



**Third Semester**

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title:</b> Electronic Devices and Circuits      |                             |
| <b>Course Code:</b> 24UEC301T                             | <b>Course Category:</b> PCC |
| <b>Teaching Scheme:</b> L – T – P                         | <b>Total Credits:</b> 04    |
| <b>3 – 1 – 0</b>                                          | <b>Semester:</b> III        |
| <b>Scheme of Examination:</b> ESE: 60 Marks, CE: 40 Marks |                             |
| <b>Prerequisites:</b> Knowledge of semiconductor physics. |                             |

| <b>Course Objectives:</b> |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| 1.                        | To learn the principle of Semiconductor Diodes.                              |
| 2.                        | To understand the working of different types of Diodes and its applications. |
| 3.                        | To study the working of Transistors and its applications.                    |
| 4.                        | To understand the working principle of MOSFET, JFET.                         |
| 5.                        | To understand and explain different types of oscillators.                    |

| <b>Course Outcomes:</b>                                      |                                                                                      |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                                      |
| CO1                                                          | Explain the working principles of semiconductor diode and its use in electronics.    |
| CO2                                                          | Analyse various circuits using diodes.                                               |
| CO3                                                          | Explain and analyse the concept of Bipolar Junction Transistor and its applications. |
| CO4                                                          | Describe working principle of various Amplifiers                                     |
| CO5                                                          | Describe the working principle of oscillator.                                        |
| CO6                                                          | Explain the construction and working principle of unipolar transistors               |

| <b>Course Contents:</b>                                                                                                                                                                                                                                                                                                       |                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                                                 | <b>[07 Hours]</b> |
| <b>Semiconductor Diode:</b><br>Introduction of P-N Junction, Biasing of diodes, V-I characteristics of diode, static and dynamic resistance of diode, Avalanche & Zener breakdown, diode current equation, Transition and Diffusion Capacitance, types of diodes: Zener diode, Varactor Diode, LED, Photodiode, tunnel diode. |                   |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                                                | <b>[08 Hours]</b> |
| <b>Applications of diode:</b><br>Introduction to rectifiers, types of rectifiers: HWR and center tap and Bridge FWR (working principle, waveform and analysis). Rectifiers with filters: Capacitor, Inductor and $\pi$ -type, Zener diode as regulator. Wave shaping circuits: Clippers and Clampers.                         |                   |
| <b>UNIT III</b>                                                                                                                                                                                                                                                                                                               | <b>[08 Hours]</b> |



**Bipolar Junction Transistors:**

Construction and Types of BJT, Biasing of BJT, BJT Configurations, V-I characteristics, Stability Factor, Compensation Techniques of BJT, Thermal Runaway, Transistor as an amplifier.

**UNIT IV**

**[08 Hours]**

**Feedback Amplifiers:**

Classification of Amplifiers, Concept of feedback, Transfer ratio or Gain, Negative feedback: Voltage Series, Current Series, Current Shunt, Voltage Shunt Feedback.

Large Signal Amplifiers: Introduction, features, classification, Concept of Quiescent Point. Class A, Class B, Class C, Class AB Amplifiers. Cross Over Distortion, Concept of Push Pull Amplifiers.

**UNIT V**

**[07 Hours]**

**Oscillators:**

Basic theory of oscillator and Barkhausen's criteria, classification of oscillator based on circuit components. RC phase shift oscillator, Wein bridge oscillator, LC oscillators, Hartley and Colpitts oscillator.

**UNIT VI**

**[07 Hours]**

**Unipolar Transistors:**

Construction & working of JFET, JFET parameters, V-I characteristics, MOSFET (Enhancement-type & Depletion-type), V-I characteristics, UJT as relaxation oscillator. Introduction to CMOS Technology.

**Suggested Self Readings:**

**Text Books**

1. J. Millman and Halkias: "Electronic Devices and Circuits", TMH Publications
2. Salivahanan, Suresh Kumar, Vallavaraj: "Electronic devices and circuits", TMH Publications.
3. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices", 7th edition, Pearson, 2014.
4. Thomas L. Floyd, "Electronic Devices Electron Flow Version" 9<sup>th</sup> edition, Prentice Hall, 2012.

**Reference Books**

1. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
2. C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
3. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ. Press, 2011.
4. Boylestad & Nashelsky: "Electronic Devices & Circuit Theory", PHI publications.



**Third Semester**

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title:</b> Electronic Devices and Circuits Lab  |                             |
| <b>Course Code:</b> 24UEC301P                             | <b>Course Category:</b> PCC |
| <b>Teaching Scheme:</b> L – T – P                         | <b>Total Credits:</b> 01    |
| <b>0 – 0 – 2</b>                                          |                             |
| <b>Scheme of Examination:</b> ESE: 25 Marks, CE: 25 Marks |                             |

**Course Objectives:**

|    |                                                                            |
|----|----------------------------------------------------------------------------|
| 1. | Explain the basic concepts of different semiconductor components.          |
| 2. | Plot and study the characteristics of semiconductor devices.               |
| 3. | Calculate different performance parameters of transistors.                 |
| 4. | Use semiconductor devices in different electronic circuits and analyze it. |
| 5. | Explain the basic concepts of different semiconductor components.          |

