*D. Y. Patil Education Society's*

# D. Y. Patil Technical Campus
# Faculty of Engineering & Faculty of Management
# Talsande

*(An Autonomous Institute)*

**Approved by AICTE and Affiliated to Shivaji University, Kolhapur**

***(Accredited by NAAC 'A' Grade with 3.25 CGPA in First Cycle)***

## Curriculum Structure

**With Effective from Academic Year 2024-25**

# LIST OF ABBREVIATIONS

| Sr. No | Abbreviations | Courses |
|---|---|---|
| 1 | BSC | Basic Science Course |
| 2 | ESC | Engineering Science Course |
| 3 | PCC | Programme Core Course |
| 4 | PEC | Programme Elective Course |
| 5 | MDM | Multidisciplinary Minor |
| 6 | OE | Open Elective |
| 7 | VSEC | Vocational and Skill Enhancement Course |
| 8 | AEC | Ability Enhancement Course |
| 9 | HSSM | Humanities Social Science and Management |
| 10 | IKS | Indian Knowledge System |
| 11 | VEC | Value Education Course |
| 12 | FP | Field Project |
| 13 | ELC | Experiential Learning Courses |
| 14 | CC | Co-curricular Courses |
| 15 | MC | Mandatory Course |
| 16 | ISE | In Semester Evaluation |
| 17 | MSE | Mid Semester Examination |
| 18 | CA | Continuous Assessment |
| 19 | POE | Practical Oral Examination |
| 20 | ESE | END Semester Examination |

# CURRICULUM FRAMEWORK

## The Course and Credit Distribution

| Sr. No | Type of Course | No. of Courses | | Total No. Credit | |
|---|---|---|---|---|---|
| | | Sem I | Sem II | Sem I | Sem II |
| 1 | Basic Science Course (BSC) | 2 | 2 | 8 | 8 |
| 2 | Engineering Science Course (ESC) | 2 | 1 | 8 | 5 |
| 3 | Programme Core Course (PCC) | | 1 | | 2 |
| 4 | Programme Elective Course (PEC) | | | | |
| 5 | Multidisciplinary Minor (MDM) | | | | |
| 6 | Open Elective (OE) | | | | |
| 7 | Vocational and Skill Enhancement Course (VSEC) | 1 | 1 | 2 | 2 |
| 8 | Ability Enhancement Course (AEC) | | 1 | | 1 |
| 9 | Humanities Social Science and Management (HSSM) | | | | |
| 10 | Indian Knowledge System (IKS) | 1 | | 2 | |
| 11 | Value Education Course (VEC) | | | | |
| 12 | Field Project (FP) | | | | |
| 13 | Experiential Learning Courses (ELC) | | | | |
| 14 | Co-curricular Courses (CC) | 1 | 1 | 2 | 2 |
| 15 | Mandatory Course (MC) | | | | |
| Total | | 7 | 7 | 22 | 20 |

| Semester wise Course Distribution | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Sr. No | Course Category | Number of Courses per Semester | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| 1 | Basic Science Course (BSC) | 2 | 2 | | | | | | | 4 |
| 2 | Engineering Science Course (ESC) | 2 | 1 | | | | | | | 3 |
| 3 | Programme Core Course (PCC) | | 1 | 3 | 3 | 3 | 3 | 2 | 2 | 17 |
| 4 | Programme Elective Course (PEC) | | | | | 1 | 2 | 2 | 1 | 6 |
| 5 | Multidisciplinary Minor (MDM) | | | 1 | 1 | 1 | 1 | 1 | 1 | 6 |
| 6 | Open Elective (OE) | | | 1 | 1 | 1 | | | | 3 |
| 7 | Vocational and Skill Enhancement Course (VSEC) | 1 | 1 | | 1 | | 1 | | | 4 |
| 8 | Ability Enhancement Course (AEC) | | 1 | | 1 | | | | | 2 |
| 9 | Entrepreneurship Management Courses | | | 1 | 1 | | | | | 2 |
| 10 | Indian Knowledge System (IKS) | 1 | | | | | | | | 1 |
| 11 | Value Education Course (VEC) | | | 1 | 1 | | | | | 2 |
| 12 | Research Methodology | | | | | | | 1 | | 1 |
| 13 | Field Project (FP) | | | 1 | | | | | | 1 |
| 14 | Project | | | | | | | 1 | | 1 |
| 15 | Internship | | | | | | | | 1 | 1 |
| 16 | Co-curricular Courses (CC) | 1 | 1 | | | | | | | 2 |
| Total | | 7 | 7 | 8 | 9 | 6 | 7 | 7 | 5 | 56 |

| CREDIT DISTRIBUTION : SEMESTER WISE | | | | | | | | | | Total | Total Credits GR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit | | | | | | | | | | | |
| Sr. No | Type of Course | No of Credits/ Semester | | | | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| 1 | Basic Science Course (BSC) | 8 | 8 | | | | | | | 16 | 14-18 |
| 2 | Engineering Science Course (ESC) | 8 | 5 | | | | | | | 13 | 16-12 |
| 3 | Programme Core Course (PCC) | | 2 | 10 | 10 | 12 | 10 | 6 | 4 | 54 | 44-56 |
| 4 | Programme Elective Course (PEC) | | | | | 4 | 8 | 2 | 6 | 20 | 20 |
| 5 | Multidisciplinary Minor (MDM) | | | 2 | 2 | 4 | 2 | 2 | 2 | 14 | 14 |
| 6 | Open Elective (OE) | | | 4 | 2 | 2 | | | | 8 | 8 |
| 7 | Vocational and Skill Enhancement Course (VSEC) | 2 | 2 | | 2 | | 2 | | | 7 | 8 |
| 8 | Ability Enhancement Course (AEC) | | 1 | | | | | | | 4 | 4 |
| 9 | Humanities Social Science and Management (HSSM) | | | 2 | 2 | | | | | 4 | 4 |
| 10 | Indian Knowledge System (IKS) | 2 | | | | | | | | 2 | 2 |
| 11 | Value Education Course (VEC) | | | 2 | 2 | | | | | 4 | 4 |
| 12 | Research Methodology | | | | | | | | 4 | 4 | 4 |
| 13 | Field Project | | | 2 | | | | | | 2 | 2 |
| 14 | Project | | | | | | | | 4 | 4 | 4 |
| 15 | Internship | | | | | | | 12 | | 12 | 12 |
| 16 | Co-curricular Courses (CC) | 2 | 2 | | | | | | | 4 | 4 |
| Total | | 22 | 20 | 22 | 22 | 22 | 22 | 22 | 20 | 172 | 160-176 |

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## Department of Mechanical Engineering

**Curriculum Structure**

**First Year Mechanical Engineering Program (Course 2024-25)**

**With Effective from Academic Year 2024-25**

# Curriculum Structure

## First Year Mechanical Engineering

# D. Y. PATIL TECHNICAL CAMPUS

**FACULTY OF ENGINEERING & FACULTY OF MANAGEMENT, TALSANDE**

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## SCHEME OF INSTRUCTION & CURRICULUM

## Programme: - Mechanical Engineering

## Semester - I

| Sr. No. | Course Category | Course Code | Course Title | L | T | P | Course Credits | EXAMS CHEME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ISE | MSE | ESE | INT | TOTAL |
| 1 | BSC | AM24FE111 | Applied Mathematics-I | 3 | 1 | - | 4 | 20 | 30 | 50 | 25 | 125 |
| 2 | | CHEM24FE112 | Applied Chemistry | 3 | - | - | 3 | 20 | 30 | 50 | - | 100 |
| | | CHEM24FE112P | Applied Chemistry Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 3 | ESC | PSCL24FE113 | Problem Solving with C-Language | 3 | - | - | 3 | 20 | 30 | 50 | - | 100 |
| | | PSCL24FE113P | Problem Solving with C-Language Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 4 | | EGCAD24FE114 | Engineering Graphics & Computer Aided Drawing | 3 | - | - | 3 | 20 | 30 | 50 | - | 100 |
| | | EGCAD24FE114P | Engineering Graphics & Computer Aided Drawing Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 5 | VSEC | DTTI24FE115 | Design Thinking Through Innovation | 1 | - | | 1 | 25 | - | - | - | 25 |
| | | DTTI24FE115P | Design Thinking Through Innovation Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 6 | AEC | PC24FE116 | Professional Communication | 1 | - | - | 1 | 25 | - | - | - | 25 |
| | | PC24FE116P | Professional Communication Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 7 | CCA | NSS24FE117 | NSS | 1 | - | 2 | 2 | - | - | - | 50 | 50 |
| **Total** | | | | **15** | **1** | **12** | **22** | **130** | **120** | **200** | **200** | **650** |
| **Noncredit Mandatory Course** | | | | | | | | | | | | |
| 8 | MC | MC24FE118 | Finishing School Training I | 3 | - | - | NC | - | - | - | Grade | Grade |
| 9 | | MC24FE119 | Rural/ Social Internship | - | - | - | NC | - | - | - | Grade | Grade |

