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| **Course Code** | 21MAB201T | **Course**  **Name** | TRANSFORMS AND BOUNDARY VALUE PROBLEMS | **Course**  **Category** | B | Basic Sciences | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *Mathematics* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Analyze partial differential equations, and interpret the solutions related to PDE in engineering problems.* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Compute the Fourier series expansion and express the sine and cosine series.* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Analyze one-dimensional wave and heat equations using PDE and Fourier series concepts.* | |  |
| ***CLR-4 :*** | *Analyze Fourier transforms and their properties.* | |  |
| ***CLR-5 :*** | *Analyze Z transform for solving discrete-time Signal problems.* | |  |
|  |  | |  |
| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Construct and solve partial differential equations using various techniques.* | | | *3* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-2:*** | *Explain the Fourier series expansion of a function in terms of sine and cosine series.* | | | *3* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-3:*** | *Identify partial differential equations and utilize Fourier series techniques to solve one dimensional wave and heat equations.* | | | *3* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-4:*** | *Apply Fourier transforms techniques in signal analysis.* | | | *3* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-5:*** | *Solve discrete-time signal problems using Z transforms.* | | | *3* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |

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| ***Unit-1 - Partial Differential Equations*** | ***12 Hour*** |
| *Formation of partial differential equations by eliminating arbitrary constants & arbitrary functions- Solutions of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous types.* | |
| ***Unit-2 - Fourier Series*** | ***12 Hour*** |
| *Dirichlet’s conditions – General Fourier series – Odd and even functions - Half range sine and cosine series - Parseval’s identity – Harmonic Analysis* | |
| ***Unit-3 - Applications of Partial differential equations*** | ***12 Hour*** |
| *Classification of second order partial differential equations - Method of separation of variables – Solutions of one dimensional wave equation - One dimensional equation of heat conduction (Insulated edges excluded) - Steady state condition with zero boundary - Steady state condition with non-zero boundary conditions* | |
| ***Unit-4 - Fourier Transforms*** | ***12 Hour*** |
| *Fourier transform pair – Properties -Fourier sine and cosine transforms – Properties– Transforms of simple functions - Convolution theorem (without proof) – Parseval’s identity.* | |
| ***Unit-5 - Transforms*** | ***12 Hour*** |
| *Z - transforms – Properties of Z transforms – Inverse Z transforms – Convolution theorem (without Proof) – Solution of linear difference equations with constant coefficients using Z-transform* | |

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| **Learning**  **Resources** | 1. *Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2015.* 2. *B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.* 3. *Veerarajan T., Transforms and Partial Differential Equations, Tata McGraw-Hill, New Delhi, 3rd edition,2012.* 4. *Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 2010 3rd Edition.* | 1. *N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, New Delhi, 10th edition,2016.* 2. *Kandasamy P., etal. Engineering Mathematics, Vol.II & Vol.III (4th revised edition), S. Chand & Co., New Delhi,2000* |

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| **Learning Assessment** | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | *Summative*  *Final Examination*  *(40% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(50%)* | | *Life-Long Learning*  *CLA-2*  *(10%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 2 | *Understand* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 3 | *Apply* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| Level 4 | *Analyze* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
| 1. *Mr. Madhan Shanmugasundaram, Infosys Technologies* | 1. *Prof. Y.V.S.S. Sanyasiraju, IIT Madras* | 1. *Dr. B.Vennila hod.maths.ktr@srmist.edu.in* |
|  | 1. *Prof. K.C. Sivakumar, IIT Madars* |  |

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| **Course Code** | 21PDH201T | **Course**  **Name** | SOCIAL ENGINEERING | **Course**  **Category** | H | Humanities & Social Sciences | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *Career Development Centre* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *create personal and social awareness and responsibility* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *learn about environment and approach towards social issues* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *train students on social competencies to become self-reliant, resourceful and industrious* | |  |
| ***CLR-4 :*** | *understand social entrepreneurship* | |  |
| ***CLR-5 :*** | *develop a mindset to contribute to the society* | |  |
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| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *identify and addresses needs of social responsibilities* | | | *-* | *-* | *-* | *-* | *-* | *2* | *2* | *3* | *3* | *3* | *-* | *-* | *-* | *-* | *-* |
| ***CO-2:*** | *resolve social problems* | | | *-* | *-* | *-* | *-* | *-* | *3* | *3* | *2* | *3* | *2* | *-* | *-* | *-* | *-* | *-* |
| ***CO-3:*** | *understand social responsibility competencies and Corporate Social Responsibility activities* | | | *-* | *-* | *-* | *-* | *-* | *2* | *1* | *2* | *3* | *3* | *-* | *-* | *-* | *-* | *-* |
| ***CO-4:*** | *build a business plan to meet social needs* | | | *-* | *-* | *-* | *-* | *-* | *2* | *2* | *3* | *3* | *2* | *-* | *-* | *-* | *-* | *-* |
| ***CO-5:*** | *gain real time experience through student social responsibility project and presentation* | | | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *3* | *3* | *2* | *-* | *-* | *-* | *-* | *-* |