**Course Outcomes:**

At the end of this course, students will have an ability to:

|     |                                                                                    |
|-----|------------------------------------------------------------------------------------|
| CO1 | Design circuits using various Semiconductor diodes and plot their characteristics. |
| CO2 | Plot and analyse the characteristics of Bipolar and unipolar Transistors.          |
| CO3 | Apply the concept of positive feedback to design different types of oscillators.   |

| Sr. No. | List of Experiments                                                                                                                                                                                                                                                          |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.      | Familiarization with the Electronic Instruments like function generator, CRO, DC power Supply.<br>a) Use of multimeter as voltmeter, ammeter, Ohmmeter, continuity meter.<br>b) Measurement of voltage and frequency with CRO and DSO, saving and accessing waveform on DSO. |
| 2.      | Design a) A forward bias circuit and b) Reverse bias circuit of a diode. Plot its characteristics and calculate its parameters.                                                                                                                                              |
| 3.      | Design diode positive and negative. Use suitable frequency and plot waveforms.                                                                                                                                                                                               |
| 4.      | To design Zener diode as voltage regulator.                                                                                                                                                                                                                                  |
| 5.      | To determine the operating voltages of different colors of LEDs and measure minimum current and forward bias voltages across them.                                                                                                                                           |
| 6.      | Design a Half-wave rectifier circuits and plot its waveform.                                                                                                                                                                                                                 |
| 7.      | Design a Full-wave rectifier circuits and plot its waveform.                                                                                                                                                                                                                 |
| 8.      | To plot input and output characteristic of (BJT) transistor in CE configuration.                                                                                                                                                                                             |
| 9.      | To plot input and output characteristic of (BJT) transistor in CB configuration.                                                                                                                                                                                             |



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|     |                                                                                               |
|-----|-----------------------------------------------------------------------------------------------|
| 10. | To study the concept of phase shift on CRO / DSO and measure phase shift in degrees/ radians. |
| 11. | To design RC/ LC Oscillator.                                                                  |
| 12. | To design transistor as an audio amplifier, Measure its efficiency.                           |
| 13. | One mini project using transistor, MOSFET and general electronic components.                  |



**Third Semester**

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title: Data Structures</b>                      |                             |
| <b>Course Code: 24UEC302T</b>                             | <b>Course Category: PCC</b> |
| <b>Teaching Scheme: L – T – P</b>                         | <b>Total Credits: 02</b>    |
| <b>2 – 0 – 0</b>                                          | <b>Semester: III</b>        |
| <b>Scheme of Examination: ESE: 30 Marks, CE: 20 Marks</b> |                             |

**Course Objectives:**

|    |                                                                   |
|----|-------------------------------------------------------------------|
| 1. | Implement Object Oriented Programming concepts in Python.         |
| 2. | Understand Lists, Dictionaries and Regular expressions in Python. |
| 3. | Understanding how searching and sorting is performed in Python.   |
| 4. | Understanding how linear and non-linear data structures works.    |
| 5. | To learn the fundamentals of writing Python scripts.              |

**Course Outcomes:**

At the end of this course, students will have an ability to:

|     |                                                                                  |
|-----|----------------------------------------------------------------------------------|
| CO1 | Examine Python syntax and semantics and apply Python flow control and functions. |
| CO2 | Create, run and manipulate Python Programs using core data structures like Lists |
| CO3 | Apply Dictionaries and use Regular Expressions.                                  |
| CO4 | Interpret the concepts of Object-Oriented Programming as used in Python.         |

**Course Contents:**

|                                                                                                                                                                                                                                                                                                                      |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                                        | <b>[07 Hours]</b> |
| <b>OOPS Concepts:</b> Class, Object, Constructors, types of variables, types of methods. Inheritance: single, multiple, multi-level, Polymorphism: with functions and objects, with class methods, with inheritance, Abstraction: abstract classes.                                                                  |                   |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                                       | <b>[08 Hours]</b> |
| <b>Data Structures and Arrays:</b> Data Structures: Definition, Linear Data Structures, Non-Linear Data Structures Python Specific List, Tuples, Set, Dictionaries, Comprehensions and its Types, Strings, slicing. Arrays - Overview, Types of Arrays, Operations on Arrays, Arrays vs List. Searching and sorting. |                   |
| <b>UNIT III</b>                                                                                                                                                                                                                                                                                                      | <b>[07 Hours]</b> |
| <b>Linked List and Queues:</b> Linked Lists – Implementation of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists. Stacks - Overview of Stack, Implementation of Stack (List & Linked list), Queues: Overview of Queue, Implementation of Queue (List & Linked list)                                   |                   |
| <b>UNIT IV</b>                                                                                                                                                                                                                                                                                                       | <b>[08 Hours]</b> |



**Graphs:** Introduction, Directed vs Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search. Trees - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation.

**Suggested Self Readings:**

**Text Books**

1. Michael T. Goodrich, Data structures and algorithms in python
2. Narasimha Karumanchi, Data Structures and Algorithmic Thinking with Python

**Reference Books**

1. Dr Basant Agarwal, Benjamin Baka, Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition
2. Kent D. Lee and Steve Hubbard, Data Structures and Algorithms with Python
3. BradleyN Miller and David L. Ranum, Problem Solving with Algorithms and Data Structures Using Python
4. R. Nageswara Rao, Core Python Programming -Second Edition, Dreamtech Press



**Third Semester**

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title: Data Structures Lab</b>                  |                             |
| <b>Course Code: 24UEC302P</b>                             | <b>Course Category: PCC</b> |
| <b>Teaching Scheme: L – T – P</b>                         | <b>Semester: III</b>        |
| <b>0 – 0 – 2</b>                                          | <b>Total Credits: 01</b>    |
| <b>Scheme of Examination: ESE: 25 Marks, CE: 25 Marks</b> |                             |

**Course Objectives:**

|    |                                                                   |
|----|-------------------------------------------------------------------|
| 1. | Implement Object Oriented Programming concepts in Python.         |
| 2. | Understand Lists, Dictionaries and Regular expressions in Python. |
| 3. | Understanding how searching and sorting is performed in Python.   |
| 4. | Understanding how linear and non-linear data structures works.    |
| 5. | To learn the fundamentals of writing Python scripts.              |