Note: This structure is approved by Academic Council in the meeting dated 03.09.2024

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## SCHEME OF INSTRUCTION & SYLLABI

## Programme: - Mechanical Engineering

## Semester - II

| Sr. No. | Course Category | Course Code | Course Title | L | T | P | Course Credits | EXAMS CHEME | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ISE | MSE | ESE | INT | TOTAL |
| 1 | BSC | AM24FE121 | Applied Mathematics-II | 3 | 1 | - | 4 | 20 | 30 | 50 | 25 | 125 |
| 2 | | PHY24FE122 | Applied Physics | 3 | - | - | 3 | 20 | 30 | 50 | - | 100 |
| | | PHY24FE122P | Applied Physics Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 3 | ESC | GENAI24FE123 | Generative AI | 3 | - | - | 3 | 20 | 30 | 50 | - | 100 |
| | | GENAI24FE123P | Generative AI Laboratory | - | - | 2 | 1 | - | - | - | 25 | 25 |
| 4 | PCC | FME24FE124 | Fundamentals of Mechanical Engineering | 2 | - | - | 2 | - | - | 50 | - | 50 |
| 5 | VSEC | CSMW24FE125 | Carpentry and Sheet Metal Working | 1 | - | 2 | 2 | 25 | - | - | 25 | 50 |
| 6 | IKS | ITPA24FE126 | Indian Town Planning and Architecture | 2 | - | - | 2 | 20 | - | 30 | - | 50 |
| 7 | CCA | YOGA24FE127 | Yoga | 1 | - | 2 | 2 | - | - | - | 50 | 50 |
| **Total** | | | | **15** | **1** | **8** | **20** | **105** | **90** | **230** | **150** | **575** |
| **Noncredit Mandatory Course** | | | | | | | | | | | | |
| 8 | MC | MC24FE128 | Finishing School Training II | 3 | - | - | NC | - | - | - | Grade | Grade |
| 9 | | MC24FE129 | Capstone Project | - | - | - | NC | - | - | - | Grade | Grade |

Note: This structure is approved by Academic Council in the meeting dated 03.09.2024

| **Course Title : Applied Mathematics I** | |
|---|---|
| **Course Code: AM24FE111** | **Semester: I** |
| **Teaching Scheme: L-T-P :3 – 1 – 0** | **Credits : 4** |
| **Evaluation Scheme: ISE-I (10 Marks), MSE (30 Marks), ISE-II (10 Marks)** | **ESE Marks : 50 marks** |

| **Prior Knowledge of:** | Matrices, Derivatives. |
|---|---|

**Course Objectives:**

| | |
|---|---|
| **1.** | To teach mathematical methodology. |
| **2.** | To develop mathematical skills and enhance logical thinking power of students. |
| **3.** | To provide students with skills in Linear Algebra and Statistics and differential calculus. |
| **4.** | To imbibe graduates with mathematical knowledge, computational skills and the ability to deploy the skills effectively in solution of engineering problems. |

**CurriculumDetails**

| **Course Contents** | **Duration** |
|---|---|
| **Unit-I : LinearAlgebra–I**<br>• Introductiontomatrices,typesof matrices.<br>• Rankofmatrixbynormalformandechelon form.<br>• Solutionofsimultaneouslinearnon-homogenous equations.<br>• Solutionofsimultaneouslinearhomogenous equations. | **07 Hrs** |
| **Unit-II : LinearAlgebra–II**<br>• Definitionoflinearcombinationof vectors.<br>• Dependenceandindependenceof vectors.<br>• Eigenvaluesandits properties.<br>• Eigenvectorsandits properties.<br>• Cayley – Hamilton theorem ( Without proof) | **07 Hrs** |
| **Unit-III :NumericalSolutionsofLinear Equations**<br>• Introduction<br>• Gauss–Elimination method<br>• Gauss–Jordan method<br>• Gauss–Seidel method<br>• Jacobi'siterative method | **07 Hrs** |
| **Unit-IV : Probability Distribution** | **08 Hrs** |

| Course Contents | Duration |
|---|---|
| • Random variables.<br>• Discrete Probability distribution.<br>• Continuous probability distribution.<br>• Binomial Distribution.<br>• Poisson Distribution.<br>• Normal Distribution. | |
| **Unit-V : Correlation and Regression and Fitting of Curves**<br>• Introduction, Types of correlation, Karl Pearson's coefficient of correlation.<br>• Interpretation of the coefficients of correlation.<br>• Computation of coefficient of correlation for ungroup data<br>• Lines of regression .<br>• Calculations of equations of the lines of regression.<br>• Fit a first degree curve.<br>• Fit a second degree curve.<br>• Fit an exponential curve $y = a .x^b$, $y = a. b^x$ | **08 Hrs** |
| **Unit-VI : Partial Differentiation**<br>• Introduction.<br>• Partial derivatives.<br>• Total derivatives.<br>• Euler'stheoremonhomogeneousfunctions.<br>• Jacobiananditsproperties.<br>• Maxima and Minima. | **08 Hrs** |

**Course Outcomes (COs):**After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| **1** | **understand** matrices and **apply** such knowledge to solve linear system of equation and find eigen values and eigen vectors. |
| **2** | **use** numerical methods to solve system of linear equation |
| **3** | **describe** the statistical data numerically by using Lines of regression and Curve fittings, **solve** the problems on probability distribution |
| **4** | **solve** the problems on partial differentiation and **apply** such knowledge to find maxima and minima |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 ,3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| 2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - |
| 3 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| 4 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - |

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Advanced Engineering Mathematics | 7th | PeterV.O'Neil | Cengage Learning | 2012 |
| 2 | Advanced Engineering Mathematics | 1st | H.K.Dass | S. Chand Publications, New Delhi | 2011 |
| 3 | A Text Book of Applied Mathematics | 7th | P.N.Wartikar, J.N.Wartikar | VidyarthiGrihaPrakashan,Pune. | 2006 |
| 4 | Higher Engineering Mathematics | 36th | B.S.Grewal | Khanna Publishers | 2001 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Advanced Engineering Mathematics | 5th | ErwinKreyszig | IndiaPvt.,Ltd. | 2014 |
| 2 | Higher Engineering Mathematics | 6th | B.V.Ramana | TataM/cGraw – HillPublication | 2010 |
| 3 | Numerical Methods for Scientific and Engineering Computation | 5th | M.K.Jain | New Age International Pvt.LtdNew Delhi | 2007 |
| 4 | A Textbook of Engineering Mathematics | 6th | N.P.Bali,Iyengar | Laxmi Publication | 2004 |

**Useful Link /Web Resources:**

1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in

**List of Tutorials:**

| Tut. No | Title of Tutorials | Duration |
|---|---|---|
| 01 | LinearAlgebra–I | 01 Hr |
| 02 | LinearAlgebra–I | 01 Hr |
| 03 | LinearAlgebra–II | 01 Hr |
| 04 | LinearAlgebra–II | 01 Hr |
| 05 | NumericalSolutions of Linear Equations | 01 Hr |
| 06 | Numerical Solutions of Linear Equations | 01 Hr |
| 07 | Probability Distribution | 01 Hr |
| 08 | Probability Distribution | 01 Hr |
| 09 | Correlation and Regression and Fitting of Curves | 01 Hr |
| 10 | Correlation and Regression and Fitting of Curves | 01 Hr |
| 11 | Partial Differentiation | 01 Hr |
| 12 | Partial Differentiation | 01 Hr |

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**(Programme – Mechanical Engineering) w.e.f. A.Y. 2024-2025**

| | |
|---|---|
| **Course Title: Applied Chemistry** | |
| **Course Code: CHEM24FE112** | **Semester: I** |
| **Teaching Scheme: L-T-P: 3-0-0** | **Credits: 3** |
| **Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-II (10 marks)** | **ESE Marks: 50 marks** |

| | |
|---|---|
| **Prior Knowledge of:** | Physical and chemical properties of water, basics knowledge ceramic, properties of elements and metallic material, electrochemistry, green chemistry |

**Course Objectives:**

| | |
|---|---|
| 1. | To analyze water quality parameters and metallic materials. |
| 2. | To explain the corrosion mechanism, methods and to prevent corrosion. |
| 3 | To create interest among the students regarding various engineering materials. |
| 4. | To think about green chemistry and pollution |
| 5. | To understand the basic concepts of battery techniques. |

