

**Course Structure and Syllabus for**  
**B.Tech.**  
**MECHANICAL ENGINEERING (ME)**  
**(Applicable for batches admitted from 2023-24)**



**Department of Mechanical Engineering**

**DHANEKULA INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**(An Autonomous, NAAC Accredited ISO 9001-2015 Certified Institution)**

**(Approved by AICTE, Affiliated to JNTUK, Kakinada)**

**Ganguru, Vijayawada, Andhra Pradesh-521139, INDIA.**

**[www.diet.ac.in](http://www.diet.ac.in)**

# DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

## VISION – MISSION – PEOs

|                                      |   |
|--------------------------------------|---|
| Institute Vision                     | Pioneering Professional Education through Quality   |
| Institute Mission                    | <p>Providing Quality Education through state-of-art infrastructure, laboratories and committed staff.</p> <p>Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect.</p> <p>Involving faculty members and students in research and development works for betterment of society.</p>  |
| Department Vision                    | To prepare mechanical engineers with global competency and desire to serve the society.   |
| Department Mission                   | <p>Transforming students as Mechanical Engineers with professional attitudes, industrial adoptability, and leadership abilities.</p> <p>Providing Quality Education with state-of-art facilities.</p> <p>Inculcating ethical values, ability to lifelong learning and social responsibilities.</p>  |
| Program Educational Objectives(PEOs) | <p>Graduates of Mechanical Engineering will be able</p> <p>PEO1: To pursue successful careers or higher studies in Mechanical engineering through their solid foundation in mathematics, science, and engineering.</p> <p>PEO2: To analyze and design appropriate solutions for socially relevant problems by using current engineering techniques.</p> <p>PEO3: To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.</p> <p>PEO4: To grab an opportunity to expand their horizon beyond Mechanical engineering.</p> |

## DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

POs/PSOs

### PROGRAM OUTCOMES(PO's)

|    |  |
|----|--|
| 1  | <b>Engineering Knowledge :</b> Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.  |
| 2  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| 3  | <b>Design/development of solutions:</b> 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  | <b>Conduct investigations of complex problems:</b> 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  | <b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.   |
| 6  | <b>The engineer and society:</b> 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  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| 8  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| 9  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| 10 | <b>Communication:</b> 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 | <b>Project management and finance:</b> 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 | <b>Life-long learning:</b> 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 (PSO's)

PSO1: Apply mechanical engineering knowledge to design and manufacture products relevant to society in an innovative and economical way.

PSO2: Ability to work in multidisciplinary areas such as automation, robotics, design, and simulation software etc.

PSO3: Qualify in national and international level competitive examinations for successful higher studies and employment.

**B.Tech (ME)-COURSESTRUCTURE–DIET23**  
**(Applicable from the academic year 2023-24 onwards)**

**INDUCTIONPROGRAMME**

| <b>S.No.</b> | <b>CourseName</b>   | <b>Category</b> | <b>L-T-P-C</b> |
|--------------|---|-----------------|----------------|
| 1            | Physical Activities -- Sports, Yoga and Meditation, Plantation                | MC              | 0-0-6-0        |
| 2            | Career Counselling  | MC              | 2-0-2-0        |
| 3            | Orientation to all branches -- career options, tools, etc.                    | MC              | 3-0-0-0        |
| 4            | Orientation on admitted Branch -- corresponding labs, tools and platforms     | EC              | 2-0-3-0        |
| 5            | Proficiency Modules & Productivity Tools                                      | ES              | 2-1-2-0        |
| 6            | Assessment on basic aptitude and mathematical skills                          | MC              | 2-0-3-0        |
| 7            | Remedial Training in Foundation Courses                                       | MC              | 2-1-2-0        |
| 8            | Human Values & Professional Ethics  | MC              | 3-0-0-0        |
| 9            | Communication Skills -- focus on Listening, Speaking, Reading, Writing skills | BS              | 2-1-2-0        |
| 10           | Concepts of Programming   | ES              | 2-0-2-0        |

**B.Tech.–IYearISemester**

| S.No.        | Category            | Title                                | L/D       | T         | P         | Credits     |
|--------------|---------------------|--------------------------------------|-----------|-----------|-----------|-------------|
| 1            | BS&H                | Communicative English                | 2         | 0         | 0         | 2           |
| 2            | BS&H                | Engineering Chemistry                | 3         | 0         | 0         | 3           |
| 3            | BS&H                | Linear Algebra & Calculus            | 3         | 0         | 0         | 3           |
| 4            | Engineering Science | Basic Civil & Mechanical Engineering | 3         | 0         | 0         | 3           |
| 5            | Engineering Science | Introduction to Programming          | 3         | 0         | 0         | 3           |
| 6            | BS&H                | Communicative English Lab            | 0         | 0         | 2         | 1           |
| 7            | BS&H                | Engineering Chemistry Lab            | 0         | 0         | 2         | 1           |
| 8            | Engineering Science | Engineering Workshop                 | 0         | 0         | 3         | 1.5         |
| 9            | Engineering Science | Computer Programming Lab             | 0         | 0         | 3         | 1.5         |
| 10           | BS&H                | Health and wellness, Yoga and Sports | -         | -         | 1         | 0.5         |
| <b>Total</b> |                     |                                      | <b>14</b> | <b>00</b> | <b>11</b> | <b>19.5</b> |

**B.Tech.–IYearIISemester**

| S.No.        | Category            | Title   | L/D       | T         | P         | Credits     |
|--------------|---------------------|---|-----------|-----------|-----------|-------------|
| 1            | BS&H                | Engineering Physics                             | 3         | 0         | 0         | 3           |
| 2            | BS & H              | Differential Equations & Vector Calculus        | 3         | 0         | 0         | 3           |
| 3            | Engineering Science | Basic Electrical and Electronics Engineering    | 3         | 0         | 0         | 3           |
| 4            | Engineering Science | Engineering Graphics                            | 1         | 0         | 4         | 3           |
| 5            | Engineering Science | IT Workshop                                     | 0         | 0         | 2         | 1           |
| 6            | Professional Core   | Engineering Mechanics                           | 3         | 0         | 0         | 3           |
| 7            | BS&H                | Engineering Physics Lab                         | 0         | 0         | 2         | 1           |
| 8            | Engineering Science | Electrical and Electronics Engineering Workshop | 0         | 0         | 3         | 1.5         |
| 9            | Professional Core   | Engineering Mechanics Lab                       | 0         | 0         | 3         | 1.5         |
| 10           |                     | NSS/NCC/Scouts & Guides/Community Service       | -         | -         | 1         | 0.5         |
| <b>Total</b> |                     |   | <b>13</b> | <b>00</b> | <b>15</b> | <b>20.5</b> |