**Course Outcomes:**

At the end of this course, students will have an ability to:

|     |                                                                                             |
|-----|---------------------------------------------------------------------------------------------|
| CO1 | Examine Python syntax and semantics and apply Python flow control and functions.            |
| CO2 | Create, run and manipulate Python Programs using core data structures like Lists.           |
| CO3 | Explain various operations on linear data Structures and their implementation using Python. |
| CO4 | Explain Non-linear data Structures and their implementation using Python.                   |

| Sr. No. | List of Experiments                                                                                                         |
|---------|-----------------------------------------------------------------------------------------------------------------------------|
| 1.      | Write a Python program for class that has three instance variables of type str, int, and float.                             |
| 2.      | Write a Python programme for inheritance Hierarchy based on Polygon class having abstract methods area () and perimeter (). |
| 3.      | Write a python program to implement Method Overloading and Method Overriding.                                               |
| 4.      | Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list.          |
| 5.      | Write a program for Linear Search and Binary search.                                                                        |
| 6.      | Write a program to implement Bubble Sort and Selection Sort.                                                                |
| 7.      | Write a program to implement Stacks and Queues.                                                                             |
| 8.      | Write a program to implement Singly Linked List.                                                                            |
| 9.      | Write a program to implement Doubly Linked list.                                                                            |
| 10.     | Write a program to implement Binary Search Tree.                                                                            |
| 11.     | Write a program to convert infix to post fix notation.                                                                      |
| 12.     | Write a program to illustrate tree traversals a) In order b) Preorder c) Post order.                                        |



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|     |                                                                                                 |
|-----|-------------------------------------------------------------------------------------------------|
| 13. | Write a Python program for class that has three instance variables of type str, int, and float. |
|-----|-------------------------------------------------------------------------------------------------|





**Third Semester**

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title: Network Theory &amp; Analysis</b>        |                             |
| <b>Course Code: 24UEC303T</b>                             | <b>Course Category: PCC</b> |
| <b>Teaching Scheme: L – T – P</b>                         | <b>Total Credits: 03</b>    |
| <b>3 – 0 – 0</b>                                          |                             |
| <b>Scheme of Examination: ESE: 60 Marks, CE: 40 Marks</b> |                             |

**Course Objectives:**

|    |                                                                                                                |
|----|----------------------------------------------------------------------------------------------------------------|
| 1. | To make the students capable of analyzing any given electrical network.                                        |
| 2. | Various methods of analysis of electric networks under transient and steadystate conditions.                   |
| 3. | To make the students learn how to synthesize an electrical network from agiven impedance /admittance function. |

**Course Outcomes:**

At the end of this course, students will have an ability to:

|     |                                                                       |
|-----|-----------------------------------------------------------------------|
| CO1 | Apply Mesh analysis method to analyze electrical circuits.            |
| CO2 | Apply Nodal analysis method to analyze electrical circuits.           |
| CO3 | Apply network theorems for the analysis of networks.                  |
| CO4 | Evaluate Transient Analysis of R-L-C- networks                        |
| CO5 | Apply Laplace transforms to analyze networks and Synthesize waveforms |
| CO6 | Evaluate two port network parameters                                  |

**Course Contents:**

**UNIT I [07 Hours]**

**Mesh Analysis:**

Network Components and its types, Ohm's Law, Voltage Source, Current sources, Source transformation and Network Reduction, Mesh Analysis for complicated network containing independent sources and reactance, Super Mesh analysis.

**UNIT II [07 Hours]**

**Node Analysis:**

Nodal Analysis for complicated network containing independent sources and reactance. Super Node analysis, Duality.

**UNIT III [08 Hours]**

**Network Theorems:**

Superposition Theorem, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem and Reciprocity Theorem as applied to ac-dc circuits.

**UNIT IV [07 Hours]**

**Transient Analysis:**



Initial Conditions, Final Conditions, Steps for finding Initial Conditions and Final Conditions, Transient response of electrical networks such as R-L, R-C to standard inputs and evaluation of initial and final conditions.

**UNIT V [08 Hours]**

**Application of Laplace Transform:**

Laplace Transform Formulae & Properties, Laplace Transform of Basic R, L and C components, Analysis of electrical circuits using Laplace transform for standard inputs, Synthesis of Few typical waveforms & their Laplace Transform

**UNIT VI [08 Hours]**

**Two Port Network Parameters:**

Z Parameter, Y Parameter, Hybrid Parameter, ABCD Parameter, Reciprocity and Symmetry Conditions, Analytical treatment of all Parameters.

**Suggested Self Readings:**

**Text Books**

1. Van Valkenburg, "Network Analysis", Third Edition, 2009, Prentice Hall of India.
2. Sudhakar A. Shyammmohan, "Circuits and Networks", Third Edition, 2006, Tata McGraw-Hill.
3. D. Roy Choudhary, "Networks and Systems", New Age International Publishers, 2nd Edition, 2012

**Reference Books**

1. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers 1999
2. K. Sureshkumar, "Electric Circuits & Network", Pearson Publication
3. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hil Education, 2013.
4. Network analysis : G.K. Mittal, Khanna Publications.