**Curriculum Details**

| Course Contents | Duration |
|---|---|
| **UNIT I: Water Treatment**<br>• Introduction,<br>• Impurities in natural water,<br>• Water quality parameters like pH, acidity, alkalinity, chlorides, total solids and hardness of water (causes, types, and units of hardness).<br>• Ill effects of hard water in steam generation in boilers,<br>• Numerical problems on hardness,<br>• Treatment of hard water by Ion exchange process and Reverse osmosis process (R.O.). | **07 Hrs** |
| **UNIT II: Corrosion and its Control**<br>• Introduction,<br>• types of corrosion - atmospheric corrosion (oxidation corrosion), electrochemical corrosion - hydrogen evolution and oxygen absorption mechanism,<br>• factors affecting the rate of corrosion,<br>• Prevention of corrosion by proper selection of material and proper designing, cathodic protection – sacrificial anodic method and external current method, hot dipping- galvanizing and tinning, electroplating, metal spraying and metal cladding. | **07 Hrs** |
| **UNIT III:Metallic and Ceramic Materials**<br>**Metallic materials**: | **07 Hrs** |

| | |
|---|---|
| • Introduction,<br>• Alloys - definition and classification, purposes of making an alloy.<br>• Ferrous alloys: Plain carbon steel (mild, medium and high), stainless steel.<br>• Non-ferrous alloys: Copper alloys – Brass & Bronze, Nickel alloy - Nichrome, Aluminum alloys - Duralumin and Alnico, Tin alloy - Solder metal.<br>**Ceramics Materials:**<br>• Definition,<br>• Classification.<br>• Properties of Ceramics,<br>• Manufacturing process and chemical composition of Portland cement,<br>• Mechanism of setting and hardening. | |
| **UNIT IV:Polymers and Cement Chemistry**<br>**Polymers:**<br>• Plastics, thermos-softening and thermosetting plastics<br>• Industrially important plastics like phenol formaldehyde, urea formaldehyde, Conducting polymers and Biopolymers (Introduction, examples and applications.)<br>**Cement Chemistry:**<br>• Cement manufacturing, dry process, wet process, semi dry process,<br>• Hydration reactions | **07 Hrs** |
| **UNIT V: Green Chemistry and Pollution**<br>• Introductions of green chemistry,<br>• 12 principles of green chemistry,<br>• Synthesis of chemicals by green chemistry routes,<br>• 3Rs - Reduce, Reuse and Recycle,<br>• disposal of plastics,<br>• Biodegradable polymers- need, constituents, required, factors, properties, applications,<br>• Microwave and ultrasound assisted reactions, examples of green synthesis.<br>• Air pollution, soil pollution, water pollution (causes and preventive measures) | **07 Hrs** |
| **UNIT VI:Energy System and Battery Technology**<br>• Introduction, Classification of batteries (primary and secondary batteries).<br>• Construction, working, advantages and applications of carbon-zinc cell, Ni-Cd and Li- ion battery as an electrochemical cell.<br>• Principle, Properties and applications of Quantum dots sensitized solar cells (QDSSC's).<br>• Fuel cells: Concept, types of fuel cells and merits.<br>Construction, working and applications, phosphoric acid fuel cell and Hydrogen- oxygen fuel cell | **07 Hrs** |

Remarks

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| 112.1 | **Remember** the water quality parameters and water treatment methods to solve the domestic and industrial problems. |
| 112.2 | **Select** proper engineering materials for industries and apply the knowledge of corrosion for prevention of corrosion. |
| 112.3 | **Apply** the knowledge of metallic and ceramic materials on selection of engineering materials. |
| 112.4 | **Use** the knowledge of polymer, nanomaterials,green chemistry and its characterization techniques in engineering field |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.1 | 1 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 |
| 112.2 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| 112.3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| 112.4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |

**Text Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Engineering Chemistry" (15th Ed.) by P. C. Jain & Monica Jain, Dhanpat Rai & Co. | 15th | by P. C. Jain & Monica Jain, Dhanpat Rai & Co. | Dhanpat Rai Publishing Company | 2015 |
| 2 | "A Textbook of Engineering Chemistry" by Dr. S. S. Dara &Dr. S. S. Umare S. Chand & Company Ltd. | New | Dr. S. S. Dara &Dr. S. S. Umare S. Chand & Company Ltd. | S Chand | 2004 |
| 3 | "A Text Book of Engineering Chemistry" by Shashi Chawla Dhanpat Rai & Co. | 6th | Shashi Chawla Dhanpat Rai & Co. | Dhanpat Rai & Co. (P) Limited | 2017 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Engineering Chemistry" (15th Ed.) by P. C. Jain & Monica Jain, Dhanpat Rai & Co. | 15th Ed | P. C. Jain & Monica Jain, Dhanpat Rai & Co. | Dhanpat Rai Publishing Company | 2015 |
| 2 | "Engineering Chemistry "by M. M. Uppal, Khanna Publishers. | 8th | M. M. Uppal | Khanna Publishers. | 1992 |
| 3 | Engineering Chemistry" by O.G.Palanna, Tata McGraw Hill Education Pvt. Ltd. | 2nd | O.G.Palanna, Tata | McGraw Hill Education | 2017 |

**Useful Link /Web Resources:**

**1.** https://www.vlab.co.in/broad-area-chemical-science

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**(Programme – Mechanical Engineering) w.e.f. A.Y. 2024-2025**

| **Course Title: Applied Chemistry Laboratory** | |
|---|---|
| **Course Code: CHEM24FE112P** | **Semester: I** |
| **Teaching Scheme: L-T-P: 0-0-2** | **Credit: 01** |
| **Evaluation Scheme: INT (25 marks)** | **ESE Marks: 00** |

| **Prior Knowledge of:** | Experiments based on titration, Handling of glassware's and chemicals |
|---|---|

**Course Objectives:**

| | |
|---|---|
| 1. | To test water quality parameters using various titration analysis methods |
| 2. | To estimate the corrosion rate and study the mechanism of corrosion to prevent corrosions |
| 3. | To describe the importance of polymeric materials |
| 4. | To synthesize simple advanced materials and estimate concentration of elements in materials. |
| 5. | To use pH meter and colorimeter |

**List of Experiments- Minimum 8 practical's need to perform from the following list**

| **Exp. No** | **Title of Experiments** | **Duration** |
|---|---|---|
| 01 | Determination of total hardness of water sample by EDTA method (Complexometric Titration). | 02 Hrs |
| 02 | Determination of acidity of given water sample. | 02 Hrs |
| 03 | Determination of alkalinity of given water sample. | 02 Hrs |
| 04 | Determination of chloride content of water sample by Mohr's method. | 02 Hrs |
| 05 | Determination of pH of various samples by using digital pH meter. | 02 Hrs |
| 06 | Determination of rate of corrosion of aluminum in acidic and basic medium. | 02 Hrs |
| 07 | Determination of percentage of copper in brass. | 02 Hrs |
| 08 | To study the construction and working of Galvanic cell | 02 Hrs |
| 09 | Preparation of urea formaldehyde resin. | 02 Hrs |
| 10 | Preparation of phenol formaldehyde resin. | 02 Hrs |
| 11 | Estimation of iron from a solution by colorimetry. | 02 Hrs |
| 12 | Estimation of copper from a solution by colorimetry | 02 Hrs |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| 112.1 | **Interpret** the calculation of various water quality parameters using titration methods |
| 112.2 | **Apply** the corrosion knowledge to know the process of corrosion |
| 112.3 | **Remember** the synthesis method of the advanced materials like urea and phenol formaldehyde resin |
| 112.4 | **Explaining** the use of pH meter, colorimeter for the analysis |

**Course Articulation Matrix:** Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

| PO's / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.1 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| 112.2 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |
| 112.3 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |
| 112.4 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 1 |

**Suggested Learning Resources: --**

**Text Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Laboratory manual on engineering chemistry | 1st | S. K. Bashin, Dr.Sudha Rani | Dhanpat Rai Publishing CompanyLtd.,New Delhi | 2012 |
| 2 | Engineering Chemistry | 15th | P. C. Jain, | Dhanpat Rai Publishing Company Ltd., New Delhi | 2014 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Laboratory manual on engineering chemistry | 1 st | S. K. Bashin, Dr. Sudha Rani | Dhanpat Rai Publishing Company Ltd., New Delhi | 2012 |
| 2 | Engineering Chemistry | 15th | P. C. Jain, | Dhanpat Rai Publishing Company Ltd., New Delhi | 2014 |