## COMMUNICATIVE ENGLISH

|                  |                      |                            |             |   |   |
|------------------|----------------------|----------------------------|-------------|---|---|
| Course Category: | <b>BS</b>            | Credits: 2                 |             |   |   |
| Course Type:     | <b>Theory</b>        | Lecture-Tutorial-Practice: | 2           | 0 | 0 |
| Prerequisites    | Basic reading skills | Continuous Evaluation      | 30M         |   |   |
|                  |                      | Semester End Evaluation    | 70M         |   |   |
|                  |                      | <b>Total Marks</b>         | <b>100M</b> |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |  |           |
|---|--|-----------|
| CO No:  | Course Outcome Description   | K - Level |
| CO1   | Employ suitable strategies for skimming and scanning to get a general idea of a text and locate specific information | Affective |
| CO2   | Apply grammar rules to form sentences effectively  | Affective |
| CO3   | Use correct word forms to communicate effectively with enriching vocabulary  | Affective |
| CO4   | Recognize the theme of the given text and summarize and interpret the information                                    | Affective |
| CO5   | Report the information effectively in different formats using good writability                                       | Affective |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1    |     |     |     |     |     |     |     | 3   | 3   | 3    |      |      |      | 3    |
| CO2    |     |     |     |     |     |     |     | 3   | 3   | 3    |      |      |      | 3    |
| CO3    |     |     |     |     |     |     |     | 3   | 3   | 3    |      |      |      | 3    |
| CO4    |     |     |     |     |     |     |     | 3   | 3   | 3    |      |      |      | 3    |
| CO5    |     |     |     |     |     |     |     | 3   | 3   | 3    |      |      |      | 3    |

### COURSE CONTENT:

#### UNIT-1: Lesson: **HUMAN VALUES: Gift of Magi** (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

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

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

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

**UNIT-2: Lesson: NATURE: The Brook** by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks. Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

**UNIT-3: Lesson: BIOGRAPHY: Elon Musk**

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

**UNIT-4: Lesson: INSPIRATION: The Toys of Peace by Saki**

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

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

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

Writing: Letter Writing: Official Letters, Resume,E-mailwriting,Coverletter,SOP

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

**UNIT-5: Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)**

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension. Writing: Writing structured essays on specific topics.

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

Vocabulary: Technical Jargons

**TEXT BOOKS:**

1. Pathfinder: Communicative English for Undergraduate Students, 1 st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)

1. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

**REFERENCE BOOKS:**

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.

2. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019

3. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

**Web Resources:**

GRAMMAR:

1. [www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)

2. <https://dictionary.cambridge.org/grammar/british-grammar/>

3. [www.eslpod.com/index.html](http://www.eslpod.com/index.html)

4. <https://www.learngrammar.net/>

5. <https://english4today.com/english-grammar-online-with-quizzes/>

6. <https://www.talkenglish.com/grammar/grammar.aspx>

**VOCABULARY**

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

2. [https://www.youtube.com/channel/UC4cmBAit8i\\_NJZE8qK8sfpA](https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA)





|     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|--|
| CO1 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO2 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO4 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CO5 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |

## **COURSE CONTENT:**

### **UNIT I Water Technology**

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

### **UNIT II Electrochemistry and Applications**

Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries-working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

### **UNIT III Polymers and Fuel Chemistry**

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene.

PVC Nylon 6,6 and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

### **UNIT IV Modern Engineering Materials**

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils –

Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland Cement, constituents, Setting and Hardening of cement.

## **UNIT V Surface Chemistry and Nanomaterials**

Surface Chemistry- Introduction, micelle formation Colloids-Introduction, synthesis of colloids (Braggs Method), stabilization of colloids by stabilizing agents

Nanometals and Nanometal Oxides-introduction, chemical and biological methods of preparation of nanometals and metal oxides, stabilization of nanomaterials by stabilizing agents Adsorption Isotherm-Freundlich and Longmuir, BET equation (no derivation)

Applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

### **TEXT BOOKS:**

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

### **REFERENCE BOOKS:**

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth- Heineman, 1992.
3. Textbook of Polymer Science, Fred W. Billmeyer Jr, 3rd Edition

### **E-RESOURCES/DIGITAL MATERIAL:**

(a) <https://moodle.net>

(b) <https://libguides.reading.ac.uk/chemistry/e-resources>

## LINEAR ALGEBRA AND CALCULUS

|                  |  |                            |      |   |   |
|------------------|--|----------------------------|------|---|---|
| Course Category: | BS   | Credits: 3                 |      |   |   |
| Course Type:     | Theory / Tutorial  | Lecture-Tutorial-Practice: | 3    | 0 | 0 |
| Prerequisites    | Basics of Matrices, Differentiation & Integration.<br>Convergence of a Series. | Continuous Evaluation      | 30M  |   |   |
|                  |  | Semester End Evaluation    | 70M  |   |   |
|                  |  | Total Marks                | 100M |   |   |

**Course Objectives:** To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |  |              |
|---|--|--------------|
| CO No:  | Course Outcome Description   | K - Level    |
| CO1   | Test the Linear system's consistency and determine its solution.                       | 4-Analyzing  |
| CO2   | Apply eigen values and eigen vectors to reduce a quadratic form to its canonical form. | 3-Applying   |
| CO3   | Apply mean value theorems to obtain series expansions of single variable functions.    | 3-Applying   |
| CO4   | Utilize partial differentiation in optimizing multi variable functions.                | 3-Applying   |
| CO5   | Evaluate multiple integrals and find area / volume of bounded regions.                 | 5-Evaluating |

Note: K-Level is defined From Blooms Taxonomy

### COURSE CONTENT:

#### UNIT-1: Matrices:

Rank of a matrix by echelon form, normal form. Cauchy–Binet formula (without proof). Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

## **UNIT-2: Eigen values, Eigen Vectors and Orthogonal Transformation:**

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal transformation.

## **UNIT-3: Calculus**

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

## **UNIT-4: Partial differentiation and Applications (Multivariable Calculus):**

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

## **UNIT-5: Multiple integrals (Multi variable Calculus):**

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

## **TEXT BOOKS:**

- [1] Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 2017, 44<sup>th</sup> Edition
- [2] Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10<sup>th</sup> Edition.

## **REFERENCE BOOKS:**

- (i) Engineering Mathematics-I (Linear Algebra and Calculus) by T.K.V. Iyengar et.al., S Chand and Company Ltd
- (ii) Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14<sup>th</sup> Edition.
- (iii) Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
- (iv) Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5<sup>th</sup> Edition.
- (v) Advanced Engineering Mathematics, Michael Greenberg, Pearson publishers, 9<sup>th</sup> edition.