|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title:</b> Electronics Workshop – I             |                             |
| <b>Course Code:</b> 24UEC304P                             | <b>Course Category:</b> PCC |
| <b>Teaching Scheme:</b> L – T – P                         | <b>Total Credits:</b> 01    |
| 0 – 0 – 2                                                 | <b>Semester:</b> III        |
| <b>Scheme of Examination:</b> ESE: 25 Marks, CE: 25 Marks |                             |

| <b>Course Objectives:</b> |                                                                                                                                            |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                        | To learn basic concepts, of all active, passive components and different types of Electronics components used in DC circuits, AC circuits. |
| 2.                        | To learn basics of Semiconductor devices, Power supply, Bipolar and Field effect transistors.                                              |
| 3.                        | Learn to use the simulation software tools for the analysis of Electrical and Electronics.                                                 |

| <b>Course Outcomes:</b>                                      |                                               |
|--------------------------------------------------------------|-----------------------------------------------|
| At the end of this course, students will have an ability to: |                                               |
| CO1                                                          | Identify & perform                            |
| CO2                                                          | Design printed circuit board.                 |
| CO3                                                          | Perform simulation of circuit using software. |

| Sr. No. | List of Experiments                                                                                                       |
|---------|---------------------------------------------------------------------------------------------------------------------------|
| 1.      | Identification & Testing of different types of Voltage Sources (Battery, Solar Cell, AC Source) using Digital Multimeter. |
| 2.      | Identification & Testing of different types of Resistors.                                                                 |
| 3.      | Identification & Testing of different types of Inductors & Capacitors.                                                    |
| 4.      | Identification & Testing of different types of Diodes (Rectifier, Zener & LED).                                           |
| 5.      | Identification & Testing of different types of Transistors (BJT, FET).                                                    |
| 6.      | Identification & Testing of different types of Transformers.                                                              |
| 7.      | Identification & Analysis of different types of Relays.                                                                   |
| 8.      | Identification & Analysis of different types of Sensors.                                                                  |
| 9.      | Identification & Analysis of different types of Motors (DC, Stepper & Servo)                                              |
| 10.     | Design Procedure of a Single Sided PC Boards.                                                                             |
| 11.     | Design of a Single Sided PCB Layout using Software.                                                                       |
| 12.     | Use of a DSO/CRO for any simple Circuit analysis.                                                                         |
| 13.     | Mini-Project.                                                                                                             |



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| Reference Books                                                                                               |
|---------------------------------------------------------------------------------------------------------------|
| 1. James Kirkpatrick, "Electronic Drafting and Printed Circuit Board Design", Galgotia Publications Pvt. Ltd. |



**Third Semester**

|                                                           |                             |
|-----------------------------------------------------------|-----------------------------|
| <b>Course Title: Software Simulation</b>                  |                             |
| <b>Course Code: 24UEC305P</b>                             | <b>Course Category: PCC</b> |
| <b>Teaching Scheme: L – T – P</b>                         | <b>Total Credits: 01</b>    |
| <b>0 – 0 – 2</b>                                          | <b>Semester: III</b>        |
| <b>Scheme of Examination: ESE: 25 Marks, CE: 25 Marks</b> |                             |

| <b>Course Objectives:</b> |                                                                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 1.                        | Students becomes able to formulate and solve engineering problems in electric and electronic circuits using MATLAB and LTspice /pSpice. |
| 2.                        | Learn to insert simple instructions to MATLAB, to find the solution of a mathematical and electronic system                             |
| 3.                        | Learn to use the LT spice/pSpice simulation software tool for the analysis of Electrical and Electronic Circuits.                       |

| <b>Course Outcomes:</b>                                      |                                                                                  |
|--------------------------------------------------------------|----------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                                  |
| CO1                                                          | Write a MATLAB / Scilab program for the given problem.                           |
| CO2                                                          | Interpret mathematical analysis of the given problem and plot various functions. |
| CO3                                                          | Examine electronic circuits using LTspice/pSpice Software.                       |

| Sr. No. | List of Experiments                                                            |
|---------|--------------------------------------------------------------------------------|
| 1.      | Introduction to MATLAB/ Scilab Environment                                     |
| 2.      | Perform simple mathematical operations using MATLAB/ Scilab.                   |
| 3.      | Perform simple matrix and array manipulations using MATLAB/Scilab.             |
| 4.      | Generate and plot various discrete and continuous signals using MATLAB/Scilab. |
| 5.      | Calculate the different types of performance measures using MATLAB/Scilab.     |
| 6.      | Introduction to LTspice/pSpice Environment.                                    |
| 7.      | DC Analysis of Thevenin's theorem.                                             |
| 8.      | DC Analysis of Rectifier circuit (Half/Full).                                  |
| 9.      | Design and simulation of any R-L-C circuit using LTspice/pSpice.               |
| 10.     | Design and simulation of class C amplifier using LTspice/pSpice.               |
| 11.     | Design and simulation of class A amplifier using LTspice/pSpice.               |
| 12.     | Design and simulation of class B amplifier using LTspice/pSpice.               |



|     |                                                                   |
|-----|-------------------------------------------------------------------|
| 13. | Design and simulation of class AB amplifier using LTspice/pSpice. |
| 14. | Transient analysis of Transistorized Amplifier circuit.           |
| 15. | Mini Project using MATLAB/ Scilab/ LTspice/pSpice.                |

| Reference Books |                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------|
| 1.              | Stephen Chapman: "Matlab programming for Engineers" Thomson Learning Publication                    |
| 2.              | Amit Kumar Singh:                                                                                   |
| 3.              | Muhammad Rashid: "Introduction to PSpice Using OrCAD for Circuits and Electronics" PHI Publications |



**Third Semester**

|                                                       |                               |
|-------------------------------------------------------|-------------------------------|
| <b>Course Title: Consumer Electronics</b>             |                               |
| <b>Course Code: 24UOE339T</b>                         | <b>Course Category: OE -I</b> |
| <b>Teaching Scheme: L – T – P</b>                     | <b>Total Credits: 03</b>      |
| <b>3 – 0 – 0</b>                                      | <b>Semester: III</b>          |
| <b>Scheme of Examination: ESE: 60 Mks, CE: 40 Mks</b> |                               |

| <b>Course Objectives:</b> |                                                                                                                                                       |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                        | To give students an in-depth knowledge of various electronic consumer Electronics gadgets,                                                            |
| 2.                        | To study various audio and video devices and systems                                                                                                  |
| 3.                        | Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices. |