**Useful Link /Web Resources:**

1. https://www.vlab.co.in/broad-area-chemical-science

| | |
|---|---|
| **Course Title :-Problem Solving with Programming (C-Language)** | |
| **Course Code:- PSCL24FE113** | **Semester:- Semester–I** |
| **Teaching Scheme L-T-P : 03-00-00** | **Credits :3** |
| **Evaluation Scheme: ISE-I (10Marks), ISE-II (10Marks), MSE (30Marks)** | **ESE Marks: 50 marks** |

| | |
|---|---|
| **Prior Knowledge of:** | **Basic Knowledge of Computers** |

**Course Objectives:**

| | |
|---|---|
| **1.** | Understand working principles of programming languages |
| **2.** | Demonstrate use of decision and repetition structure in order to solve specific problem |
| **3.** | Use of modular approach for problem solving |
| **4.** | Understand the basics of pointers |

**Curriculum Details:**

| Course Contents | Duration |
|---|---|
| **Unit-I Introduction to C**<br>• Evolution of "C"<br>• Feature of "C"<br>• Structure of C Program<br>• Compilation and Execution<br>• Data Types – user defined<br>• pre-defined, Variables, Constants<br>• reading and printing variable values<br>• Preprocessor Directive | **08 Hrs** |
| **Unit-II Operators in C**<br>• Arithmetic Operators<br>• Relational Operators<br>• Logical Operators<br>• Unary Operators<br>• Bitwise Operators<br>• Ternary Operator<br>• sizeof operator | **07 Hrs** |
| **Unit-III Control Flow Statements & Blocks**<br>• Decision Controls<br>• If-else statements<br>• Switch Case<br>• Loops – for loop<br>• while loop<br>• do – while loop<br>• Loop interruption – break, continue, exit functions | **08 Hrs** |
| **Unit-IV Functions** | **08 Hrs** |

| Course Contents | Duration |
|---|---|
| • Fundamentals of function – function declaration and prototype<br>• Function definition<br>• Function call<br>• Return type and return statement<br>• Function arguments<br>• Scope of Variables in function<br>• Variable storage classes<br>• Storage classes – Automatic, Static, Register, External | |
| **Unit-V Arrays**<br>• Single Dimensional Array<br>• Multi-Dimensional Array<br>• Character Array<br>• Strings<br>• Built in String functions -strcat, strcmp, strcpy, strlen, strrev | **06 Hrs** |
| **Unit-VI Pointers**<br>• Address & Dereferencing<br>• Pointer Type Declaration<br>• Pointer Initialization<br>• Pointer Assignment<br>• Pointer Arithmetic<br>• Pointer Comparison<br>• Pointer & Functions – Passing Pointer to function, pass by value, pass by reference<br>• Pointer to array | **08 Hrs** |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| **1** | Explain features of "C" programming language. |
| **2** | Select appropriate operators in programming expressions for implementing simple C-Programs. |
| **3** | Explain Decision Making, Branching statements and looping statements for implementing Programs. |
| **4** | Model a given big problem statement in to smaller parts to provide modular approach. |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| 2 | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| 3 | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| 4 | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution: 1 No Contribution--

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | The Complete Reference | 4th | Herbert Schildt | McGraw-Hill Education | 2017 |
| 2 | "C" Programming Language | 2nd | Brian Kernighan, Dennis Ritchie | PHI Learning | 2011 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Practical "C" Programming | 3rd | Steve Oualline | Oreilly | 2013 |
| 2 | Programming in ANSI C | 8th | E. Balagurusamy | McGraw Hill Education | 2019 |

**Useful Link /Web Resources:**

1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in

| | |
|---|---|
| **Course Title : -- Problem Solving with C-Language Laboratory** | |
| **Course Code: - PSCL24FE113P** | **Semester: - Semester–I** |
| **Teaching Scheme L-T-P : - 00-00-02** | **Credits : 1** |
| **Evaluation Scheme: INT- 50 Marks** | **ESE/POE/OE Marks: -** |

| | |
|---|---|
| **Prior Knowledge of:** | **Basic Knowledge of Computers** |

**Course Objectives:**

| | |
|---|---|
| **1.** | Apply concepts of variable, constants, input and output streams for developing interactive programs. |
| **2.** | Develop a solution using loops and conditional statements |
| **3.** | Design solution using arrays. |
| **4.** | Develop an optimized solution for large problem using concept of function and pointer. |

**List of Experiments-**

| Exp. No | Title of Experiments | Duration |
|---|---|---|
| 01 | To study variables and constants in "C"<br>Practical/Experimentation:<br>• Declare and initialize variables and constant using assignment statement and scanf function<br>• Use printf function to display the variables – (data type formatting) | 02 Hrs |
| 02 | To Study arithmetic operators in "C"<br>• Develop program to use arithmetic operators | 02 Hrs |
| 03 | To Study logical operators and Conditional Execution<br>• Develop program to test conditional execution of the code –If else, else if, nested if else, else if ladder, switch | 02 Hrs |
| 04 | To Study Iterative Execution<br>• Develop program to test iterative execution of the code – while, do-while and for | 02 Hrs |
| 05 | To Study functions in "C"<br>• Develop function which accepts argument, process the argument and return the result – eg. Addition function accepts two numbers, performs addition and returns the result | 02 Hrs |
| 06 | To Study Arrays in "C"<br>• Develop a function which accepts a integer array and print the array<br>• Develop a function which accepts a integer array, perform arithmetic operation on array | 02 Hrs |
| 07 | To Study String and String Functions in "C"<br>• Develop a program which accepts a character array, string as input and display it<br>• Develop a program demonstrating various string functions [e.g. strlen(),strcpy(),strcat(),strcmp()] | 02 Hrs |
| 08 | To Study Multi-Dimensional Array<br>• Implement Matrix Addition using 2D array.<br>• Implement Matrix Multiplication using 2D array. | 02 Hrs |
| 09 | To Study Pointers in "C" | 02 Hrs |

| Exp. No | Title of Experiments | Duration |
|---|---|---|
| | • Develop a function to accept array argument using pointer, modify and display contents of the array using pointer | |
| 10 | To Study Pointers in "C"<br>• Pass integer variables using – pass by value and pass by reference concept<br>• Modify the values and test the effect on the variables by printing values in the function and main method | 02 Hrs |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| **1** | Use of variable, constants, input and output streams for developing interactive programs. |
| **2** | Writing control flow statement using C Programming. |
| **3** | Develop C program using array and function. |
| **4** | Develop C program solution for given problem using pointers. |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| 2 | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| 3 | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |
| 4 | 2 | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - |

Strongly Contribution: 3 Moderate Contribution: 2 Weak Contribution:1 No Contribution--

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | The Complete Reference | 4th | Herbert Schildt | McGraw-Hill Education | 2017 |
| 2 | "C" Programming Language | 2nd | Brian Kernighan, Dennis Ritchie | PHI Learning | 2011 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Practical "C" Programming | 3rd | Steve Oualline | Oreilly | 2013 |
| 2 | Programming in ANSI C | 8th | E. Balagurusamy | McGraw Hill Education | 2019 |

**Useful Link /Web Resources:**

1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in

| **Course Title : Engineering Graphics and Computer Aided Engineering Drawing** | |
|---|---|
| **Course Code: EGCAD24FE114** | **Semester: I** |
| **Teaching Scheme: L-T-P : 3-0-0** | **Credits : 3** |
| **Evaluation Scheme: ISE-I (10 Marks), MSE (30 Marks), ISE-II (10 Marks)** | **ESE Marks: 50** |

| **Prior Knowledge of:** | General Awareness, Knowledge of Geometry at SSC Level |
|---|---|

**Course Objectives:**

| | |
|---|---|
| 1. | To learn Manual as well as computer based Engineering Drawing. |
| 2. | To project line, plane and solids by using 1st angle method of projections. |
| 3. | To understand and project orthographic and isometric Projections |
| 4 | To understand and develop lateral surfaces of cut sections of different standard solids |

**CurriculumDetails**

| **Course Contents** | **Duration** |
|---|---|
| **Unit-1 Introduction to Computer Aided Drawing**<br>• Introduction to CAD & Graphical user interface of the CAD software.<br>• Drawing instruments,<br>• Geometrical constructions,<br>• Lettering,<br>• Title block,<br>• Sheet sizes,<br>• Line types,<br>• Dimensioning. | **7Hrs** |
| **Unit-2 Methods of projection-**<br>• Projection concept,<br>• Orthographic Projection,<br>• Projection of points in all quadrants,<br>• First angle Vs. third angle method of projection.<br>**Projection of Lines-**<br>• Projection of oblique lines its True length and angle with reference planes by rotation method.<br>• Concept of grade and bearing of line( Line inclined to both plane Rotation Method Only) | **8 Hrs** |
| **Unit-3 Projections of Planes & Solids** | **7 Hrs** |

| Course Contents | Duration |
|---|---|
| • Projection of planes (only regular polygons like Triangular, Square, Rectangular, Pentagonal, Hexagonal and circle) inclined to HP.<br>• Projection of regular Solids such as Prisms, pyramids, cylinder and cone with their axis inclined to HP | |
| **Unit 4- Orthographic Projections**<br>• Selection of views,<br>• Spacing of views,<br>• Dimensioning and sections.<br>• Drawing required views (any two views) from given pictorial views (Conversion of pictorial view into orthographic view) including sectional orthographic view. | **8 Hrs** |
| **Unit 5- Isometric projections**<br>• Concept of isometric projection,<br>• Isometric scale and isometric drawing.<br>• Conversion of orthographic views of simple 3D objects into single isometric drawing.<br>• Introduction of 3D Modelling workspace of AutoCAD.<br>• 3D Modelling of Simple Object using AutoCAD. | **8 Hrs** |
| **Unit 6-Development of Lateral Surfaces**<br>• Development of plane and curved lateral surfaces of regular Prisms, Pyramids, Cylinders and Cones (cutting planes specified via figure). | **7 Hrs** |

