
| CO5 | Students will justify a suitable process for thermoplastics, thermosetting plastics and for cutting tools | 3 |

TEXT BOOKS:

1. Serope Kalpakjian & Steven R. Schmid, “Manufacturing Engineering and Technology”, Pearson India Education Services Pvt. Ltd, 7th edition, 2018
2. Dr. P.C. Sharma, “A Textbook of Production Technology (Manufacturing Processes), S. Chand & Company Ltd, 8th edition, 2014

REFERENCES :

1. Mikell P. Groover, “Principles of Modern Manufacturing”, SI version, Wiley & Sons Pvt Ltd, Global Edition, 2016
2. R.K. Rajput, “A text book of Manufacturing Technology (Manufacturing Processes)”, Laxmi Publications (p) Ltd, 2016
3. Rao. P.N, “ Manufacturing Technology”, Tata McGraw Hill Publishing Co. Ltd, Volume 1, 5th edition, 2018
4. Serope Kalpakjian & Stevan R. Schmid, “Manufacturing Processes for Engineering Materials”, Pearson India Education Services Pvt. Ltd, 6th edition, 2018

E- Resources

1. http://www.ipme.ru/e-journals/RAMS/no_15418/04_15418_kawasaki.pdf
2. <https://pdfs.semanticscholar.org/6f56/4a28d39f1365f337be04922424472dcf3413.pdf>
3. <https://nptel.ac.in/courses/112107144/>

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 1 | 2 | | | | 2 | | | | | 3 | | 3 | |
| 2. | 3 | 1 | 2 | | | | 2 | | | | | 3 | | 3 | |
| 3. | 3 | 1 | 2 | | | | 2 | | | | | 3 | | 3 | |
| 4. | 3 | 2 | 3 | | | | 2 | | | | | 3 | | 3 | |
| 5. | 3 | | 3 | | | | 3 | | | | | 3 | | 3 | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)



| L | T | P | C |
|---|---|---|-----|
| 0 | 0 | 3 | 1.5 |

OBJECTIVES:

- To introduce the concept of 2D drafting using CAD packages.
- To improve communications through documentation, and to promote awareness for manufacturing.
- To introduce students to understand standards of drawing in mechanical engineering
- To acquire knowledge in Coordinate Measuring machine (CMM) for geometric features

LIST OF EXPERIMENTS

- I. INTRODUCTION TO COMPUTER AIDED DRAFTING (3)**
Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands like Layers, Block, Insert (Auto CAD) for simple objects – Dimensioning.
- II. EXPERIENTIAL LEARNING ON LIMITS, FITS AND TOLERANCE THROUGH MACHINE ELEMENTS (6)**
Basics of Limits, fits, and Tolerance – Identification of types of fits by simple assembly of machine components - Selection of fits from standard tables – types of fits – Demonstration
- III. GEOMETRIC DIMENSIONING (6)**
Basics of Geometric Dimensioning and Tolerance – Measuring of Machine components using CMM – Experiment on cylindricity, circularity, parallelism and perpendicularity
- IV. PRACTICE ON ASSEMBLY DRAWINGS (33)**
Cotter joint, knuckle joint, flange coupling, universal coupling, footstep bearing, Plummer block, connecting rod ends, screw jack (any four)

NOTE:

1. Expose to CMM for the measurement of Geometric dimensioning is Mandatory
2. Any two assembly drawing should be practiced manually by the student.

TOTAL : 45 PERIODS**COURSE OUTCOMES**

| CO | Statements | RBT Level |
|-----|--|-----------|
| CO1 | The students will be able to read and interpret the production drawings | 2 |
| CO2 | The students will be able to understand proper fits and tolerances. | 2 |
| CO3 | The students will generate assembly drawings for various mechanical products | 3 |
| CO4 | The students will acquire skill to measure the machine components geometry using CMM | 3 |

REFERENCES :

1. Gopalakrishna K.R., “Machine Drawing”, Subhas Publishers, Bangalore, 2013.
2. Gill P.S,”Machine Drawing”, S.K. Kataria & Sons Publications, 2013
3. Bhatt.N.D, “Machine Drawing”, Chorotar Publishing House, 2011.

4. Sham Tickoo, "AutoCAD 2017: A Problem-Solving Approach, Basic and Intermediate", 23rd Edition, 2017
5. James D. Bethune Boston University, "Engineering Graphics with AutoCAD 2002", Pearson Education, 2005.
6. Alan Kalameja, "AutoCAD 2008: A tutor for Engineering Graphics", Auto Desk Press 2007
7. <https://thesourcecad.com/autocad-tutorials/>

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

| S.No. | Description of Equipment | Qty |
|-----------------|--|-------------|
| HARDWARE | | |
| 1. | Computer Server | 1 |
| 2. | Computer nodes or systems (High end CPU with atleast 1 GB main memory) networked to the server | 30 |
| 3. | A3 size plotter | 1 |
| 4. | Laser Printer | 1 |
| SOFTWARE | | |
| 5. | Licensed software for Drafting and Modeling | 30 licenses |
| 6. | Licensed operating system | Adequate |

CO-PO Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1 0 | PO1 1 | PO1 2 | PS O1 | PS O2 | PS O3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|----------|----------|
| CO1 | 3 | | | | 3 | | | | | 2 | | 3 | 2 | | |
| CO2 | 3 | | | | 3 | | | | | 2 | | 3 | 2 | | |
| CO3 | 3 | | 1 | | 3 | | | | | 2 | | 3 | 2 | | |
| CO4 | 3 | | | | 3 | | | | 1 | | | 3 | 2 | | |

1. Weak, 2 – Moderate, 3 - Strong

| | | | |
|---|---|---|-----|
| L | T | P | C |
| 0 | 0 | 3 | 1.5 |

OBJECTIVES

- To impart the practical knowledge in casting and Joining Process
- To impart the basic machining skills in lathe and to equip with the practical knowledge required in the core industries.