| <b>Course Outcomes:</b>                                      |                                                                                            |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                                            |
| CO1                                                          | Explain various audio gadgets used in domestic and commercial applications.                |
| CO2                                                          | Explain various video gadgets used in domestic applications.                               |
| CO3                                                          | Explain various video gadgets used in Commercial applications.                             |
| CO4                                                          | Explain satellite communication technology along with DTH for day to day applications.     |
| CO5                                                          | Describe various types of home appliances used in domestic life like washing machine, oven |
| CO6                                                          | RO plant, Mixer, grinder, vacuum cleaner etc.                                              |

| <b>Course Contents:</b>                                                                                                                                                                                                                     |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                                                               | <b>[07 Hours]</b> |
| <b>Audio Systems:</b><br>Audio amplifier, microphone, loudspeaker, Public address systems, What is DJ, Audio as Data and Signal, Digital Audio Processes Outlined, Time Compression and Expansion. block diagram of home theatre & working. |                   |
| <b>UNIT II</b>                                                                                                                                                                                                                              | <b>[08 Hours]</b> |



### Video Systems: Part I:

Elements of TV communication system, Scanning and its need, Difference between a conventional CTV with LCD & LED TVs. Principle of LCD and LED TV and function of its different section. Basic principle and working of 3D TV. IPS panels and their features. Different types of interfaces like HDMI, USB, RGB etc. TV Remote Control– Types, parts and functions, IR Code transmitter and IR Code receiver. Working principle, operation of remote control. Different adjustments, general faults in remote control.

### UNIT III

[07 Hours]

### Video Systems: Part II

Projectors: - Differentiate LCD and LED projectors. Specifications of LED Projector Working principle of LED Projector. Most frequently occurring faults in a LED projector and Cameras: - Types of cameras and their specifications used in CCTV systems. CCTV setup and its components Working of Digital Video Recorders and types of DVRs.

### UNIT IV

[08 Hours]

### Satellite Communication and Technology:

Basic satellite communication, Merits& Demerits of satellite communication, applications, types of satellite & its orbits, Satellite Frequency Bands. Basic components of DTH system: MODEM, PDA, LNBC, Satellite receiver terminal, dish installation aspects, Azimuth & elevation settings of dish/ DTH receiver. Types of cables used in DTH system, set top box features, block diagram of set top box.

### UNIT V

[07 Hours]

### Introduction to different type of domestic/commercial appliances Part I:

Washing M/c: different types of machines, washing techniques, basic working principle of manual, semi- automatic and fully automatic machines, study the working of motors, different types of timers, power supply circuits. Vacuum cleaner working principle, Various parts & functions of Mixer/Grinder, speed control circuit & auto overload protector.

### UNIT VI

[08 Hours]

### Introduction to different type of domestic/commercial appliances Part II:

Operation of Micro-wave oven: Different types of ovens, study the various functions of Oven, Block diagram of microwave oven, Electrical wiring diagram of microwave oven, Microwave generation system-circuit.

Printers: - Printer & its types, principle, parts, working of dot matrix, inkjet & Laser printer, Advantages, disadvantages of each, comparison between impact & non- impact printers & cables used to connect the various printers to computer.

Digital Electronic Lock, Copier, Scanner, fax machine.





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| Suggested Self Readings: |                                                                                 |
|--------------------------|---------------------------------------------------------------------------------|
| Text Books               |                                                                                 |
| 1.                       | Consumer Electronics 1 Edition (English, Paperback, Bali S. P.)                 |
| 2.                       | Consumer Electronics (English, Paperback, Gupta B R)                            |
| 3.                       | Consumer Electronics – A Conceptual Approach” by Dr J S CHITODE                 |
| 4.                       | A Beginners Guide to Consumer Electronics Repair: Hand Book and Tutorial”<br>by |
| 5.                       | “Troubleshooting Consumer Electronics Audio Circuits” by H Davidson             |
| 6.                       | Consumer Electronics 1 Edition (English, Paperback, Bali S. P.)                 |
| 7.                       | Consumer Electronics (English, Paperback, Gupta B R)                            |



**Third Semester**

|                                                                         |                               |
|-------------------------------------------------------------------------|-------------------------------|
| <b>Course Title: Industrial Electronics</b>                             |                               |
| <b>Course Code: 24UOE340T</b>                                           | <b>Course Category: OE -I</b> |
| <b>Teaching Scheme: L – T – P</b>                                       | <b>Total Credits: 03</b>      |
| <b>3 – 0 – 0</b>                                                        | <b>Semester: III</b>          |
| <b>Scheme of Examination: ESE: 60 Mks, CE: 40 Mks</b>                   |                               |
| <b>Prerequisites: Basics of Electrical and Electronics Engineering.</b> |                               |

| <b>Course Objectives:</b> |                                                                                                                                                       |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                        | To give students an in-depth knowledge of various electronic consumer Electronics gadgets.                                                            |
| 2.                        | To study various audio and video devices and systems.                                                                                                 |
| 3.                        | Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices. |

| <b>Course Outcomes:</b>                                      |                                                                               |
|--------------------------------------------------------------|-------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                               |
| CO1                                                          | Explain fundamental physical and technical base of Electromechanical sensors. |
| CO2                                                          | Describe basic laws and phenomena that define behaviour of sensors.           |
| CO3                                                          | Explain Analog process control devices.                                       |
| CO4                                                          | Create analytical design and development solutions for sensors and actuators. |
| CO5                                                          | Describe fundamentals of PLC and Scada.                                       |
| CO6                                                          | Describe application and development of sensors used with PLC.                |

| <b>Course Contents:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>[08 Hours]</b> |
| <b>Electronic and Electromechanical Sensors:</b><br>Mechanical and Electrical Switch Classifications, Mutually and mechanically activated Electronic Circuit Switches, Discrete Output Devices, Discrete Automation, Electronic Sensors: Non-contact Sensors, Sensor Output Interfaces, Sensor Applications and Selection, Integrating Sensors into Power and Control Circuits, Position, displacement, velocity, acceleration, force, flow, level temperature, humidity, Thermocouples, RTD, LVDT, strain gauges. |                   |