(vi) Higher Engineering Mathematics, H.K Das, Er. Rajnish Verma, S.Chand Publications, 2014, Third Edition (Reprint 2021)

**E-RESOURCES/DIGITAL MATERIAL:**

- (a) <http://www.nptelvideos.com/mathematics/>
- (b) <https://digimat.in/cgi-bin/search.cgi>

## BASIC CIVIL & MECHANICAL ENGINEERING

|                  |                                 |                            |      |   |   |
|------------------|---------------------------------|----------------------------|------|---|---|
| Course Category: | <b>Engineering Science (ES)</b> | Credits : 3                |      |   |   |
| Course Type:     | <b>Theory</b>                   | Lecture-Tutorial-Practice: | 3    | 0 | 0 |
| Prerequisites    | -                               | Continuous Evaluation      | 30M  |   |   |
|                  |                                 | Semester End Evaluation    | 70M  |   |   |
|                  |                                 | Total Marks                | 100M |   |   |

### Course Outcomes:

| After successful completion of course, the student will be able to: |   |           |
|---|---|-----------|
| CO No:  | Course Outcome Description  | K - Level |
| CO1   | Understand various disciplines of Civil Engineering including the basic construction materials and building elements.                 | K-2       |
| CO2   | Interpret the basic concepts of surveying and types and applications of soils, foundations and geosynthetics.                         | K-2       |
| CO3   | Realize the importance of Transportation in nation's economy and that of Water Storage and its conservation.                          | K-2       |
| CO4   | Identify the scope and importance of Mechanical Engineering in different sectors and industries                                       | K-2       |
| CO5   | Understand the different manufacturing processes and explain the basics of thermal engineering and its applications                   | K-2       |
| CO6   | Describe the working of different mechanical power transmission systems and power plants and basics of robotics and its applications. | K-2       |

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO | PO | PO4 | PO | PO6 | PO7 | PO | PO | PO | PO | PO | PSO | PSO |
|--------|-----|----|----|-----|----|-----|-----|----|----|----|----|----|-----|-----|
| CO1    | 3   | -  | -  | -   | -  | 2   | -   | 2  | -  | -  | -  | -  | 2   | 2   |
| CO2    | 3   | 2  | -  | -   | -  | 2   | -   | 2  | -  | -  | -  | -  | 2   | 2   |
| CO3    | 3   | -  | -  | -   | -  | 3   | 2   | 2  | -  | -  | -  | -  | 2   | 2   |
| CO4    | 3   | 2  | -  | -   | -  | -   | -   | -  | -  | -  | -  | 2  | 3   | 2   |
| CO5    | 3   | 2  | -  | -   | -  | -   | -   | -  | -  | -  | -  | 2  | 3   | 2   |
| CO6    | 3   | 2  | -  | -   | -  | -   | -   | -  | -  | -  | -  | 2  | 3   | 2   |

## **COURSE CONTENT:**

### **UNIT-1:**

**Basics of Civil Engineering:** Role of Civil Engineers in society- Various disciplines of Civil Engineering- Structural Engineering, Geotechnical Engineering, Transportation Engineering, Hydraulics and Water Resources Engineering, Environmental Engineering (Scope of each discipline) - Building Construction and Planning: Construction Materials–Cement, Aggregates, Bricks, Cement concrete and Steel (physical properties, classification, and uses/applications only) – list of building elements.

### **UNIT-2:**

**Surveying:** Objectives of Surveying - Horizontal Measurements - Angular Measurements- Introduction to Bearings - Levelling instruments used for levelling - Contour mapping.

**Geotechnical Engineering:** Soils (types, origin and distribution) - Foundations and Geosynthetics (types and their applications).

### **UNIT-3:**

**Transportation Engineering** Importance of Transportation in Nation's economic development - Types of Highway Pavements - difference between Flexible and Rigid Pavements. Introduction to Harbours, Tunnels, Airports, and Railways (functions and components only)

**Water Resources and Environmental Engineering:** Introduction, Sources of water - Quality of water - Specifications - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (introduction to Dams and Reservoirs - purpose and classification according to use).

### **UNIT-4:**

**Introduction to Mechanical Engineering:** Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

**Engineering Materials** - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

### **UNIT-5:**

**Manufacturing Processes:** Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.



**Thermal Engineering** – Working principle of a boiler IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

**UNIT-6:**

**Power plants** – Working principle of Steam, Diesel, Hydro, Nuclear power plants.

**Mechanical Power Transmission** - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

**Introduction to Robotics** - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.)

**TEXT BOOKS:**

[1]. Basic Civil Engineering, M.S. Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd. Fourth Edition.

[2]. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

**REFERENCE BOOKS:**

1. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
2. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.
3. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
4. Geotechnical Engineering, C. Venkataramaiah, New Age Publishers, 2021, 7th Edition.
5. Irrigation and Water Power Engineering - Dr. B. C. Punmia, Dr. Pande B.B. Lal, Er. A.K. Jain, Laxmi Publications, 2021, 17th Edition.
6. Highway Engineering, S.K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
7. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
8. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
9. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
10. AppuuKuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

11. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
12. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.
13. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
14. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

**E-RESOURCES/DIGITAL MATERIAL:**

- a) <https://archive.nptel.ac.in/courses/105/106/105106201/>
- b) [https://onlinecourses.nptel.ac.in/noc23\\_ce80/preview](https://onlinecourses.nptel.ac.in/noc23_ce80/preview)



## **COURSE CONTENT:**

### **UNIT-1:**

Introduction to Programming Languages, Basics of a Computer Program-Algorithms, flowcharts (Using DiaTool), pseudo code, Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operators, Type Conversion and Casting, formatted IO, Problem solving techniques: Algorithmic approach, Characteristics of algorithm, Example Programs

### **UNIT-2:**

Control Structures: Simple sequential programs, Conditional Statements (if, if-else, if else ladder, Nested if, switch), Nesting, Loops (for, while, do-while), Break and Continue, Example Programs.

### **UNIT-3:**

Arrays and Strings: Arrays indexing, Array Declaration and Initialization, programs with array of integers, two dimensional arrays, Introduction to Strings, String handling functions, Example Programs.

### **UNIT-4:**

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, Dynamic Memory Allocation functions, User-defined data types-Structures and Unions, Example Programs.

### **UNIT-5:**

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, Recursion, modifying parameters inside functions using pointers, Arrays and Structures as parameters. Storage Class Modifiers, File Handling- Creation, Opening Modes, File IO

### **Textbooks:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3<sup>rd</sup> edition, 2011.
2. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall, 2015.
3. Schism's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996.
4. Let us C ,YaswanthKanetkar, 16th Edition, BPB Publication, 2020.

5. Programming in ANSI C, McGraw Hill, seventh edition by E.Balagurusamy .2017

### **Reference Books:**

1. Programming in C, Reema The raja, Oxford,2016,2<sup>nd</sup> edition
2. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication, 2013
3. Problem solving using C , K Venugopal,3<sup>d</sup> Edition, TMG Publication,2015
4. Anil B. Chaudhuri, “Flowchart and Algorithm Basics: The Art of Programming”, Mercury Learning & Information, 2020.
5. Paul J. Dietel and Harvey M. Deitel, “C: How to Program”, Prentice Hall, 8th edition (Jan 19, 2021)

### **E-Resources:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_cs01/preview](https://onlinecourses.nptel.ac.in/noc21_cs01/preview)

### **Websites:**

- <http://www.c4learn.com/>
- <http://www.geeksforgeeks.org/c/>
- <http://nptel.ac.in/courses/122104019/>
- <http://www.learn-c.org/>
- <https://www.tutorialspoint.com/cprogramming/>