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| ***Unit-1 -*** | ***6 Hour*** |
| *Introduction to Social Engineering – Importance – Social Ethics – Vision & Mission towards society – Social Change – Individual Social Responsibility (ISR)* | |
| ***Unit-2 -*** | ***6 Hour*** |
| *UNSDGs – Relevance & impact of SDGs – Social Marketing – Marketing mix - Process* | |
| ***Unit-3 -*** | ***6 Hour*** |
| *PRC – Self-determination – Self regulation – Well-being (PERMA) – Volunteerism – SRC – Contributing to community & environment – Solving problems peacefully – Valuing diversity – Building relationships* | |
| ***Unit-4 -*** | ***6 Hour*** |
| *NGO – functions – Types – Approaches – NPO – Corporate Social Responsibility – Evolution - Benefits – Types – Legal Mandate* | |
| ***Unit-5 -*** | ***6 Hour*** |
| *Social Entrepreneurship – History – Impact – Types – Social Entrepreneurs – Social Enterprises – Social Business model canvas* | |

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| **Learning**  **Resources** | 1. *Joel Makeower, Beyond The Bottom Line: Putting Social Responsibility to work for your Business and the World,Oct,1995* 2. *Simen Sinek, Start with Why, How great leaders Inspire Everyone to Take Action, Penguin UK, 2011* 3. *Adam Grant, Give and Take: Why Helping others drives our success, Orion Publishing Group, 2014* 4. *David Bornstien, How to change the world, Oxford University Press, 2007* | 1. *Nicholls,Alex,ed., Social Entrepreneurship – New Models of Sustainable Social Change, Oxford University Press, 2008* 2. *Ronald R. Sims, Ethics and Corporate Social Responsibility: Why Giants fall, 2003* 3. *Robert A. Rohm, Positive Personality Profiles, Personality Insights, Inc, 2006* 4. *Neil Malhotra, Frontiers in Social Innovation. Harvard Business Review Press, 2022* |

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| **Learning Assessment** | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | *Summative*  *Final Examination*  *(40% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(50%)* | | *Life-Long Learning*  *CLA-2*  *(10%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 2 | *Understand* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 3 | *Apply* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| Level 4 | *Analyze* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
| 1. *Mr. Ajay Zener, Director, Gradsquare* | 1. *Dr.J.Vanitha, Dept. of Sociology, Loyola College.* | 1. *Dr.P.Madhusoodhanan* |
|  |  | 1. *Mr.P.Priyanand, SRMIST* |
|  |  | 1. *Ms.M.Kavitha, SRMIST* |

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| **Course Code** | 21CSS201T | **Course**  **Name** | COMPUTER ORGANIZATION AND ARCHITECTURE | **Course**  **Category** | S | Engineering Sciences | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *School of Computing* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Understand the Fundamentals of computers, Memory operations and Addressing Modes* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Know about Functions of Arithmetic and Logic unit* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Explore the Operations of Control Unit, Execution of Instruction and Pipelining* | |  |
| ***CLR-4 :*** | *Classify the Need for Parallelism, Multicore and Multiprocessor Systems* | |  |
| ***CLR-5 :*** | *Understand the Concepts and functions of Memory unit, I/O unit* | |  |
|  |  | |  |
| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Identify the computer hardware and how software interacts with computer hardware* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *-* | *-* |
| ***CO-2:*** | *Apply Boolean algebra as related to designing computer logic ,through simple combinational and sequential logic circuits* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *-* |
| ***CO-3:*** | *Examine the detailed operation of Basic Processing units and the performance of Pipelining* | | | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* |
| ***CO-4:*** | *Analyze concepts of parallelism and multi-core processors.* | | | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *-* |
| ***CO-5:*** | *Classify the memory technologies, input-output systems and evaluate the performance of memory system* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* |