| UNIT II                                                                                                                                                                                                                                                                                                                                                            | [08 Hours] |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>Smart Sensors:</b><br>Accelerometers, Force Sensors, Load Cells, Torque Sensors, Pressure Sensors, Microphones, Impact Hammers, MEMS Sensors, Sensor Arrays. Smart Transducers, Ultrasonic Transducers, Sonic Transducers.                                                                                                                                      |            |
| UNIT III                                                                                                                                                                                                                                                                                                                                                           | [07 Hours] |
| <b>Actuators:</b><br>Smart Actuators: Displacement Actuators; Force Actuators; Power Actuators; Vibration Dampers; Shakers; Fluidic Pumps; Motors, Solenoid valves, Hydraulic systems, Pneumatic Systems, DC and AC stepper motors, Dosing equipment weigh feeders, dosing pumps, extrusion – bulk and film electronic components.                                 |            |
| UNIT IV                                                                                                                                                                                                                                                                                                                                                            | [07 Hours] |
| <b>Analog Process Control Devices and safety:</b><br>Process Actuators and Output Devices, Control Valves, Electrical Heating Elements, Control Sensors, Transmitters, and Transducers, Temperature Sensors, Pressure Sensors, Flow Sensors, Level Sensors, Position Sensors, Presence Sensors, Interlock Devices.                                                 |            |
| UNIT V                                                                                                                                                                                                                                                                                                                                                             | [08 Hours] |
| <b>Programmable Logic Controllers (PLCs) SCADA (Supervisory Control and Data Acquisition System): Part I</b><br>Functions of PLC, Architecture, Selection of PLC, Networking of PLCs, Ladder Programming, Interfacing Input and Output devices with PLC, PLC based automated systems. SCADA Elements, Features, Applications, Communications, Introduction to DCS. |            |
| UNIT VI                                                                                                                                                                                                                                                                                                                                                            | [07 Hours] |
| <b>Programmable Logic Controllers (PLCs) SCADA (Supervisory Control and Data Acquisition System): Part II</b><br>Rotary encoders, digipots. 0-10V and 4-20mA systems, used in PLCs for analog input and output signals, Automation: Transfer machines, robotics basics, Application of PLCs, Industrial heating.                                                   |            |

| Suggested Self Readings: |                                                                                                   |
|--------------------------|---------------------------------------------------------------------------------------------------|
| Text Books               |                                                                                                   |
| 1.                       | Madhuchhanda Mitra, Programmable Logic controllers and Industrial Automation.                     |
| 2.                       | S. K. Bhattacharya and S. Chatterjee, "Industrial Electronics & Control", Tata McGraw Hill, 2003. |
| 3.                       | Terry. L. M. Bartell, "Industrial Electronics", Delmer Publishers, 1997.                          |
| 4.                       | Samarjit Sen Gupta, Penram International Publishing India Pvt. Ltd.                               |
|                          |                                                                                                   |



**Lokmanya Tilak Jankalyan Shikshan Sanstha's**

**PRIYADARSHINI COLLEGE OF ENGINEERING, NAGPUR**



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**Reference Books**

|    |                                                                                                                                        |
|----|----------------------------------------------------------------------------------------------------------------------------------------|
| 1. | John W. Webb, Ronold A Reis, Programmable Logic Controllers, Principles and Applications: 5th Edition, Prentice Hall of India Pvt. Ltd |
| 2. | Stuart A. Boyer, SCADA supervisory control and data acquisition, ISA Publication.                                                      |
| 3. | Curtis Johnson, Process Control Instrumentation Technology: 8th Edition Pearson Education                                              |



**Third Semester**

|                                                       |                               |
|-------------------------------------------------------|-------------------------------|
| <b>Course Title: Sensors and Systems</b>              |                               |
| <b>Course Code: 24UOE341T</b>                         | <b>Course Category: OE -I</b> |
| <b>Teaching Scheme: L – T – P</b>                     | <b>Total Credits: 03</b>      |
| <b>3 – 0 – 0</b>                                      | <b>Semester: III</b>          |
| <b>Scheme of Examination: ESE: 60 Mks, CE: 40 Mks</b> |                               |

| <b>Course Objectives:</b> |                                                                    |
|---------------------------|--------------------------------------------------------------------|
| 1.                        | To understand basic working principle of various types of sensors. |
| 2.                        | To understand the sensors used in automobile applications.         |
| 3.                        | To understand the sensors used in industries                       |
| 4.                        | To understand the various sensors used in IoT smart city project.  |
| 5.                        | To illustrate various actuators and motors used in robotics field. |

| <b>Course Outcomes:</b>                                      |                                                                                      |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                                      |
| CO1                                                          | Explain fundamental physical and technical base of sensors and actuators.            |
| CO2                                                          | Describe basic laws and phenomena that define behaviour of sensors and actuators.    |
| CO3                                                          | Analyze various approaches, procedures and results related to sensors and actuators. |
| CO4                                                          | Create analytical design and development solutions for sensors and actuators.        |
| CO5                                                          | Interpret the acquired data and measured results.                                    |
| CO6                                                          | Describe application and development of sensors and actuators                        |

| <b>Course Contents:</b>                                                                                                                                                                                                                                                                           |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                     | <b>[07 Hours]</b> |
| <b>Basics of Sensors:</b><br>Sensors / Transducers: Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization, Design procedure while choosing the sensors for various application. Types of sensors: Inductive, capacitive and resistive sensors. |                   |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                    | <b>[08 Hours]</b> |

**Sensors used in Automobile Industries:**

Camshaft Position Sensor ,Throttle Position Sensor ,Vehicle Speed Sensor, Voltage sensor, Fuel Temperature Sensor, Manifold Absolute Pressure (MAF) Sensor, Coolant Sensor, Spark Knock Sensor, Oxygen Sensor, Engine Speed Sensor, Mass airflow sensor. Selection of appropriate model & types of sensors, their Interfacing with microcontroller.