## COMMUNICATIVE ENGLISH LAB

|                  |                                    |                            |             |   |   |
|------------------|------------------------------------|----------------------------|-------------|---|---|
| Course Category: | <b>BS</b>                          | Credits: 1                 |             |   |   |
| Course Type:     | <b>Lab</b>                         | Lecture-Tutorial-Practice: | 0           | 0 | 2 |
| Prerequisites    | Basic understanding of LSRW Skills | Continuous Evaluation      | 30M         |   |   |
|                  |                                    | Semester End Evaluation    | 70M         |   |   |
|                  |                                    | <b>Total Marks</b>         | <b>100M</b> |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |  |             |
|---|--|-------------|
| CO No:  | Course Outcome Description   | K - Level   |
| CO1   | Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet                    | Cognitive   |
| CO2   | Speak fluently by practicing accent, rhythm, and intonation  | Affective   |
| CO3   | Interact with others confidently on the phone or in person by using appropriate expressions                      | Psychomotor |
| CO4   | Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction. | Psychomotor |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO  | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1 | PO1 | PO1 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| CO1 |     |     |     |     |     |     | 3   | 3   | 3   |     |     |      | 3    |
| CO2 |     |     |     |     |     |     | 3   | 3   | 3   |     |     |      | 3    |
| CO3 |     |     |     |     |     |     | 3   | 3   | 3   |     |     |      | 3    |
| CO4 |     |     |     |     |     |     | 3   | 3   | 3   |     |     |      | 3    |

## **COURSE CONTENT:**

- 1 Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. Self-Introduction, Introducing others, Non-verbal communication
6. Group Discussions-methods & practice
7. Debates - Methods & Practice
8. PPT Presentations
9. Poster Presentation
10. Interviews Skills

**Suggested Software:** • Walden Infotec

• Young India Films

## **Reference Books:**

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

## **Web Resources: Spoken English:**

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishmedialab.com](http://www.englishmedialab.com)
3. [www.englishinteractive.net](http://www.englishinteractive.net)
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. [https://www.youtube.com/c/mmmEnglish\\_Emma/featured](https://www.youtube.com/c/mmmEnglish_Emma/featured)
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>

8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. [https://www.youtube.com/channel/UCV1h\\_cBE0Drdx19qkTM0WNw](https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw)

**Voice & Accent:**

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. [https://www.youtube.com/channel/UC\\_OskgZBoS4dAnVUgJVexc](https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc)
4. [https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp\\_IA](https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA)



## ENGINEERING CHEMISTRY LAB

|                  |                                 |                            |      |   |   |
|------------------|---------------------------------|----------------------------|------|---|---|
| Course Category: | BS/ES/PC/PE/OE/MC/SC            | Credits :1.5               |      |   |   |
| Course Type:     | Theory / Tutorial /Practical    | Lecture-Tutorial-Practice: | 0    | 0 | 3 |
| Prerequisites    | Basic Concepts of Chemistry Lab | Continuous Evaluation      | 30M  |   |   |
|                  |                                 | Semester End Evaluation    | 70M  |   |   |
|                  |                                 | Total Marks                | 100M |   |   |

### Course Outcomes:

| After Successful Completion of the course, the student will be able to: |   |           |
|---|---|-----------|
| CO No   | Course Outcome Description  | K - Level |
| CO1   | Handle Colorimeter, P <sup>H</sup> Meter, viscometer, conductivity meter, and Oven for analysis of coal and materials using small quantities involved for quick and accurate results. | Applying  |
| CO2   | Carry out acid-base, complexometric, and redox titrations.  | Applying  |
| CO3   | Prepare advanced materials like Bakelite, nanomaterials   | Applying  |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate,3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1    | 3   |     |     |     |     |     |     |     | 3   |      |      |      |      |      |
| CO2    | 3   |     |     |     |     |     |     |     | 3   |      |      |      |      |      |
| CO3    | 3   |     |     |     |     |     |     |     | 3   |      |      |      |      |      |
| CO4    | 3   |     |     |     |     |     |     |     | 3   |      |      |      |      |      |
| CO5    | 3   |     |     |     |     |     |     |     | 3   |      |      |      |      |      |

### COURSE CONTENT:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method

3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter.
13. Estimation of Ferrous Iron by Dichrometry.
14. Determination of alkalinity of a sample containing  $\text{Na}_2\text{CO}_3$  and  $\text{NaOH}$ .
15. Estimation of calcium carbonate content in toothpaste.
16. Determination of the concentration of acid in soft drinks (pH-metry method).
17. Conductometric titration of strong acid vs. strong base

**Note: Of the above experiments at-least 10 assessment experiments should be completed in a semester.**

**TEXT BOOKS:**

[1]A Textbook of Quantitative Analysis, Arthur J. Vogel.

## ENGINEERING WORKSHOP

|                 |                                 |                            |      |   |   |
|-----------------|---------------------------------|----------------------------|------|---|---|
| CourseCategory: | <b>Engineering Science (ES)</b> | Credits: 1.5               |      |   |   |
| Course Type:    | <b>Practical</b>                | Lecture-Tutorial-Practice: | 0    | 0 | 3 |
| Prerequisites   | -                               | Continuous Evaluation      | 30M  |   |   |
|                 |                                 | Semester End Evaluation    | 70M  |   |   |
|                 |                                 | Total Marks                | 100M |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |   |           |
|---|---|-----------|
| CO No:  | Course Outcome Description  | K - Level |
| CO1   | Perform operations in carpentry, fitting, plumbing with appropriate tools             | 3         |
| CO2   | Develop prototypes with sheet metals  | 3         |
| CO3   | Perform electrical connections required for house wiring                              | 3         |
| CO4   | design the patterns and core boxes for metal casting processes                        | 3         |
| CO5   | Understand Arc Welding and Gas welding equipment for the fabrication of welded joints | 3         |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate,3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1    | 3   | 2   | -   | -   | -   | -   | -   | 3   | 3   | 2    | -    | 2    | 3    | 2    | -    |
| CO2    | 3   | 2   | -   | -   | -   | -   | -   | 3   | 3   | 2    | -    | 2    | 3    | 2    | -    |
| CO3    | 3   | 2   | -   | -   | -   | -   | -   | 3   | 3   | 2    | -    | 2    | 3    | 2    | -    |
| CO4    | 3   | 2   | -   | -   | -   | -   | -   | 3   | 3   | 2    | -    | 2    | 3    | 2    | -    |
| CO5    | 3   | 2   | -   | -   | -   | -   | -   | 3   | 3   | 2    | -    | 2    | 3    | 2    | -    |

### COURSE CONTENT:

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
  - a. Half – Lap joint
  - b. Mortise and Tenon joint
  - c. Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
  - a. Tapered tray
  - b. Conical funnel
  - c. Elbow pipe
  - d. Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
  - a. V-fit
  - b. Dovetail fit
  - c. Semi-circular fit
  - d. Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.
  - a. Parallel and series
  - b. Two-way switch
  - c. Godown lighting
  - d. Tube light
  - e. Three phase motor
  - f. Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.
10. **3D Printing** - Demonstration on 3D Printing

Textbooks:

- [1]. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
- [2]. A Course in Workshop Technology Vol I. & II, B.S. Raghuvanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

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

E-Resources:

1. <https://archive.nptel.ac.in/courses/112/107/112107219/>

## COMPUTER PROGRAMMING LAB

|                  |  |                            |      |   |   |
|------------------|--|----------------------------|------|---|---|
| Course Category: | <b>Engineering Science (ES)</b>                                    | Credits: 1.5               |      |   |   |
| Course Type:     | Practical  | Lecture-Tutorial-Practice: | 0    | 0 | 3 |
| Prerequisites    | Basics Mathematics,<br>Logical thinking and<br>basics of Computers | Continuous Evaluation      | 30M  |   |   |
|                  |  | Semester End Evaluation    | 70M  |   |   |
|                  |  | Total Marks                | 100M |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |  |           |
|---|--|-----------|
| CO No:  | Course Outcome Description   | K - Level |
| CO1   | Solve simple programs using basic C programming concepts             | 3         |
| CO2   | Develop simple programs using control statements                     | 3         |
| CO3   | Build program solutions using arrays and strings                     | 3         |
| CO4   | Apply pointers concepts in programming                               | 3         |
| CO5   | Apply structure and union, files concepts to use memory in programs. | 3         |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1    | 2   | -   | -   | -   | 3   | -   | -   | -   | 3   | -    | -    | 3    | 3    | 3    |
| CO2    | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -    | -    | 3    | 3    | 3    |
| CO3    | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -    | -    | 3    | 3    | 3    |
| CO4    | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -    | -    | 3    | 3    | 3    |
| CO5    | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -    | -    | 3    | 3    | 3    |

### COURSE CONTENT:

#### Exercise 1: Familiarization with programming environment

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

#### Exercise 2: Converting algorithms/flowcharts into C Source code.

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

iii) Simple interest calculation

**Exercise 3: Simple computational problems using arithmetic expressions.**

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

**Exercise 4: Simple computational problems using the operator' precedence and associativity.**

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

**Exercise 5: Problems using control statements.**

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

**Exercise 6: Problems using control statements.**

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

**Exercise 7: Using arrays.**

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

**Exercise 8: arrays and strings**

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements using bubble sort.
- iv) Concatenate two strings without built-in functions.
- v) Reverse a string using built-in and without built-in string functions.

#### **Exercise 9: Pointers**

- i) Demonstrate dynamic memory allocation functions with example program.

#### **Exercise 10: Structures and union**

- i) Write a C program to find the total, average of n students using structures.
- ii) Write a C program to illustrate Union.

#### **Exercise 11: Using functions.**

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.

#### **Exercise 12: Using Recursion Function**

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the LCM of two numbers.
- iii) Write a recursive function to find the factorial of a number.

#### **Exercise 13: Simple functions using Call by reference, Dangling pointers.**

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

#### **Exercise 14: File handling**

- i) Write a C program to write and read text into a file.
- ii) Copy the contents of one file to another file.
- iii) Find no. of lines, words, and characters in a file.

#### **TEXT BOOKS:**

1. Programming in ANSI C, McGrawHill, seventh edition by E.Balagurusamy, 2017
2. Programming in C, Reema Thareja, Second Edition, OXFORD, 2016.
3. How to solve it by Computer, R. G. Dromey, and Pearson Education.
4. Let us C, YaswanthKanetkar, 17th Edition, BPB Publication,2020.



## **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India, Second Edition, Pearson Education, 2015.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE,2011
3. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication,2013
4. Problem solving using C, K Venugopal,3'd Edition, TMG Publication,2015
5. Anil B. Chaudhuri, “Flowchart and Algorithm Basics: The Art of Programming”, Mercury Learning & Information, 2020.
6. Paul J. Dietel and Harvey M. Deitel, “C: How to Program”, Prentice Hall, 8th edition (Jan 19, 2021)

## **E-RESOURCES/DIGITAL MATERIAL:**

1. <https://www.geeksforgeeks.org/c-programming-examples/>
2. <https://www.studytonight.com/c/programs/>
3. <http://www.w3schools.com/>
4. <http://www.learn-c.org/>
5. <https://www.tutorialsyoint.com/cprogramming/>
6. <https://www.hackerrank.com/>
7. <https://www.codechef.com/>
8. <https://www.topcoder.com/>

## HEALTH AND WELLNESS, YOGA AND SPORTS

|  |   |                        |           |
|--|---|------------------------|-----------|
| <b>Lecture – Tutorial:</b>   | 0   | <b>Internal Marks:</b> | <b>10</b> |
| <b>Credits:</b>  | 0.5   | <b>External Marks:</b> | <b>90</b> |
| <b>Prerequisites:</b>  |   |                        |           |
| <b>Course Objectives :</b> The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality. |   |                        |           |
| <b>Course Outcomes :</b> At the end of the course students will be able to:  |   |                        |           |
| CO1  | Understand the importance of yoga and sports for Physical fitness and sound health. |                        |           |
| CO2  | Demonstrate an understanding of health-related fitness components.                  |                        |           |
| CO3  | Compare and contrast various activities that help enhance their health.             |                        |           |
| CO4  | Assess current personal fitness levels.   |                        |           |
| CO5  | Develop Positive Personality.   |                        |           |

| <b>Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)</b> |             |             |             |             |             |             |             |             |             |              |              |              |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|
|   | <b>PO 1</b> | <b>PO 2</b> | <b>PO 3</b> | <b>PO 4</b> | <b>PO 5</b> | <b>PO 6</b> | <b>PO 7</b> | <b>PO 8</b> | <b>PO 9</b> | <b>PO 10</b> | <b>PO 11</b> | <b>PO 12</b> |
| CO1   |             |             |             |             |             |             |             |             |             |              |              |              |
| CO2   |             |             |             |             |             |             |             |             |             |              |              |              |
| CO3   |             |             |             |             |             |             |             |             |             |              |              |              |
| CO4   |             |             |             |             |             |             |             |             |             |              |              |              |
| CO5   |             |             |             |             |             |             |             |             |             |              |              |              |

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

Activities:

- i) Organizing health awareness programmes in community
- ii) Preparation of health profile

|   |
|---|
| Preparation of chart for balance diet for all age groups  |
| <p><b>UNIT –II</b> : Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.</p> <p>Activities:<br/>Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar</p>  |
| <p><b>UNIT- III</b> : Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.</p> <p>Activities:</p> <ul style="list-style-type: none"> <li>i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.<br/>Practicing general and specific warm up, aerobics</li> <li>ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.</li> </ul> |
| <b>REFERENCE BOOKS:</b>   |
| <ol style="list-style-type: none"> <li>1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones &amp; Bartlett Learning, 2022</li> <li>2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice</li> <li>3. Archie J. Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993</li> <li>4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014</li> <li>5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014</li> </ol>                   |



## **COURSE CONTENT:**

### **UNIT-1: Wave Optics**

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

### **UNIT-2: Crystallography and X-ray diffraction**

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

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

### **UNIT-3: Dielectric and Magnetic Materials**

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

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

### **UNIT-4: Quantum Mechanics and Free electron Theory**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical

conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

### **UNIT-5: Semiconductors**

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

### **TEXT BOOKS:**

- [1] A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
- [2] Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)
- [3] Applied Physics- Dr. D. Tirupathi Naidu, M. Veeranjanyulu- VGS Techno Series, 2021.