LIST OF EXPERIMENTS:**CASTING**

Study of various types of patterns, pattern materials, foundry tools

1. Preparation of green sand mould for single piece pattern
2. Preparation of green sand mould for split patterns
3. Melting of non ferrous alloys and making a casting (Demonstration)

Welding

Study of arc welding and gas welding equipment's, types of electrodes

1. Fabrication of simple structural shapes using Gas Metal Arc Welding
2. Joining of plates using Metal Inert Gas Welding / Gas Metal Arc Welding
3. Demonstration of Tungsten Arc Welding, Cold Metal Transfer Welding and Friction Stir Welding

LATHE

Study of lathe, various mechanisms, work holding devices, tool holding devices and various Machining operations

1. Plain, Turning and Taper Turning
2. External & Internal Thread cutting & Knurling
3. Eccentric Turning
4. Estimation of machining time for the above turning processes
5. Pin and bush assembly
6. Dismantling and assembly of headstock and tail stock of a lathe.

TOTAL : 45 PERIODS**OUTCOMES :**

Upon completion of this course,

| CO | Statements | RBT level |
|----|---|-----------|
| 1 | The students can able to identify and perform the operations for a given product diagram for a lathe. | 3 |
| 2 | The students can able to make a green sand mould using different patterns. | 3 |
| 3 | The students can able to select the suitable welding parameters to make a welded component using Arc and MIG welding. | 3 |

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- | | |
|----------------------------|--------|
| 1. Centre Lathes | 7 Nos. |
| 2. Arc Welding machine | 5 nos |
| 3. Metal Inert Gas Welding | 1 no |

REFERENCES :

1. Serope Kalpakjian & Steven R. Schmid, "Manufacturing Engineering and Technology", Pearson India Education Services Pvt. Ltd, 7th edition, 2018

2. Dr. P.C. Sharma, “A Textbook of Production Technology (Manufacturing Processes), S. Chand & Company Ltd, 8th edition, 2014

Course Articulation matrix

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | | 3 | | | | | 2 | | | | 3 | | 3 | |
| 2. | 3 | | 3 | | | | | 2 | | | | 3 | | 3 | |
| 3. | 3 | | 3 | | | | | 2 | | | | 3 | | 3 | |

Weak, 2 – Moderate, 3 - Strong



EE22111

**BASIC ELECTRICAL AND ELECTRONICS
ENGINEERING LABORATORY
(Common to all Branches except EC)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

COURSE OBJECTIVES:

1. To provide exposure to the students with hands on experience in basic of Electrical and Electronics wiring connection and measurements.
2. To introduce the students to Electrical Machines and basic laws of Electrical Circuits.

LIST OF EXPERIMENTS:

1. Wiring – Residential house wiring and Stair case wiring.
2. (a) AC Analysis- Measurement of electrical quantities–voltage, current, power, and power factor using RLC.
(b) Study of three phase system.
3. Energy conservation - Measurement and comparison of energy for incandescent lamp and LED lamp.
4. (a) Identification of circuit components (Resistor, Capacitor, Diode and BJT) and soldering practice.
(b) Signal Measurement- Measurement of peak to peak, RMS, average, period, frequency of signals using CRO.
5. (a) VI Characteristics of Solar photovoltaic panel.
(b) Design of Solar PV Array and Battery sizing for Residential solar PV system.
6. Design a 5V/12V Regulated Power Supply using FWR and IC7805 / IC7812.
7. DC Analysis- Verification of Ohm’s Law and Kirchoff’s Laws.
8. Study of Transformer and motor characteristics.

TOTAL: 30 PERIODS

OUTCOMES:

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

| SL.NO | STATEMENT | RBT LEVEL |
|-------|--|-----------|
| CO1. | Wiring of basic electrical system and measurement of electrical parameters. | 4 |
| CO2. | Verify the basic laws of Electric circuits and select various Electrical Machines. | 4 |
| CO3. | Construct electronic circuits and design solar photovoltaic system. | 4 |
| CO4. | Apply the concept of three-phase system. | 4 |
| CO5. | Construct a fixed voltage regulated power supply. | 4 |

(1- Remembering, 2- Understanding, 3- Applying, 4- Analysing, 5- Evaluating, 6- Creating)

REFERENCES:

1. Mittle V.N, Arvind Mittal, "Basic Electrical Engineering", Tata Mc Graw Hill (India), Second Edition, 2013.
2. Sedha R.S., "A Text Book of Applied Electronics", S. Chand & Co., 2014.

COURSE ARTICULATION MATRIX

| COs | POs | | | | | | | | | | | | PSOs | | |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|------|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 3 | 3 | 3 | 3 | | | | | 2 | | | 2 | | | |
| 2. | 3 | 3 | 3 | 3 | | | | | 2 | | | 2 | | | |
| 3. | 3 | 3 | 3 | 3 | | | | | 2 | | | 2 | | | |
| 4. | 3 | 3 | 3 | 3 | | | | | 2 | | | 2 | | | |
| 5. | 3 | 3 | 3 | 3 | | | | | 2 | | | 2 | | | |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