**UNIT III****[08 Hours]****Sensors used in Automation Industries:**

Rotary transformer, torque transducer, passive seed sensors, smart position sensor, non-contact hall effect rotary position sensors, current and voltage sensors, hot metal detector, proximity and displacement sensor. Selection of appropriate model & types of sensors. their calibration, characterization.

**UNIT IV****[08 Hours]****Sensors used in IoT Smart City Applications:**

Temperature Sensor, Pressure Sensor, Accelerometer and Gyroscope Sensor, IR Sensor, Optical Sensor, Gas Sensor, Smoke Sensor, rain sensor, motion sensor, RFID. Selection of appropriate model & types of sensors Case Study: Designing sensors interface for :

1. Smart traffic light system.
2. Waste management system.

**UNIT V****[07 Hours]****Actuators and motors used in Robotics: Part I**

Pneumatic and Hydraulic Actuation Systems- Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves, Process control valves, Rotary actuators.

**UNIT VI****[07 Hours]****Actuators and motors used in Robotics: Part I**

Mechanical Actuation Systems Types of motion, Kinematic chains, Cams, Gears, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection, Electrical Actuation Systems, Electrical systems, Mechanical switches, Solid-state switches, Solenoids, D.C.Motors, A.C. Motors, Stepper motors.

**Suggested Self Readings:****Text Books**

- |    |                                                                                                                                    |
|----|------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Stefan Johann Rupitsch, Jacob Fraden, Sensors and Signal Conditioning Wiley-Blackwell, 2008 Handbook of modern sensors, Springer,. |
| 2. | Senturia S. D., Piezoelectric Sensors and Actuators: Fundamentals and Applications, Springer, 2018                                 |

**Reference Books**



**Lokmanya Tilak Jankalyan Shikshan Sanstha's**

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|    |                                                                                                    |
|----|----------------------------------------------------------------------------------------------------|
| 1. | W. Bolton, "Mechatronics", Pearson Education Limited.                                              |
| 2. | Jacob Fraden, Stefan Johann Rupitsch; Sensors and Signal Conditioning                              |
| 3. | Wiley-Blackwell, 2008, Handbook of modern sensors, Springer,                                       |
| 4. | Senturia S. D.; Piezoelectric Sensors and Actuators: Fundamentals and Applications, Springer, 2018 |



**Third Semester**

|                                                                              |                             |
|------------------------------------------------------------------------------|-----------------------------|
| <b>Course Title: Universal Human Values</b>                                  |                             |
| <b>Course Code: 24UBS307T</b>                                                | <b>Course Category: VEC</b> |
| <b>Teaching Scheme: L – T – P</b>                                            | <b>Total Credits: 02</b>    |
| <b>2 – 0 – 0</b>                                                             | <b>Semester: III</b>        |
| <b>Scheme of Examination: ESE: 30 Mks, CE: 20 Mks</b>                        |                             |
| <b>Prerequisites: Basic knowledge of ethical education and human values.</b> |                             |

| <b>Course Objectives:</b> |                                                                                                                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                        | To help students to see the need for developing a holistic perspective of life and strengthen self-reflection by sensitizing them about self, family, society and nature/existence. |

| <b>Course Outcomes:</b>                                      |                                                                                 |
|--------------------------------------------------------------|---------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                                 |
| CO1                                                          | Analyze the essentials of value education and self-exploration.                 |
| CO2                                                          | Evaluate coexistence of the self with the body.                                 |
| CO3                                                          | Develop sustained happiness through identifying the essentials of human values. |
| CO4                                                          | Identify the importance of harmony in family, society and universal order.      |

| <b>Course Contents:</b>                                                                                                                                                                                    |                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                              | <b>[08 Hours]</b> |
| <b>Value education:</b><br>Definition, need for value education. The content and the process of value education, basic guidelines for value education, self-exploration as a means of value education.     |                   |
| <b>UNIT II</b>                                                                                                                                                                                             | <b>[07 Hours]</b> |
| <b>Concept of Swasthya and Sanyam:</b><br>Harmony of self with body, coexistence of self and body, understanding the needs of self and the body, understanding the activities in the self and in the body. |                   |
| <b>UNIT III</b>                                                                                                                                                                                            | <b>[08 Hours]</b> |
| <b>Values in relationship:</b><br>Trust, respect, affection, care, guidance, reverence, glory, gratitude and love, the five dimensions of human endeavor – Siksha, Swasthya, Nyay, Utpadan and Vinimaya.   |                   |





**UNIT IV**

**[07 Hours]**

**Basics for ethical human conduct:**

Definitiveness in ethical human conduct, human rights violations and social disparities, concept of value-based life and its importance. .