### **REFERENCE BOOKS:**

- (i) Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
- (ii) Engineering Physics-P. K. Palanisamy, SCITECH publications, 2014.
- (iii) Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
- (iv) Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010.
- (v) Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

### **E-RESOURCES/DIGITAL MATERIAL:**

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

## DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

|                  |                            |                            |      |   |   |
|------------------|----------------------------|----------------------------|------|---|---|
| Course Category: | BS                         | Credits: 3                 |      |   |   |
| Course Type:     | Theory / Tutorial          | Lecture-Tutorial-Practice: | 3    | 0 | 0 |
| Prerequisites    | Basics of Differentiation, | Continuous Evaluation      | 30M  |   |   |
|                  | Integration &              | Semester End Evaluation    | 70M  |   |   |
|                  | Vector Algebra             | Total Marks                | 100M |   |   |

### Course Objectives:

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

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |   |            |
|---|---|------------|
| CO No:  | Course Outcome Description  | K - Level  |
| CO1   | Solve differential equations of first order and first degree and apply to various engineering fields.                   | 3-Applying |
| CO2   | Solve linear differential equations of higher order with constant coefficients and apply to various engineering fields. | 3-Applying |
| CO3   | Solve linear partial differential equations.  | 3-Applying |
| CO4   | Find gradient, divergence and curl of point functions and apply gradient to find directional derivative.                | 3-Applying |
| CO5   | Apply vector integral theorems to find work done and flux.  | 3-Applying |

Note: K-Level is defined From Blooms Taxonomy

### COURSE CONTENT:

#### UNIT-1: Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling – Law of natural growth and decay-Electrical circuits.

#### UNIT-2: Linear differential equations of higher order (Constant coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral (of  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $x^m$ ,  $e^{ax}V(x)$ ), Wronskian, Method of variation of parameters.

Simultaneous linear equations.  
Applications: L-C-R Circuit, Simple Harmonic motion.

### UNIT-3: Partial differential equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients with the RHS of the forms  $e^{ax+by}$ ,  $\sin(ax + by)$ ,  $\cos(ax + by)$ ,  $x^m y^n$ .

### UNIT-4: Vector differentiation

Scalar and vector point functions, vector operator Del, Del applied to scalar point functions - Gradient - Applications of Gradient - Directional derivative, Del applied to vector point functions - Divergence and Curl, vector identities.

### UNIT-5: Vector integration

Line integral-circulation-work done, Surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Volume integral, Divergence theorem (without proof) and related problems.

### TEXT BOOKS:

- [1] Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 2017, 44th Edition.
- [2] Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

### REFERENCE BOOKS:

- (vii) Engineering Mathematics-II (Differential Equations and Vector Calculus) by T.K.V. Iyengar et.al., S Chand and Company Ltd.
- (viii) Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
- (ix) Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
- (x) Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
- (xi) Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2015th Edition (9th reprint).
- (xii) Higher Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

### E-RESOURCES/DIGITAL MATERIAL:

- (a) <http://www.nptelvideos.com/mathematics/>
- (b) <https://digimat.in/cgi-bin/search.cgi>



## **BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

### **Course Objectives**

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

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

CO1. Describe fundamental laws, operating principles of motors/generators, MC/MI instruments (L2)

CO2. Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2)

CO3. Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3)

CO4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1    | 3   | 3   |     |     |     |     |     |     |     |      |      |      |      |      |
| CO2    | 3   | 3   |     |     |     |     |     |     |     |      |      |      |      |      |
| CO3    | 3   | 3   |     |     |     |     |     |     |     |      |      |      |      |      |
| CO4    | 3   | 2   |     |     |     |     |     |     |     |      |      |      |      |      |
| CO5    | 3   | 3   |     |     |     |     |     |     |     |      |      |      |      |      |

### **COURSE CONTENT:**

#### **UNIT I DC & AC Circuits**

**DC Circuits:** Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

**AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

#### **UNIT II Machines and Measuring Instruments**

**Machines:** Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

**Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

### **UNIT III Energy Resources, Electricity Bill & Safety Measures**

**Energy Resources:** Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

**Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

**Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

#### **Textbooks:**

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

#### **Reference Books:**

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

#### **Web Resources:**

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

## **PART B: BASIC ELECTRONICS ENGINEERING**

### **COURSE OBJECTIVES:**

- To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

### **UNIT I SEMICONDUCTOR DEVICES**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE.

### **UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION**

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator.

Amplifiers: Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

### **UNIT III DIGITAL ELECTRONICS**

Overview of Number Systems, Logic gates including Universal Gates, BCD codes. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, and XOR.

Simple combinational circuits—Half and Full Adders. Introduction to sequential circuits, Flip flops.

### **Textbooks:**

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

### **Reference Books:**

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.

2. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

**End examination pattern:**

- i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

## ENGINEERING GRAPHICS

|                  |                                 |                            |      |   |   |
|------------------|---------------------------------|----------------------------|------|---|---|
| Course Category: | <b>Engineering Science (ES)</b> | Credits : 3                |      |   |   |
| Course Type:     | <b>Theory</b>                   | Lecture-Tutorial-Practice: | 1    | 0 | 4 |
| Prerequisites    | Basic mathematics               | Continuous Evaluation      | 30M  |   |   |
|                  |                                 | Semester End Evaluation    | 70M  |   |   |
|                  |                                 | Total Marks                | 100M |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |  |           |
|---|--|-----------|
| CO No:  | Course Outcome Description   | K - Level |
| CO1   | Understand the principles of engineering drawing, including engineering curves, scales.  | 3         |
| CO2   | Draw orthographic projections of the points and projections of lines inclined to one principal plane & inclined to both the planes | 3         |
| CO3   | Draw Orthographic projections of planes, solids (simple position and inclined to both the planes)                                  | 3         |
| CO4   | Explain principles behind development of surfaces and Sections of solids in simple position only.                                  | 3         |
| CO5   | Draw orthographic and isometric views of different parts.  | 3         |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|------|------|------|------|------|
| CO1    | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | 3     | -    | 2    | 2    | 2    | 2    |
| CO2    | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | 3     | -    | 2    | 2    | 2    | 2    |
| CO3    | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | 3     | -    | 2    | 2    | 2    | 2    |
| CO4    | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | 3     | -    | 2    | 2    | 2    | 2    |
| CO5    | 3   | 2   | 2   | -   | 3   | -   | -   | -   | -   | 3     | -    | 2    | 2    | 2    | 2    |

### COURSE CONTENT:

#### UNIT I

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

**Curves:** construction of ellipse, parabola and hyperbola by general method, Cycloids, Involutives, Normal and tangent to Curves.

**Scales:** Plain scales, diagonal scales and vernier scales.

## **UNIT II**

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

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

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

## **UNIT III**

**Projections of Solids:** Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane, Projection of Solids with axis inclined to one reference plane.