**Course Outcomes (COs):**After successful completion of the course, students will be able to:

| COs | Statement |
|---|---|
| **1** | Understand basic commands of CAD and use of AutoCAD 3D Modelling Workspace for practicing lines, solids, lettering and dimensioning in Engineering Drawing |
| **2** | Visualize and project Orthographic and Isometric drawings of simple machine components |
| **3** | Demonstrate and projections of points, lines , planes and Solids by appropriate method |
| **4** | Develop lateral surfaces of solid cut sections and their projections |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 2 | 3 | 1 | - | 1 | 2 | 2 | - | - | - | - | 1 | - | - |
| 3 | 3 | - | - | 1 | 2 | 2 | - | - | - | - | 1 | - | - |
| 4 | 3 | - | - | 1 | | 1 | - | - | - | - | - | - | - |

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Author(s) | Publisher |
|---|---|---|---|
| 1 | Engineering Graphics with Auto CAD | D. M. Kulkarni , A. P. Rastogi | (PHI) Publisher |
| 2 | Engineering Graphics | P.G.Deshpande | Mahaluxmi |
| 3 | Machine Drawing | N. D. Bhatt | Charotor Publication House |
| 4 | Computer Aided Engineering Drawing | S. Trymbaka Murthy | -I.K. International Publishing House Pvt. Ltd., New Delhi. |

**Reference Books:**

| Sr. No | Title | Author(s) | Publisher |
|---|---|---|---|
| 1 | “Engineering Drawing and Graphics” | K. Venugopal | New Age Publication |
| 2 | “Engineering Drawing” | N. B. Shaha and B.C. Rana | Pearson Education |
| 3 | Machine Drawing” | K. L. Narayana | , New Age Publication |
| 4 | Working with AutoCAD 2000” | Ajeet Sing | Tata McGraw Hill |

**Online Resources: Unit No Online Resource Link Source**

https://archive.nptel.ac.in/courses/112/105/112105294/ NPTEL
https://archive.nptel.ac.in/courses/112/104/112104172/ NPTEL
https://archive.nptel.ac.in/courses/112/102/112102304/ NPTEL
https://nptel.ac.in/courses/112103019 NPTEL

| **Course Title : Engineering Graphics and Computer Aided Engineering Drawing Laboratory** | |
|---|---|
| **Course Code: EGCAD24FE114P** | **Semester: I** |
| **Teaching Scheme: L-T-P : 0-0-2** | **Credits : 1** |
| **Evaluation Scheme: ISE- 25** | **ESE Marks: --** |

| **Prior Knowledge of:** | General Awareness, Knowledge of Geometry at SSC Level |
|---|---|

**Course Objectives:**

| | |
|---|---|
| 1. | To learn Manual as well as computer based Engineering Drawing. |
| 2. | To project line, plane and solids by using 1st angle method of projections. |
| 3. | To understand and project orthographic and isometric Projections |
| 4 | To understand and develop lateral surfaces of cut sections of different standard solids |

**List of Practicals**

| **PracticalNo** | **Title of Tutorials** | **Duration** |
|---|---|---|
| 01 | Submission Sheet on Geometrical Constructions & Projections of Line Introduction of AutoCAD GUI & Basic Commands: at least 4 Figures are to be drawn in sketch book and redraw using AutoCAD and Line Problems for submission sheets | 6 Hrs |
| 02 | Sheet on Projections of Planes | 4 Hrs |
| 03 | Sheet on Projections of Solids | 4 Hrs |
| 04 | Sheet on Orthographic Projections | 4 Hrs |
| 05 | Isometric Projections & 3D Modelling | 4 Hrs |
| 06 | Sheet on Development of Lateral Surfaces | 4 Hrs |
| 07 | Practice & Internal Oral | 4 Hrs |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| COs | Statement |
|---|---|
| **1** | Understand basic commands of CAD and use of AutoCAD 3D Modelling Workspace for practicing lines, solids, lettering and dimensioning in Engineering Drawing |
| **2** | Visualize and project Orthographic and Isometric drawings of simple machine components |
| **3** | Demonstrate and projections of points, lines , planes and Solids by appropriate method |
| **4** | Develop lateral surfaces of solid cut sections and their projections |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 2 | 3 | 1 | - | 1 | 2 | 2 | - | - | - | - | 1 | - | - |
| 3 | 3 | - | - | 1 | 2 | 2 | - | - | - | - | 1 | - | - |
| 4 | 3 | - | - | 1 | | 1 | - | - | - | - | - | - | - |

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Author(s) | Publisher |
|---|---|---|---|
| 1 | Engineering Graphics with Auto CAD | D. M. Kulkarni , A. P. Rastogi | (PHI) Publisher |
| 2 | Engineering Graphics | P. G. Deshpande | Mahaluxmi |
| 3 | Machine Drawing | N. D. Bhatt | Charotor Publication House |
| 4 | Computer Aided Engineering Drawing | S. Trymbaka Murthy | -I.K. International Publishing House Pvt. Ltd., New Delhi. |

**Reference Books:**

| Sr. No | Title | Author(s) | Publisher |
|---|---|---|---|
| 1 | "Engineering Drawing and Graphics" | K. Venugopal | New Age Publication |
| 2 | "Engineering Drawing" | N. B. Shaha and B.C. Rana | Pearson Education |
| 3 | Machine Drawing" | K. L. Narayana | , New Age Publication |
| 4 | Working with AutoCAD 2000" | Ajeet Sing | Tata McGraw Hill |

**Online Resources: Unit No Online Resource Link Source**

https://archive.nptel.ac.in/courses/112/105/112105294/ NPTEL
https://archive.nptel.ac.in/courses/112/104/112104172/ NPTEL
https://archive.nptel.ac.in/courses/112/102/112102304/ NPTEL
https://nptel.ac.in/courses/112103019 NPTEL

| **Course Title : Design Thinking Through Innovation** | |
|---|---|
| **Course Code:- DTTI24FE115** | **Semester: I** |
| **Teaching Scheme L-T-P : 1-0-0** | **Credits : 01** |
| **Evaluation Scheme:- ISE 25** | **ESE Marks (50 marks) : --** |

| | |
|---|---|
| **Prior Knowledge of:** | The Design Thinking & Innovations subject aim at providing students with the tools and exposure to be able to address problems using the design thinking process. The curriculum for "Design Thinking through Innovations" structured in such a way students learn to acquire both knowledge of design and practice of skills required to develop an attitude towards design. Being of the exemplary kinds, it focuses more on hands-on knowledge, learnt by doing and acting upon challenges discovered within the community and surroundings. |

**Course Objectives:**

| | |
|---|---|
| **1.** | To Familiarize with Engineering Design Process and The basics of Design Thinking |
| **2.** | To Bring Awareness on Idea Generation to Solve the Problems |
| **3.** | To Familiarize with the various types of prototype and the techniques used for prototyping. |