**Suggested Self Readings:**

**Text Books**

|    |                                                                                                         |
|----|---------------------------------------------------------------------------------------------------------|
| 1. | A Foundation Course in Human Values and Professional Ethics, R.R. Gaur,                                 |
| 2. | R Asthana, G.P. Bagaria, 2 <sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019                  |
| 3. | Professional Ethics and Human Values, Premvir Kapoor, Khanna BookPublishing, New Delhi, 2019.           |
| 4. | Universal Human Values and Professional Ethics By Dr. Ritu Soryan, S.K.Katraia & Sons Publishing, 2022. |



**Third Semester**

|                                                                           |                             |
|---------------------------------------------------------------------------|-----------------------------|
| <b>Course Title: Probability Theory and Stochastic Processes</b>          |                             |
| <b>Course Code: 24UBS309T</b>                                             | <b>Course Category: MDM</b> |
| <b>Teaching Scheme: L – T – P</b>                                         | <b>Total Credits: 02</b>    |
| <b>2 – 0 – 0</b>                                                          | <b>Semester: III</b>        |
| <b>Scheme of Examination: ESE: 30 Mks, CE: 20 Mks</b>                     |                             |
| <b>Prerequisites: Knowledge of Limits, Differential Calculus required</b> |                             |

| <b>Course Objectives:</b> |                                                                |
|---------------------------|----------------------------------------------------------------|
| 1.                        | To study probability theory and analyse random signals         |
| 2.                        | To interpret random process                                    |
| 3.                        | To apply techniques for analysis of random signals & Processes |
| 4.                        | To study the influence of distributions.                       |

| <b>Course Outcomes:</b>                                      |                                                  |
|--------------------------------------------------------------|--------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                  |
| CO1                                                          | Understand representation of random signals.     |
| CO2                                                          | Investigate characteristics of random processes. |
| CO3                                                          | Make use of theorems related to random signals.  |
| CO4                                                          | To understand propagation of random signals.     |

| <b>Course Contents:</b>                                                                                                                                                                                                                                                                                                   |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                                             | <b>[08 Hours]</b> |
| <b>Introduction to Probability:</b><br>Introduction to Probability, events, Axioms of probability, Baye's Theorem and application, Functions of Random Variables, Introduction and Definition of Continuous and Discrete Random Variables, Probability/ Cumulative distribution functions, Probability Density Functions. |                   |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                                            | <b>[07 Hours]</b> |
| <b>Probability Distribution:</b><br>Joint Distributions of discrete and continuous random variables, Conditional Distribution.                                                                                                                                                                                            |                   |
| <b>UNIT III</b>                                                                                                                                                                                                                                                                                                           | <b>[07 Hours]</b> |



**Mathematical Expectation:**

Mathematical expectation, Variance and Standard deviation, Moments, Moment generating function, Characteristic functions of random variables, skewness and kurtosis, Conditional Expectations.

**UNIT IV**

**[08 Hours]**

**Special Probability Distribution & Stochastic Processes:**

Binomial distribution, Poisson distribution, Normal distribution, Stochastic Processes. Definition, classification. Stationary processes, Mean and Covariance function, Noises in communication system.

**Suggested Self Readings:**

**Text Books**

- |    |                                                                                                       |
|----|-------------------------------------------------------------------------------------------------------|
| 1. | B. S. Grewal; Higher Engineering Mathematics (Khanna Publications),                                   |
| 2. | Erwin Kreyszig; Advanced Engineering Mathematics (Wiley),                                             |
| 3. | H. K. Dass; Advanced Engineering Mathematics (S. Chand),                                              |
| 4. | Murray Spiegel, John Schiller, R. A. Srinivasan; Probability and Statistics (Schaum's Outline Series) |



**Third Semester**

|                                                                 |                             |
|-----------------------------------------------------------------|-----------------------------|
| <b>Course Title: Field Project/Community Engagement Project</b> |                             |
| <b>Course Code: 24UEC310P</b>                                   | <b>Course Category: ELC</b> |
| <b>Teaching Scheme: L – T – P</b>                               | <b>Total Credits: 02</b>    |
| <b>0 – 0 – 4</b>                                                | <b>Semester: III</b>        |
| <b>Scheme of Examination: ESE: 25 Mks, CE: 25 Mks</b>           |                             |

| <b>Course Objectives:</b> |                                                                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------|
| 1.                        | To identify the needs and problems of the community and involve them in the problem-solving process. |
| 2.                        | To develop among themselves a sense of social and civic responsibility.                              |
| 3.                        | To utilize their knowledge in finding practical solutions to individual and community problems.      |
| 4.                        | To develop the capacity to meet emergencies and national disasters.                                  |
| 5.                        | To practice national integration and social harmony.                                                 |

| <b>Course Outcomes:</b>                                      |                                                                                                        |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| At the end of this course, students will have an ability to: |                                                                                                        |
| CO1                                                          | Overall development on character building.                                                             |
| CO2                                                          | Attitude for selfless service to the society                                                           |
| CO3                                                          | Personality development of students through community service in a variety of areas of social concern. |

**Course Contents:**

**Any 8-10 activities to be conducted from the activities listed below:**

| <b>List of Activities</b>                               |                                                                              |
|---------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Workshop /Seminar/Expert Lecture / Field Project</b> |                                                                              |
| 1.                                                      | Expert Lectures on topics such as Environment Conservation, Value Education. |
| 2.                                                      | Expert Lecture/ Workshop on Self Defense for girls/ Disaster management.     |
| 3.                                                      | Guest lecture/workshop on Health & Sanitation/ Road Safety.                  |
| 4.                                                      | Expert Lecture/Workshop on Digital Platform awareness/ Cybercrime threats.   |
| <b>Regular Activities:</b>                              |                                                                              |
| 1.                                                      | Immunization/Health camps.                                                   |



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|                          |                                                                              |
|--------------------------|------------------------------------------------------------------------------|
| 2.                       | Tree Plantation and Cleanliness/Plastic eradication activities.              |
| 3.                       | Blood donation camps.                                                        |
| 4.                       | Hygiene and health awareness program in rural areas.                         |
| 5.                       | Awareness camps on drug Abuse/AIDS/HIV.                                      |
| 6.                       | Awareness campaign for child abuse and awareness in schools in rural/ slums. |
| <b>Flagship Program:</b> |                                                                              |
| 1.                       | Anti-Drug Campaign                                                           |
| 2.                       | Energy Conservation Program                                                  |
| 3.                       | Anti-Ragging campaign                                                        |