## **UNIT IV**

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

**Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

## **UNIT V**

**Conversion of Views:** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views for simple solids.

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

**TEXT BOOKS:**

[1].N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

**REFERENCE BOOKS:**

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

**E-RESOURCES/DIGITAL MATERIAL:**

- a) <https://nptel.ac.in/courses/112103019>
- b) <https://archive.nptel.ac.in/courses/112/102/112102304/>

## IT WORKSHOP

|                  |                                 |                            |      |   |   |
|------------------|---------------------------------|----------------------------|------|---|---|
| Course Category: | <b>Engineering Science (ES)</b> | Credits: 1                 |      |   |   |
| Course Type:     | <b>Practical</b>                | Lecture-Tutorial-Practice: | 0    | 0 | 2 |
| Prerequisites    |                                 | Continuous Evaluation      | 30M  |   |   |
|                  |                                 | Semester End Evaluation    | 70M  |   |   |
|                  |                                 | Total Marks                | 100M |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |   |           |
|---|---|-----------|
| CO No:  | Course Outcome Description  | K - Level |
| CO1   | Identify, assemble the components of a computer   | 3         |
| CO2   | Configure, evaluate, and select hardware platforms for the implementation and execution of computer applications, services and systems                | 3         |
| CO3   | Make use of tools for converting pdf to word and vice versa   | 3         |
| CO4   | Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, FOSS, LaTeX | 3         |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1    | 3   | -   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    | 3    | 3    |
| CO2    | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -    | -    | -    | 3    | 3    |
| CO3    | -   | 3   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | -    | 3    | 3    |
| CO4    | -   | 3   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | -    | 3    | 3    |

### COURSE CONTENT:

#### PC Hardware & Software Installation

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



**Task2:** 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 Aviva.

**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.

**Task5:** Every student should install BOSS on the computer. The system should be configured as dual boot (VMware) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva.

### **Internet & World Wide Web**

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

**Task2:** Web Browsers, Surfing the Web: Students customize their web browsers with the Leprosy settings, bookmarks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task3:** Search Engines& Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

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

### **Latex and Word**

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

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

**Task 3:** Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and

Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task4:** Creating a Newsletter: Features to be covered: -Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

## **EXCEL**

**Excel Orientation:** The mentor needs state 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, autofill, Formatting Text

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

## **LOOKUP/VLOOKUP**

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

## **POWERPOINT**

**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, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

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

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

## **AITOOLS –ChatGPT**

**Task1:** Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing in complete sentences to see how the model completes them.

- Ex: Prompt: "Your area knowledge able AI. Please answer the following question: What is the capital of France?"

**Task2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of ascend, and let the model generate their list of the content. This can be a fun way to brainstorm creative ideas.

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

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

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

### **TEXTBOOKS:**

1. Computer Fundamentals, Anita Goal, Pearson India Education, 2017
2. Introduction to PC Hardware Trouble Shooting Made Easy, Mike Meyers, McGraw Hill Education, 2017

### **REFERENCE BOOKS:**

1. Comdex Information Technology course toolkit, VikasGupta, WILEY Dreamtech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dreamtech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2<sup>nd</sup> edition.
4. PC Hardware-A Handbook, Kate J.Chase, PHI(Microsoft), 2004
5. LaTeX Companion, Leslie Lamport, PHI/Pearson. 2<sup>nd</sup> Edition.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinsen and Ken Quamme. – CISCO Press, Pearson Education, 3<sup>rd</sup> edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCO Press, Pearson Education, 3<sup>rd</sup> edition

**ENGINEERING MECHANICS**  
(Common to Mechanical & Civil Engineering)

|                  |                               |                            |      |   |   |
|------------------|-------------------------------|----------------------------|------|---|---|
| Course Category: | <b>Professional Core (PC)</b> | Credits : 3                |      |   |   |
| Course Type:     | <b>Theory</b>                 | Lecture-Tutorial-Practice: | 3    | 0 | 0 |
| Prerequisites    | -                             | Continuous Evaluation      | 30M  |   |   |
|                  |                               | Semester End Evaluation    | 70M  |   |   |
|                  |                               | Total Marks                | 100M |   |   |

**Course Outcomes:**

| After Successful Completion of course, the student will be able to: |   |           |
|---|---|-----------|
| CO No:  | Course Outcome Description  | K - Level |
| CO1   | Compute resultant of a forces in planer & spatial systems. Find out the Friction force in different cases                 | 3         |
| CO2   | Analyze planar, spatial force systems with and without friction under static equilibrium by analytical & graphical method | 3         |
| CO3   | locate centroid, center of gravity and mass moment of inertia of composite areas and composite bodies respectively        | 3         |
| CO4   | Analyze motion of particles and rigid bodies and apply the principles of motion, work energy and impulse momentum         | 3         |
| CO5   | Solve the problems involving the translational and rotational motion of rigid bodies                                      | 3         |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1    | 3   | 3   | 2   | -   | -   | -   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |
| CO2    | 3   | 3   | 3   | 3   | -   | 2   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |
| CO3    | 3   | 3   | 3   | 3   | -   | 2   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |
| CO4    | 3   | 3   | 3   | 3   | -   | 2   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |
| CO5    | 3   | 3   | 3   | 3   | -   | 2   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |

**COURSE CONTENT:**

**UNIT I**

**Introduction to Engineering Mechanics**– Basic Concepts. Scope and Applications

**Systems of Forces:** Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems.

**Friction:** Introduction, limiting friction and impending motion, Coulomb’s laws of dry friction, coefficient of friction, Cone of Static friction.

## **UNIT II**

**Equilibrium of Systems of Forces:** Free Body Diagrams, Lami’s Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses.

Principle of virtual work with simple examples

## **UNIT III**

**Centroid:** Centroids of simple figures (from basic principles)–Centroids of Composite Figures.

**Centre of Gravity:** Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems

**Area Moments of Inertia:** Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

**Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

## **UNIT IV**

**Rectilinear and Curvilinear motion of a particle:** Kinematics and Kinetics –D’Alembert’s Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

## **UNIT V**

**Rigid body Motion:** Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

**TEXT BOOKS:**

- [1]. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
- [2]. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
- [3]. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

**REFERENCE BOOKS:**

- 1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
- 2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
- 3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
- 4. Introduction to Statics and Dynamics, BasudevBattachatia, Oxford University Press, 2014. Second Edition
- 5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition
- 6. Engineering Mechanics, Volume 2. Engineering Mechanics, Ferdinand Leon Singer ; Author, Ferdinand Leon Singer ; Edition, 2.
- 7. Vector Mechanics for Engineers : Statics. Boston, Beer, Ferdinand P. (Ferdinand Pierre), 1915-2003, McGraw-Hill, 2004.