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| ***Unit-1 - Introduction to Number System and Logic Gates*** | ***9 Hour*** |
| *Number Systems- Binary, Decimal, Octal, Hexadecimal; Codes- Grey, BCD,Excess-3, ASCII, Parity; Binary Arithmetic- Addition, Subtraction, Multiplication, Division using Sign Magnitude,1’s compliment, 2’s compliment, BCD Arithmetic; Logic Gates-AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.* | |
| ***Unit-2 - Basic Structure of computers*** | ***9 Hour*** |
| *Functional Units of a computer, Operational concepts, Bus structures, Memory addresses and operations, assembly language , Instructions, Instruction sequencing, Addressing modes. Case study: 8086.* | |
| ***Unit-3 - Design of ALU*** | ***9 Hour*** |
| *De Morgan’s Theorem, Adders, Multiplier – Unsigned, Signed, Fast, Carry Save Addition of summands; Division–Restoring and Non-Restoring; IEEE 754 Floating point numbers and operations.* | |
| ***Unit-4 - Control Unit*** | ***9 Hour*** |
| *Basic processing unit, ALU operations, Instruction execution, Branch instruction, Multiple bus organization, Hardwired control, Generation of control signals, Micro-programmed control; Pipelining: Basic concepts of pipelining, Performance, Hazards-Data, Instruction and Control, Influence on instruction sets.* | |
| ***Unit-5 - Parallelism*** | ***9 Hour*** |
| *Need, types , applications and challenges, Architecture of Parallel Systems-Flynn’s classification; ARM Processor: The thumb instruction set, Processor and CPU cores, Instruction Encoding format, Memory load and Store instruction, Basics of I/O operations. Case study: ARM 5 and ARM 7 Architecture* | |

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| **Learning**  **Resources** | 1. *CarlHamacher,ZvonkoVranesic,SafwatZaky,ComputerOrganization,5thed.,McGraw-Hill,2015* 2. *KaiHwang,FayeA.Briggs,ComputerArchitectureandParallelProcessing”,3rded.,McGrawHill,2016* 3. *GhoshT.K.,ComputerOrganizationandArchitecture,3rded.,TataMcGraw-Hill,2011* 4. *P.Hayes,ComputerArchitectureandOrganization,3rded.,McGrawHill,2015.* | 1. *WilliamStallings,ComputerOrganizationandArchitecture–DesigningforPerformance,10thed.,Pearson Education,2015* 2. *DavidA.PattersonandJohnL.HennessyComputerOrganizationandDesign-AHardwaresoftwareinterface,5thed.,Morgan Kaufmann,2014* |

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| **Learning Assessment** | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | *Summative*  *Final Examination*  *(40% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(50%)* | | *Life-Long Learning*  *CLA-2*  *(10%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| Level 2 | *Understand* | *30%* | *-* | *30%* | *-* | *30%* | *-* |
| Level 3 | *Apply* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 4 | *Analyze* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
| 1. *Mr.Saminath Sanjai, Borqs Technologies,Inc. Bengaluru* |  | 1. Dr.K.Vijaya, Dr.Anitha D, SRMIST |

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| **Course Code** | 21ECC201T | **Course**  **Name** | SOLID STATE DEVICES | **Course**  **Category** | C | Professional Core | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *ECE* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Learn the principles of semiconductors and PN junction.* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Apply the knowledge of PN and special diodes for electronic systems.* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Gain knowledge about basic operation of BJT and its applications* | |  |
| ***CLR-4 :*** | *Acquire knowledge about basic concepts of FET and its applications.* | |  |
| ***CLR-5 :*** | *Identify and explore the various techniques of semiconductor fabrication.* | |  |
|  |  | |  |
| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Comprehend the basic properties of semiconductors and PN junction.* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *1* | *-* | *-* |
| ***CO-2:*** | *Analyze and experiment applications of special diodes and PN diode.* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *1* | *-* | *-* |
| ***CO-3:*** | *Articulate theconstruction,operation,characteristics and parameters of Bipolar Junction transistor and its Applications* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *1* | *-* | *-* |
| ***CO-4:*** | *Demonstrate construction, operation, characteristics and parameters of Field Effect Transistor and its application.* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *1* | *-* | *-* |
| ***CO-5:*** | *Explain the fabrication techniques of semiconductor devices in integrated circuits.* | | | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *1* | *-* | *-* |