**Curriculum Details**

| Course Contents | Duration |
|---|---|
| **Unit I: Engineering Design, Design Thinking and Idea Generation**<br>• Introduction ,Key Concepts of Design, A Simplified Process of Engineering Design<br>• What is Design Thinking? - Its Importance, Socio-Economical Relevance, Principles, Origin, Process of Design Thinking, Relevance of Design and Design Thinking in Engineering<br>• Introduction to Idea Generation, Idea Generation Techniques, Processes, Define the Problem, Needs v/s Wants, Identify Philosophy, Problem Solving Tools, Case Studies<br>• Critical thinking: Fundamentals, Characteristics, Critical v/s Ordinary Thinking.<br>• Critical thinking skills- linking ideas, structuring arguments, five pillars of critical thinking. | **07Hrs** |
| **Unit II: Prototyping and Tools for Design -Innovation**<br>• Prototyping: Introduction, Need, Process, Types, Fidelity for prototypes, Minimum Usable Prototype [MUP] – Concept, challenges, etc.<br>• Prototyping for Digital &Physical products: Concept, What is unique in Digital and Physical Prototypes?<br>• Digital & Physical prototypes: Preparation; testing prototypes with users.<br>• Introduction to Different tools used for design and Innovation, such as Hand Saw (Wood, PVC, CPVC and Steel),Component cutter, Spanners, Allen key & Wrench (Flat, Ring, Adjustable), Solder Gun, Component cutter, Tweezer, Multimeter, Glue Gun, Hex saw, Cutter, Wire Stripper. | **07Hrs** |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| **115.1** | **Learn** Structured Approach of Engineering Design and the Relevance of Design and Design Thinking in Engineering & **Understand** Idea Generation Techniques to find out solutions to the Problems. |
| **115.2** | **Understand** the various types of prototype and **Inculcate** the techniques used for prototyping. |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 3 | 1 | 0 | 2 | 1 | | | | | | | |
| 2 | 2 | 3 | 2 | 2 | 2 | 1 | | | | | | | |

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Author(s) | Publisher | Year |
|---|---|---|---|---|
| 1. | Introduction to Design Thinking | S.Salivahanan, S.Suresh Kumar, D.Praveen Sam | Tata Mc Graw Hill, First Edition | 2019 |
| 2. | The Design Thinking Playbook | Michael Lewrick | Wiley | 2019 |
| 3. | Prototyping for Designers: Developing the best Digital and Physical Products | Kathryn McElroy | O'Reilly | 2017 |
| 4. | "Design Thinking: Understand – Improve– Apply" | Hasso Plattner, Christoph Meine and Larry Leifer (eds) | Springer | 2011 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1. | Design Thinking – New Product Essentials from PDMA | 1st | Michael G. Luchs, Scott Swan , Abbie Griffin | Wiley | 2015 |
| 2. | 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization | 1st | Vijay Kumar | Wiley | 2012 |

**Useful Link /Web Resources:**

| Sr. No. | Online Resource Link | Source |
|---|---|---|
| 1 | Introduction to Design Thinking - Course (swayam2.ac.in)<br>Design Thinking Full Course \| Design Thinking Process \| Design Thinking For Beginners \| Simplilearn - YouTube | Swayam (NPTEL)&YouTube |
| 2 | Thinking at IDEO - Insight, innovation, & a healthy dose of play | IDEO |
| 3 | INTRO (youtube.com) | YouTube |
| 4 | The Power of an Entrepreneurial Mindset \| Bill Roche \| TEDxLangleyED (youtube.com) | YouTube |
| 5 | https://www.ideou.com/pages/design-thinking | IDEO U |
| 6 | https://dschool.stanford.edu/ | Stanford D school |
| 7 | https://www.designthinkersacademy.com/usa/ | Design Thinking Institute |
| 8 | https://www.ibm.com/design/thinking/page/toolkit | Design thinking Tool Kit |
| 9 | https://hbr.org/2018/09/design-thinking-is-fundamentally-conservative-and-preserves-the-status-quo | |

| **Course Title: Design Thinking Through Innovation Lab** | |
|---|---|
| **Course Code : DTTI24FE115P** | **Semester: I** |
| **Teaching Scheme: L-T-P: 0-0-1** | **Credit : 1** |
| **Evaluation Scheme: INT 25 marks** | **ESE/POE/OE Marks: --** |

| | |
|---|---|
| **Prior Knowledge of:** | The Design Thinking & Innovations subject aim at providing students with the tools and exposure to be able to address problems using the design thinking process. Design Thinking & Innovations is designed in such a way students learn to acquire both knowledge of design and practice of skills required to develop an attitude towards design. Being of the exemplary kinds, it focuses more on hands-on knowledge, learnt by doing and acting upon challenges discovered within the community and surroundings. |

**Course Objectives:**

| | |
|---|---|
| 1. | To Discuss Various Techniques of Idea Generation. |
| 2. | To Explain the Various Tools Used for Innovation. |
| 3. | To Discuss the Methods of Implementing Design Thinking in The Real World. |
| 4. | To Discuss the Implementation of Creativity and Innovation. |

**List of Experiments-**

| Exp. No | Title of Experiments | Duration (Hrs) |
|---|---|---|
| 01 | Overview of Design Thinking: Ethical Design and Critiques, Generation of "IDEA", Problem Identification and Exercises. | 2 |
| 02 | Brainstorming Sessions to Find out Solution for Identified Problems | 2 |
| 03 | Prototyping and Modelling Challenge, Various Tools and Methodology Used for the Prototyping. | 2 |
| 04 | Hands-On Demonstration of Different Tools used for Design & Innovation. | 2 |
| 05 | Hands-On Demonstration of Soldering Machine, Function and Purpose of Soldering Machine. | 2 |
| 06 | Explanation and Usage of Joining & Insulation Tools and Technics. | 2 |
| 07* | Assembly and Disassembly of Two Wheel Drive Robot Based Vehicle. | 4 |
| 08 | Micro Project: Group Formation and Idea Generation. | 2 |
| 09 | Creation of Prototype and Innovative Solution. | 4 |
| 10 | Test and Evaluation of Prototype. | 2 |
| 11 | Report Drafting - Instructions & Practices. | 2 |
| 12 | Presentation & Exhibition. | 4 |

***Experiment- Mechanical: Assembly and Disassembly of Two Wheel Drive Robot Based Vehicle**.

Perform minimum 8 experiments out of the above 12 experiment.

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| **115P.1** | **Learn** Structured Approach of Engineering Design and the Relevance of Design and Design Thinking in Engineering &**Understand** Idea Generation Techniques to find out solutions to the Problems. |
| **115P.2** | **Understand** the various types of prototype and **Inculcate** the techniques used for prototyping. |

**Course Articulation Matrix:** Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

| PO's / COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 1 | 3 | 1 | 0 | 2 | 1 | | | | | | | |
| **2** | 2 | 3 | 2 | 2 | 2 | 1 | | | | | | | |

**Suggested Learning Resources: --**

**Reference Books:**

| Sr. no. | Name of Book | Author | Year |
|---|---|---|---|
| 1. | Design Thinking: Understand-Improve-Apply | S. G. Blank | 2007 |
| 2. | Design Thinking for Innovation Research and Practice | Walter Brenner, Falk Uebernickel, Springer | 2016 |
| 3. | Business Design Thinking and Doing: Frameworks, Strategies and Techniques for Sustainable Innovation | Angele M. Beausoleil | 2022 |

**Useful Link /Web Resources:**

| Sr. No. | Online Resource Link | Source |
|---|---|---|
| 1 | Introduction to Design Thinking - Course (swayam2.ac.in)<br>Design Thinking Full Course \| Design Thinking Process \| Design Thinking For Beginners \| Simplilearn - YouTube | Swayam (NPTEL) &YouTube |
| 2 | Thinking at IDEO - Insight, innovation, & a healthy dose of play | IDEO |
| 3 | INTRO (youtube.com) | YouTube |
| 4 | The Power of an Entrepreneurial Mindset \| Bill Roche \| TEDxLangleyED (youtube.com) | YouTube |
| 5 | https://www.ideou.com/pages/design-thinking | IDEO U |
| 6 | https://dschool.stanford.edu/ | Stanford D school |
| 7 | https://www.designthinkersacademy.com/usa/ | Design Thinking Institute |
| 8 | https://www.ibm.com/design/thinking/page/toolkit | Design thinking Tool Kit |
| 9 | https://hbr.org/2018/09/design-thinking-is-fundamentally-conservative-and-preserves-the-status-quo | |

| | |
|---|---|
| **Course Title :** Professional Communication | |
| **Course Code:** PC24FE116 | **Semester:** I |
| **Teaching Scheme L-T-P :1-0-0** | **Credits : 1** |
| **Evaluation Scheme: ISE 25** | **ESE Marks: --** |
| **Prior Knowledge of:**<br>1. Basic knowledge of grammar.<br>2. Basic knowledge of Listening and Reading comprehension. | |

**Course Objectives:**

| | |
|---|---|
| 1 | To acquaint students with basic English Grammar and help students in improving language skills |
| 2 | To familiarize students with concept, various types, barriers and filters of communication |
| 3 | To assist students in developing Vocabulary |
| 4 | To train the students to compose and write the business letters effectively |