**E-RESOURCES/DIGITAL MATERIAL:**

- a) <https://archive.nptel.ac.in/courses/112/106/112106286/>

## ENGINEERING PHYSICS LAB

|                  |  |                            |      |   |   |
|------------------|--|----------------------------|------|---|---|
| Course Category: | <b>BS</b>  | Credits: 1                 |      |   |   |
| Course Type:     | <b>Practical</b>   | Lecture-Tutorial-Practice: | 0    | 0 | 2 |
| Prerequisites    | Basic concepts of Physics and units of physical parameters | Continuous Evaluation      | 30M  |   |   |
|                  |  | Semester End Evaluation    | 70M  |   |   |
|                  |  | Total Marks                | 100M |   |   |

### Course Outcomes:

| After Successful Completion of course, the student will be able to: |  |           |
|---|--|-----------|
| CO No:  | Course Outcome Description   | K - Level |
| CO1   | Examine the physical properties of light using interference, diffraction and polarization phenomena. | Applying  |
| CO2   | Determine the acceleration due to gravity and rigidity modulus of the material by pendulum methods.  | Applying  |
| CO3   | Measure the frequency response by resonance using electrical method.                                 | Applying  |
| CO4   | Demonstrate the magnetic and dielectric behaviour of materials                                       | Applying  |
| CO5   | Analyze the characteristics of semiconducting materials  | Applying  |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1    | 3   |     |     |     | 3   |     |     |     | 3   |      |      |      |      |      |
| CO2    | 3   |     |     |     | 3   |     |     |     | 3   |      |      |      |      |      |
| CO3    | 3   |     |     |     | 3   |     |     |     | 3   |      |      |      |      |      |
| CO4    | 3   |     |     |     | 3   |     |     |     | 3   |      |      |      |      |      |
| CO5    | 3   |     |     |     | 3   |     |     |     | 3   |      |      |      |      |      |

## **COURSE CONTENT:**

### **List of Engineering Physics Experiments**

1. Determination of radius of curvature of given plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
4. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
5. Determination of frequency of electrically maintained tuning fork by Melde's experiment.
6. Determination of dielectric constant using charging and discharging method.
7. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
8. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
9. Determination of energy gap of a semiconductor using p-n junction diode
10. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

### **Additional Experiments:**

11. Study frequency response of a LCR series resonance circuit.
12. Study the V-I characteristics of P-N junction diode.

### **References:**

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

### **E-RESOURCES/DIGITAL MATERIAL**

#### Web Resources

- [www.vlab.co.in](http://www.vlab.co.in)
- <https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>





**Activities:**

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc. Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter. Provide some exercises so that measuring instruments are learned to be used by the students.

**Components:**

2. Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
2. Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

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

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

**Reference Books:**

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

**Note:** Minimum Six Experiments to be performed.

## **ENGINEERING MECHANICS LAB**

(Common to Mechanical & Civil Engineering)

|                  |                               |                            |      |   |   |
|------------------|-------------------------------|----------------------------|------|---|---|
| Course Category: | <b>Professional Core (PC)</b> | Credits: 1.5               |      |   |   |
| Course Type:     | <b>Practical</b>              | Lecture-Tutorial-Practice: | 0    | 0 | 3 |
| Prerequisites    | Practical                     | Continuous Evaluation      | 30M  |   |   |
|                  |                               | Semester End Evaluation    | 70M  |   |   |
|                  |                               | Total Marks                | 100M |   |   |

### **Course Outcomes:**

| After Successful Completion of course, the student will be able to: |   |           |
|---|---|-----------|
| CO No:  | Course Outcome Description  | K - Level |
| CO1   | Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller | 2         |
| CO2   | Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever                        | 3         |
| CO3   | Determine the Centre of gravity and Moment of Inertia of different configurations.                                | 3         |
| CO4   | Verify the equilibrium conditions of a rigid body under the action of different force systems.                    | 3         |

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

| CO No. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1    | 3   | 2   | 2   | -   | -   | -   | -   | 3   | 3   | -    | -    | -    | 3    | 2    | -    |
| CO2    | 3   | 2   | 2   | -   | -   | -   | -   | 3   | 3   | -    | -    | -    | 3    | 2    | -    |
| CO3    | 3   | 2   | 2   | -   | -   | -   | -   | 3   | 3   | -    | -    | -    | 3    | 2    | -    |
| CO4    | 3   | 2   | 2   | -   | -   | -   | -   | 3   | 3   | -    | -    | -    | 3    | 2    | -    |

### **COURSE CONTENT:**

1. Verification of Law of Parallelogram of Forces.
2. Verification of Law of Triangle of Forces.
3. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in

equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.

4. Determination of coefficient of Static and Rolling Frictions
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non-concurrent, parallel force system with the help of a simply supported beam.
7. Study of the systems of pulleys and draw the free body diagram of the system.
8. Determine the acceleration due to gravity using a compound pendulum.
9. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
10. Determine the Moment of Inertia of a Flywheel.
11. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

#### Reference Books:

- [1]. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.
- [2]. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022

#### E-Resources:

- a) <https://archive.nptel.ac.in/courses/112/106/112106286/>

## NSS/NCC/ Scouts & Guides/Community Service

|   |   |                        |           |
|---|---|------------------------|-----------|
| <b>Lecture – Tutorial:</b>  | 0   | <b>Internal Marks:</b> | <b>10</b> |
| <b>Credits:</b>   | 0.5   | <b>External Marks:</b> | <b>90</b> |
| <b>Prerequisites:</b>   |   |                        |           |
| <b>Course Objectives:</b> The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service. |   |                        |           |
| <b>Course Outcomes :</b> At the end of the course students will be able to:   |   |                        |           |
| CO1   | Understand the importance of discipline, character and service motto.             |                        |           |
| CO2   | Solve some societal issues by applying acquired knowledge, facts, and techniques. |                        |           |
| CO3   | Explore human relationships by analyzing social problems.                         |                        |           |
| CO4   | Determine to extend their help for the fellow beings and downtrodden people.      |                        |           |
| CO5   | Develop leadership skills and civic responsibilities.                             |                        |           |

| <b>Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2-Medium, 3 – High)</b> |             |             |             |             |             |             |             |             |             |              |              |              |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|
|  | <b>PO 1</b> | <b>PO 2</b> | <b>PO 3</b> | <b>PO 4</b> | <b>PO 5</b> | <b>PO 6</b> | <b>PO 7</b> | <b>PO 8</b> | <b>PO 9</b> | <b>PO 10</b> | <b>PO 11</b> | <b>PO 12</b> |
| CO1  |             |             |             |             |             |             |             |             |             |              |              |              |
| CO2  |             |             |             |             |             |             |             |             |             |              |              |              |
| CO3  |             |             |             |             |             |             |             |             |             |              |              |              |
| CO4  |             |             |             |             |             |             |             |             |             |              |              |              |
| CO5  |             |             |             |             |             |             |             |             |             |              |              |              |

|   |
|---|
| <p><b>UNIT –I : Orientation</b></p> <p>General Orientation on NSS/NCC/ Scouts &amp; Guides/Community Service activities, career guidance.</p> <p>Activities:</p> <ol style="list-style-type: none"> <li>i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills</li> <li>ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.</li> <li>iii) Displaying success stories-motivational biopics- award winning movies on societal issues</li> </ol> |
|---|

etc.

iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

#### UNIT –II : Nature &

##### Care Activities:

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

#### UNIT- III : Community

##### Service Activities:

- i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities- experts-etc.
- ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- iii) Conducting consumer Awareness. Explaining various legal provisions etc.
- iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- v) Any other programmes in collaboration with local charities, NGOs etc.

#### **REFERENCE BOOKS:**

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