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| ***Unit-1 - Semiconductor Junction Theory*** | ***9 Hour*** |
| *Semiconductor: Fermi level, Electron and hole concentration at equilibrium, Temperature dependence of charge carrier, Drift and diffusion of carriers, Hall effect.PN junction theory: Current-Voltage relationship, Calculation of depletion width, potential barrier, diode current, Capacitive effects in PN junction, Energy band structure, PN diodes: Terminal characteristics and parameters, Diode modelling, DC load line and analysis* | |
| ***Unit-2 - Special Junction Diodes And Pn Applications*** | ***9 Hour*** |
| *Zener diode, Varactor diode, Step recovery diode, Tunnel diode, LED, Laser diode, Pin photodiode, Avalanche Photodiode.Half wave rectifier and Full wave rectifier: Center tapped and Bridge rectifier: Operation and derivation of average values of output voltage and current, ripple factor and efficiency, Peak inverse voltage, Transformer Utilization factor. Filters: Inductor and capacitor filters, LC and CLC Filters, Clippers and Clampers, Voltage Multipliers* | |
| ***Unit-3 – Bipolar Junction Transistor*** | ***9 Hour*** |
| *Physical structure and device operation of BJT, Current-Voltage characteristics of BJT configurations, Early effect, BJT circuit models: Ebers Moll, Gummel Poon, small signal & hybrid-π, Biasing circuits for BJT: Base bias, Emitter bias, Voltage-divider bias, Collector-feedback bias, BJT as an amplifier and as a switch* | |

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| ***Unit-4 - Field Effect Transistor*** | ***9 Hour*** |
| *Physical Structure, Device operation of E-MOSFET and D-MOSFET, I-V characteristics of D-MOSFET & E-MOSFET, Derivation drain current and Transconductance, Biasing circuits for MOSFET: Gate bias, Self-bias, Voltage divider bias, MESFET, HEMT, CMOSFET, MOSFET as an amplifier, MOSFET as a switch, FET Models* | |
| ***Unit-5 - Fabrication of Semiconductor Devices*** | ***9 Hour*** |
| *Integrated Circuit: Advantages, Limitations, Classification. IC Manufacturing: Material Preparation, Crystal Growing and wafer preparation, Wafer fabrication, Testing, Bonding and Packaging. Fabrication of PN diode, BJT and MOSFET* | |

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| **Learning**  **Resources** | 1. *Ben G. Streetman and Sanjay Kumar Banerjee, “Solid State Electronic Devices Pearson, 7th edition, 2016.* 2. *Donald A Neamen, Dhrubes Biswas “Semiconductor Physics and Devices”, 4th edition, McGraw-Hill Education, 2012.* 3. *Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, 11th Edition, 2013.* | 1. *R. S. Sedha, “Applied Electronics”, S. Chand, 2018.* 2. *David A. Bell, “Electronic Devices and Circuits”, 5th edition, Oxford University Press, 2015.* 3. *Muhammad Rashid, “Microelectronic Circuits: Analysis & Design”, 2nd edition,*   *Cengage Learning, 2010.*   1. *Thomas L. Floyd, “Electronic Devices”, Pearson, 9th edition, 2013.* |

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| **Learning Assessment** | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | *Summative*  *Final Examination*  *(40% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(50%)* | | *Life-Long Learning*  *CLA-2*  *(10%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *15%* | *-* | 15% | *-* | *15%* | *-* |
| Level 2 | *Understand* | *25%* | *-* | 15% | *-* | *25%* | *-* |
| Level 3 | *Apply* | *30%* | *-* | 30% | *-* | *30%* | *-* |
| Level 4 | *Analyze* | *30%* | *-* | 30% | *-* | *30%* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | 5% | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | 5% | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
|  | 1. *Mr. Saivineeth, ML Accelerator Architect @ Google* | 1. *Mrs. A. Ramya, SRMIST* |
|  |  | 1. *Dr. J. Manjula, SRMIST* |