**Curriculum Details**

| Course Contents | Duration |
|---|---|
| **Unit I: Language and Communication**<br>• Need for effective communication<br>• The process of communication<br>• Technical communication<br>• Barriers to communication and solutions | 2 Hrs |
| **Unit II: Behavioural Skills**<br>• Positive attitude<br>• Introduction to behavioural skills<br>• Understanding Self<br>• Corporate etiquettes and ethics | 3 Hrs |

| | |
|---|---|
| **Unit III: Grammar & Vocabulary**<br>• Tenses<br>• Parts of speech<br>• Modal auxiliaries<br>• Vocabulary building<br>• Common Errors in communication | 3Hrs |
| **Unit IV: Communicative skills**<br>• Listening<br>• Speaking<br>• Reading<br>• Writing | 3 Hrs |
| **Unit V: Career Skills**<br>• Job application writing<br>• Resume writing<br>• E-mail Writing<br>• Interview skills | 3 Hrs |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| 1 | Understand basic concepts of communication. |
| 2 | Apply LSRW skills in real life. |
| 3 | Explain communicative techniques |
| 4 | Recall appropriate vocabulary |

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| POs<br>COs | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |
| CO2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |
| CO3 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |
| CO4 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |

**Suggested Learning Resources:**

**Text Books:**

| Sr. No | Title | Edition | Author(s | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Business Communication | Third Edition | S. Kalia and S. Agarwal Wiley | Wiley | 2015 |
| 2 | Technical Communication | Fourth Edition | Meenakshi Raman and Sangeeta Sharma | OUP | 2013 |

**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | High School English Grammar and Composition | Second Edition | Wren and Martin | Blackie | 2000 |
| 2 | Business Communication | Second Edition | Raymond Lesikar et al. | McGraw Hill | 2007 |

| **Course Title: Professional Communication Laboratory** | |
|---|---|
| **Course Code :** PC24FE116P | **Semester: I** |
| **Teaching Scheme: L-T-P: 0-0-2** | **Credit : 1** |
| **Evaluation Scheme: INT 25 marks** | **ESE Marks: --** |
| **Prior Knowledge of:** Basic English grammar, LSRW skills | |

**Course Objectives:**

| | |
|---|---|
| 1. | To practice and assess LSRW skills of the students. |
| 2. | To provide them ample practice for developing their LSRW skills |
| 3. | To strengthen their grammatical competence through practice |
| 4. | To help for technical writing. |

**List of practical**

| Exp. No | Title of practical | Duration |
|---|---|---|
| 01 | Introducing self and others Adjectives, phrases and clauses to describe oneself and others Introducing oneself and others-demonstration | 2Hrs |
| 02. | Phonetics introduction I | 2Hrs |
| 03. | Phonetics introduction II | 2Hrs |
| 04 | Grammar: Common Errors , Framing Sentences , Vocabulary Building | 2Hrs |
| 05 | Listening practice Listening comprehension, Strategies for effective listening | 2Hrs |
| 06 | Speaking practice-Video samples of effective and ineffective public speeches | 2Hrs |
| 07 | Interview FAQs in detail, video samples, , Do's and Don'ts, | 2Hrs |
| 08 | Technical writing - Letter writing, report writing, meeting of minutes | 2Hrs |
| 09 | Group discussion | 2Hrs |
| 10 | Reading skills Newspaper reading, | 2Hrs |
| 11 | Professional Correspondence- Email, Resume writing | 2Hrs |
| 12 | Story telling: Practicing narration methods and techniques for effective narration. | 2Hrs |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| 1 | Understand English Sounds, stress patterns and intonation. |
| 3 | Use communication skills effectively. |
| 3 | Use of grammar rules properly. |
| 4 | Prepare oral presentations effectively |

**Course Articulation Matrix:** Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

| PO's Cos | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |
| **CO2** | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |
| **CO3** | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |
| **CO4** | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | | 1 |

**Suggested Learning Resources: --**
**Text Books/ Software**
**Reference Books:**

| Sr. No | Title | Edition | Author(s) | Publisher | Year |
|---|---|---|---|---|---|
| 1 | Better English Pronunciation | Second | J.D. O'Connor | OUP | 1980 |
| 2 | A Practical Course in Spoken English | First | J.K. Gangaj | PHI Learning Pvt. Ltd | 2014 |

| **Course Title : National Service Scheme** | |
|---|---|
| **Course Code :** NSS24FE117 | **Semester: I** |
| **Teaching Scheme L-T-P : 1-0-2** | **Credits : 2** |
| **Evaluation Scheme : INT 50 marks** | **ESE/POE/OE Marks: ---** |

| | |
|---|---|
| **Prior Knowledge of:** | **Basic Understanding of Social Issues:** General awareness of common social challenges like poverty, illiteracy, environmental issues, etc. **Interest in Community Service:** A genuine interest in helping others and contributing to society. **Communication Skills:** Basic communication skills will be helpful during community interactions and group activities. **Teamwork:** Openness to working in teams, as many activities are collaborative. |

**Course Objectives:**

| | |
|---|---|
| 1. | **Develop Social Responsibility:** To encourage students to actively contribute to society through community service. |
| 2. | **Foster Personal Growth:** To enhance leadership, teamwork, and communication skills. |
| 3. | **Promote Community Awareness:** To increase understanding of societal issues and challenges. |
| 4. | **Encourage Sustainable Practices:** To instill environmental consciousness and promote sustainable development through practical activities. |

## Curriculum Details:-

| Course Contents | Duration |
|---|---|
| **Unit 1:**<br>• **Introduction to NSS**<br><br>- History and Objectives of NSS<br>- Motto, Symbol, and Badge of NSS<br>- NSS Organizational Structure<br>- Role of NSS in the Personality Development of Students<br><br>• **Understanding the Community & NGOs**<br><br>- Identification of Community Needs<br>- Role of NSS Volunteers in Community Development<br>- Role of NGOs in Social Development Process of NGO Formation | **7 Hrs** |
| **Unit 2:**<br>• **Health, Hygiene, and Environment Sustainability**<br><br>- Importance of Health, Hygiene, and Sanitation<br>- First Aid and Emergency Care<br>- Environmental Issues and Challenges<br>- Role of NSS in Environmental Conservation<br><br>• **Disaster Management**<br><br>- Types of Disasters and Their Impact<br>- Preparedness and Mitigation Strategies<br>- Role of NSS in Disaster Management | **7 Hrs** |

**List of Activities:-**

| Exp. No | Title | Duration (Hrs) |
|---|---|---|
| 01 | **Use of technology for society:** Organize tech-based projects that can address local community issues. | 2 Hrs. |
| 02 | **Campus Cleanliness Drive:** Organize a cleanliness drive within the campus, encouraging waste segregation and eco-friendly practices. | 2 Hrs. |
| 03 | **Tree Plantation:** Conduct a tree plantation drive in designated campus areas, emphasizing environmental sustainability. | 2 Hrs. |
| 04 | **First Aid Workshop:** Hands-on workshop on basic first aid and CPR techniques, to be taught by a professional. | 2 Hrs. |
| 05 | **Waste Management System:** Introduce waste segregation methods and set up a waste management system in key areas of the campus. | 2 Hrs. |
| 06 | **Health and Hygiene Awareness: Conduct** an awareness session on personal hygiene and preventive healthcare for students and staff. | 2 Hrs. |
| 07 | **Energy Conservation Drive: Organize** a campaign promoting energy-saving practices, such as switching off lights and conserving electricity. | 2 Hrs. |
| 08 | **Water Conservation Project:** Develop a small project on water conservation, like rainwater harvesting or reducing water waste on campus. | 2 Hrs. |
| 09 | **Swachh Bharat Activity:** Lead a cleanliness drive focused on a specific area of the campus, documenting before-and-after effects. | 2 Hrs. |
| 10 | **Street Play on Social Issues:** Develop and perform a street play addressing a relevant social issue such as gender equality or literacy. | 2 Hrs. |
| 11 | **Role of Youth in National Integration:** Host an interactive session or group discussion on how young people can contribute to national integration, fostering a sense of unity and patriotism. | 2 Hrs. |
| 12 | **Gender Equality Awareness Campaign:** Organize a campaign or workshop to promote gender equality, highlighting the importance of equal opportunities for women in education, employment, and leadership. | 2 Hrs. |
| 13 | **Female Leadership in Society:** Invite successful women leaders to share their experiences and inspire students to take leadership roles, highlighting the impact of female empowerment in community development. | 2 Hrs. |
| 14 | **Self-Defense Training for Women:** Conduct a practical session focused on basic self-defense techniques for female students and staff, raising awareness of personal safety and empowerment. | 2 Hrs. |
| 15 | **NSS Volunteer Interaction:** Hold an interaction session where NSS volunteers share their experiences and discuss the impact of NSS activities. | 2 Hrs. |

**Course Outcomes (COs):** After successful completion of the course, students will be able to:

| CO | Statements |
|---|---|
| 1 | **Social Awareness:** Students will develop a deep understanding of societal issues and their roles in addressing them. |
| 2 | **Leadership and Teamwork:** Students will enhance their leadership abilities and teamwork skills through active participation in community service. |
| 3 | **Practical Skills:** Students will gain hands-on experience in organizing and executing community service projects. |
| 4 | **Civic Responsibility:** Students will foster a sense of civic duty and responsibility, contributing to nation-building and sustainable development. |

**Course Articulation Matrix:** Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

| PO's / CO's | BTL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | | | | | | 3 | 3 | 3 | 3 | | | |
| 2 | 2 | | | | | | 3 | 3 | 3 | 3 | | | |
| 3 | 2 | | | | | | 3 | 3 | 3 | 3 | | | |
| 4 | 2 | | | | | | 3 | 3 | 3 | 3 | | | |

**Suggested Learning Resources: --**

**Textbooks:**

1. **"National Service Scheme Manual"** - Published by the Ministry of Youth Affairs and Sports, Government of India.
2. **"Community Organization and Development"** by G.R. Madan - A comprehensive guide on social work and community development.
3. **"Social Work: An Integrated Approach"** by Sanjay Bhattacharya - Focuses on social work principles and practices relevant to NSS activities.