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| **Course Code** | 21ECC203T | **Course**  **Name** | ELECTRONIC SYSTEM AND PCB DESIGN | **Course**  **Category** | C | Professional Core | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *ECE* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Understand binary codes, able to simplify Boolean logic expressions and understand the basic TTL and CMOS gates operate at the component level* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Able to design simple combinational logics using basic gates and MSI circuits* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Familiarize with basic sequential logic components: flip-flops, registers, counters and their usage, and able to design of sequential logic circuits.* | |  |
| ***CLR-4 :*** | *Able to design application level circuits and adopt systematic approach with the use of Sequence detector.* | |  |
| ***CLR-5 :*** | *Know how to implement logic circuits using PLDs* | |  |
|  |  | |  |
| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Simplify Boolean expressions; implement gates as well as other types of IC devices using two major IC technologies, TTL and CMOS.* | | | *3* | *-* | *-* | *-* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *-* |
| ***CO-2:*** | *Identify eight basic types of fixed-function combinational logic functions and demonstrate how the devices / circuits can be used in building complete digital systems such as computers.* | | | *-* | *2* | *2* | *-* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *-* |
| ***CO-3:*** | *Understand and design sequential circuits using several types of flip-flops* | | | *-* | *2* | *2* | *-* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *-* |
| ***CO-4:*** | *Design of advanced circuit and Design the advanced sequential logic circuits.* | | | *-* | *2* | *2* | *-* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *-* |
| ***CO-5:*** | *Implement multiple output combinational logic circuits using PLDs; Explain the operation of a CPLD and FPGA.* | | | *-* | *2* | *2* | *-* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *-* |

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| ***Unit-1 - Basics and Logic Family*** | ***9 Hour*** |
| *Boolean algebra, Karnaugh Map - Quine McClusky minimization technique(4 -variable) - Logic Families:-Introduction - TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, CMOS* | |
| ***Unit-2 - Combinational circuits*** | ***9 Hour*** |
| *Combinational logic circuits : Half adder – Full Adder – Half subtractor - Full subtractor – Parallel binary adder - 2’s complement subtraction using parallel adders - Multiplexer/Demultiplexer – decoder - encoder -code converters - Magnitude Comparator* | |
| ***Unit-3 - Sequential Circuits*** | ***9 Hour*** |
| *Flip-flop and Latch: SR latches- JK flip-flop, T flip-flop, D flip-flop-Master-slave JK flip-flop- Register Counters- Ring counter, Johnson counter-Shift registers (SISO, SIPO, PISO, PIPO)--Universal shift register-Counters:-Asynchronous/Ripple counters--Synchronous counters-Modulus-n Counter -Up-Down counter- State reduction-State assignment* | |
| ***Unit-4 - Advanced Combinational & Sequential logic*** | ***9 Hour*** |
| *Advance sequential logic:-- Mealy and Moore model- Analyze and design synchronous sequential circuits - FSM - Sequence detector - Vending Machine – Advanced digital circuits:- Hamming code – Delay in a ripple carry adder - Carry Look Ahead adder -2 Bit Multiplier* | |

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| ***Unit-5 - PLD's and Memory*** | ***9 Hour*** |
| *RAM Memory decoding-ROM--Basic concepts:-Programmable Logic Devices (PLDs):-Basic concepts-PROM as PLD-Programmable Array Logic (PAL)--Programmable Logic Array (PLA)-FPGA* | |

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| **Learning**  **Resources** | 1. *Morris Mano M, Michael D. Ciletti, "Digital Design with an Introduction to the Verilog HDL", 5th ed., Pearson Education, 2014* 2. *Charles H Roth (Jr), Larry L. Kinney, "Fundamentals of Logic Design", 5th ed., Cengage Learning India Edition, 2010.* 3. *Thomas L. Floyd, "Digital Fundamentals", 10th ed., Pearson Education, 2013* | 1. *Ronald J. Tocci, "Digital System Principles and Applications", 10th ed., Pearson Education, 2009.* 2. *Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications", 6th ed., TataMcgraw Hill, 2008* |

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| **Learning Assessment** | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | *Summative*  *Final Examination*  *(40% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(50%)* | | *Life-Long Learning*  *CLA-2*  *(10%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *15%* | *-* | *15%* | *-* | *15%* | *-* |
| Level 2 | *Understand* | *25%* | *-* | *20%* | *-* | *25%* | *-* |
| Level 3 | *Apply* | *30%* | *-* | *25%* | *-* | *30%* | *-* |
| Level 4 | *Analyze* | *30%* | *-* | *25%* | *-* | *30%* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *10%* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *5%* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
|  | 1. *Mr. Saivineeth, ML Accelerator Architect @ Google* | 1. *M.Maria Dominic Savio* |

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| **Course Code** | 21ECC205T | **Course**  **Name** | ELECTROMAGNETIC THEORY AND INTERFERENCE | **Course**  **Category** | C | Professional Core | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *ECE* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Gain knowledge on the basic concepts and insights of Electric field* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Gain knowledge on the basic concepts and insights of Magnetic field and emphasize the significance of Maxwell’sequations.* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Interpret the wave propagation in guided waveguide.* | |  |
| ***CLR-4 :*** | *Acquire the fundamental knowledge on Transmission Line Theory and acquire the knowledge on transmission line parameter calculation.* | |  |
| ***CLR-5 :*** | *Acquire knowledge on theoretical concepts and analysis techniques to find solutions for problems related to electromagnetic wave propagation and Transmission line Theory.* | |  |
|  |  | |  |
| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Apply the concepts and knowledge to solve problems related to electric field.* | | | *-* | *2* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-2:*** | *Analyze the concepts of Magnetic field and Maxwell’s equations in the real world application.* | | | *-* | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-3:*** | *Translate the phenomenon of guided wave propagation and its mode of propagation.* | | | *-* | *3* | *2* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-4:*** | *Describe the importance of transmission line theory applicable to low frequency transmission lines.* | | | *-* | *2* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-5:*** | *Solve transmission line parameter and impedance matching through analytical and graphical methods.* | | | *-* | *2* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |

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| ***Unit-1 – Electrostatics*** | ***9 Hour*** |
| *Introduction to electrostatics- Rectangular co-ordinate- Cylindrical & Spherical Co-ordinate- Review of vector calculus- Coulomb’s Law and field intensity- Problem based on coulomb’s law- Electric field due to continuous charge distribution-Concept- Derivation of E due Infinite Line charge* | |
| ***Unit-2 - Magnetostatics and Maxwells Equations*** | ***9 Hour*** |
| *Energy density in electrostatic field- Problem discussion. - Biot savart law-Magnetic field intensity due to Infinite line charge- H- due finite and semi finite line charge- Ampere’s circuital law&application: Infinite line current- Infinite Sheet current- Infinitely long coaxial Transmission line- Problem based on ACL.* | |
| ***Unit-3 - Electromagnetic Waves and Waveguides*** | ***9 Hour*** |
| *Introduction to EM waves- Waves in general- Plane wave in lossless dielectric- Plane wave in free space- Plane wave in good conductor- Problems based on plane waves in lossless, free space and good conductor- Rectangular waveguide- Rectangular waveguide-Problems* | |
| ***Unit-4 - Transmission Line Theory and Intoduction to Interference*** | ***9 Hour*** |
| *Transmission line parameters- Transmission line equivalent circuit- Explanation- Transmission line equation derivation- Problem discussion.- Transmission line characteristics: lossless Line- Distortion less line - EMI/EMC- Types of EMI/EMC - SE, CE - Susceptibility* | |

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| ***Unit-5 - Transmission Line Calculator and Impedance Matching - Advanced EM theory*** | ***9 Hour*** |
| *Introduction to impedance matching- Smith chart Introduction- Reflection coefficient, Standing wave ratio Input impedance calculation in smith chart- Practice problems.- Single stub matching Introduction- Procedure for single stub matching- Problems solving in smith chart.* | |

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| **Learning**  **Resources** | 1. *Matthew N. O. Sadiku., S. V. Kulkarni, “Elements of Electromagnetics”, 6th ed., Oxford University Press, 2015* 2. *G. S. N. Raju, “Electromagnetic Field Theory and Transmission Lines”, Pearson Education, 2006* | 1. *Nannapaneni Narayana Rao, “Principles of Engineering Electromagnetics”,6th ed., Pearson Education, 2016* 2. *William H. Hayt,Jr., John A.Buck., “Engineering Electromagnetics”,8th ed.,Tata McGraw-Hill 2012.* 3. *John D.Ryder, “Networks, Lines and Fields”, PHI, 2009.* |