**Reference Books:**

1. **"Leadership and Personality Development"** by Kiran Bedi - Insights into leadership qualities and personal development.
2. **"Environmental Studies: From Crisis to Cure"** by R. Rajagopalan - Covers environmental issues and sustainable practices.
3. **"Disaster Management"** by R.B. Singh - A useful resource for understanding disaster preparedness and management.

**Government Websites:**

1. **National Service Scheme (NSS) Official Website:** https://nss.gov.in - Official guidelines, resources, and updates from the Ministry of Youth Affairs and Sports.
2. **Ministry of Youth Affairs and Sports:** https://yas.nic.in - Information on youth programs, including NSS.
3. **National Disaster Management Authority (NDMA):** https://ndma.gov.in - Resources on disaster management and preparedness.
4. **Swachh Bharat Mission:** https://swachhbharat.mygov.in - Government initiatives on cleanliness and hygiene.

## Activity Details

### 1. Use of Technology for Society

- **Activity:** Showcase how technology can solve societal problems.
- **Innovative Add-ons:**
  - **Poster Making:** Students design posters on innovative tech solutions (e.g., apps for health, education, farming).
  - **Presentation in Classes:** Groups present tech-based projects that can address local community issues.
  - **Awareness Rally:** Conduct a rally showcasing how technology can improve the quality of life, carrying banners highlighting tech solutions.

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### 2. Campus Cleanliness Drive

- **Activity:** Conduct a cleanliness drive on campus.
- **Innovative Add-ons:**
  - **Poster Making:** Create posters on cleanliness and the importance of waste segregation.
  - **Slogan Contest:** Hold a contest for the best slogans encouraging cleanliness.
  - **Awareness Rally:** Organize a campus-wide rally promoting "Swachh Campus" ideals.
  - **Sticker Campaign:** Place stickers in classrooms and common areas reminding students to keep the campus clean.

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### 3. Tree Plantation

- **Activity:** Organize a tree plantation drive on campus.
- **Innovative Add-ons:**
  - **Poster Making:** Design posters on the importance of tree plantation for combating climate change.
  - **Tree Adoption:** Each student adopts and takes care of a tree, monitoring its growth.
  - **Awareness Campaign:** Organize a social media campaign highlighting the trees planted, encouraging others to join.
  - **Sticker Campaign:** Create stickers promoting "Go Green" and place them around campus.

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### 4. First Aid Workshop

- **Activity:** Hands-on workshop on basic first aid and CPR.
- **Innovative Add-ons:**
  - **Poster Presentation:** Create posters showing basic first aid steps and display them in high-traffic areas.

- **Demo Video:** Record students performing first aid steps and create a tutorial for campus-wide sharing.
- **Awareness Drive:** Organize a demonstration booth where students can teach others basic first aid techniques.

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### 5. Waste Management System

- **Activity:** Implement a waste segregation and management system on campus.
- **Innovative Add-ons:**
  - **Poster Making:** Design posters explaining waste segregation and recycling processes.
  - **Awareness Rally:** Organize a rally with slogans promoting recycling and reducing plastic use.
  - **Sticker Campaign:** Place stickers on waste bins to remind students about segregating waste properly (e.g., “Recycle Here”).
  - **Poster Presentation:** Create infographics about the environmental impact of waste, displayed in common areas.

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### 6. Health and Hygiene Awareness

- **Activity:** Conduct a session on health and hygiene for students and staff.
- **Innovative Add-ons:**
  - **Poster Making:** Design posters on personal hygiene practices and display them in restrooms and canteens.
  - **Awareness Rally:** Organize a rally promoting personal hygiene and public health.
  - **Interactive Workshop:** Include live demonstrations on handwashing and hygiene habits.
  - **Sticker Campaign:** Create stickers for restrooms reminding people to wash hands regularly.

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### 7. Energy Conservation Drive

- **Activity:** Organize a campaign promoting energy-saving practices.
- **Innovative Add-ons:**
  - **Poster Making:** Design posters with energy-saving tips (e.g., "Turn off lights when not in use").
  - **Sticker Campaign:** Create stickers for light switches and equipment reminding users to conserve energy.
  - **Energy Audit:** Conduct a campus energy audit, finding areas where energy is being wasted and suggest solutions.
  - **Presentation in Classes:** Present findings from the energy audit and promote energy-saving practices among peers.

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### 8. Water Conservation Project

- **Activity:** Develop a small project for water conservation (e.g., rainwater harvesting).
- **Innovative Add-ons:**
  - **Poster Making:** Design posters promoting water-saving habits (e.g., "Save Water, Save Life").
  - **Sticker Campaign:** Place stickers near taps reminding users to turn off water after use.
  - **Water Audit:** Conduct a campus water usage audit and propose water-saving measures.
  - **Awareness Rally:** Organize a rally promoting the importance of water conservation.

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### 9. Swachh Bharat Activity

- **Activity:** Lead a campus cleanliness drive in a specific area.
- **Innovative Add-ons:**
  - **Poster Making:** Design posters on the Swachh Bharat mission and its goals.
  - **Before-and-After Photo Contest:** Organize a contest encouraging students to take "before-and-after" photos of areas cleaned.
  - **Awareness Rally:** Conduct a rally promoting Swachh Bharat ideals across campus.
  - **Social Media Campaign:** Use social media to highlight the impact of your cleanliness drives.

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### 10. Street Play on Social Issues

- **Activity:** Develop and perform a street play on social issues like gender equality or literacy.
- **Innovative Add-ons:**
  - **Poster Making:** Create posters that introduce the theme of the play and distribute them before the performance.
  - **Flash Mob:** Combine the street play with a flash mob to gather attention in high-traffic campus areas.
  - **Classroom Presentations:** Perform the street play in various classes to reach more students.

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### 11. Role of Youth in National Integration

- **Activity:** Host a session or group discussion on youth's contribution to national integration.
- **Innovative Add-ons:**
  - **Poster Making:** Create posters showing how youth can promote national unity and diversity.
  - **Interfaith Dialogue:** Organize a dialogue between students from different religions and cultures to foster understanding.
  - **Awareness Rally:** Conduct a unity rally celebrating cultural diversity and national integration.

### 12. Gender Equality Awareness Campaign

- **Activity:** Organize a workshop to promote gender equality.
- **Innovative Add-ons:**
  - **Poster Making:** Design posters showing the importance of gender equality and display them around campus.
  - **Slogan Contest:** Organize a contest for the best gender equality slogan.
  - **Awareness Rally:** Conduct a rally advocating for gender equality with banners and slogans.

### 13. Female Leadership in Society

- **Activity:** Invite successful women leaders to share their experiences.
- **Innovative Add-ons:**
  - **Poster Making:** Create posters highlighting female leaders from various fields.
  - **Panel Discussion:** Organize a panel discussion with women leaders and encourage students to interact.
  - **Role Model Campaign:** Run a social media campaign featuring stories of inspiring women leaders.

### 14. Self-Defense Training for Women

- **Activity:** Conduct a self-defense workshop for female students and staff.
- **Innovative Add-ons:**
  - **Poster Making:** Create posters on personal safety tips and display them around campus.
  - **Interactive Demo:** Record the self-defense training and create a short tutorial video to share with other students.
  - **Awareness Rally:** Organize a rally promoting women's safety and empowerment.

### 15. NSS Volunteer Interaction

- **Activity:** Hold an interaction session where NSS volunteers share their experiences.
- **Innovative Add-ons:**
  - **Poster Making:** Create posters showcasing key achievements of NSS volunteers and their impact on society.
  - **Panel Discussion:** Invite senior NSS volunteers to discuss challenges and best practices in community service.
  - **Experience Sharing Event:** Organize an event where students present their NSS experiences using photos and videos.