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| **Learning Assessment** | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | *Summative*  *Final Examination*  *(40% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(50%)* | | *Life-Long Learning*  *CLA-2*  *(10%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 2 | *Understand* | *25%* | *-* | *25%* | *-* | *25%* | *-* |
| Level 3 | *Apply* | *35%* | *-* | *35%* | *-* | *35%* | *-* |
| Level 4 | *Analyze* | *20%* | *-* | *20%* | *-* | *20%* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100 %* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
| 1. *Mr. Anuj Kumar, Bombardier Transportation, Ahmedabad,* [*kumaranuj.anii@gmail.com*](mailto:kumaranuj.anii@gmail.com) | 1. *Dr. Meenakshi, Professor of ECE, CEG, Anna University,* [*meena68@annauniv.edu*](mailto:meena68@annauniv.edu) | 1. *Dr. Sandeep Kumar P, Assistant Professor, SRMIST* |
| 1. *Mr. Hariharasudhan - Johnson Controls, Pune,* [*hariharasudhan.v@jci.com*](mailto:hariharasudhan.v@jci.com) | 1. *Dr. Venkatesan, Sr. Scientist, NIOT, Chennai,* [*venkat@niot.res.in*](mailto:venkat@niot.res.in) | 1. *C. T. Manimegalai, Associate Professor, SRMIST* |

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| **Course Code** | 21ECC211L | **Course**  **Name** | DEVICES AND DIGITAL IC LAB | **Course**  **Category** | C | Professional Core | L | T | P | C |
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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *ECE* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Understand the principles of Zener diode and its application.* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Gain knowledge about applications of PN.* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Explore the characteristics and operation of BJT and MOSFET.* | |  |
| ***CLR-4 :*** | *Acquire knowledge combinational circuits and its applications.* | |  |
| ***CLR-5 :*** | *Familiarize operations of various sequential circuits.* | |  |
|  |  | |  |
| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Demonstrate the characteristics of Zener and its applications.* | | | *3* | *2* | *-* | *-* | *1* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *-* | *-* |
| ***CO-2:*** | *Analyze applications of PN diode.* | | | *3* | *2* | *-* | *-* | *1* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-3:*** | *Articulate the characteristics and parameters of BJT and MOSFET.* | | | *3* | *2* | *-* | *-* | *1* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *-* | *-* |
| ***CO-4:*** | *Implement different combinational circuits.* | | | *3* | *2* | *-* | *-* | *1* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *-* | *-* |
| ***CO-5:*** | *Design various sequential circuits in real life.* | | | *3* | *2* | *-* | *-* | *1* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *1* | *-* | *-* |

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| ***Unit-1 - Zener Diode and Application*** | ***12 Hour*** |
| *Semiconductor principles- Properties of PN- Principle of Zener diode- Characteristics of Zener diode, Forward biasing, Reverse Biasing- Diodeparameters- I-V characteristics- Application in reverse Biasing - Voltage regulator- Series, Shunt- Load regulation, line regulation* | |
| ***Unit-2 - Pn Apllications*** | ***12 Hour*** |
| *Rectifiers- Half wave, Full wave centre tapped- Filters: Capacitive filter- Rectification with and without filter, Efficiency, ripple factor- Clipper:Principles, Series clipper, Shunt clipper, Biased clipper- Clamper: Positive clamper, Negative clamper, Biased clamper* | |
| ***Unit-3 - Bipolar Junction Transistor and Metal Oxide Semiconductor Field Effect Transistor*** | ***12 Hour*** |
| *BJT: Principle, Operation, Characteristics: Input characteristics, Output characteristics- Transistor parameters- DC load line- BJT biasing: Fixed bias, Collector feedback bias, Emitter bias, Voltage divider bias MOSFET: Principle, Operation, Characteristics: Transfer characteristics, Drain characteristics, FET parameters, MOSFET Switching* | |
| ***Unit-4 - Combinational Circuits*** | ***12 Hour*** |
| *Design of combinational circuits- Adders: Half adder, full adder, Full adder using half adder, 4-bit binary parallel adder- Encoder: 4×2, 8×3- Decoder: 2×4, 3×8-4:1 Multiplexer- 1:4 Demultiplexer* | |
| ***Unit-5 - Sequential Circuits*** | ***12 Hour*** |
| *Clock- Flip flop: RS, JK, D & T- Synchronous counters: Up, Down, Up/Down, Asynchronous counters: Up, Down, Up/Down, Mod-n Counters* | |

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| **Learning**  **Resources** | 1. *David A. Bell, “Electronic evices and Circuits”,5th edition,Oxford University Press, 2015.* 2. *Donald A Neamen, Dhrubes Biswas “Semiconductor Physics and Devices”, 4th edition, McGraw-Hill Education, 2012.* 3. *Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, 11th Edition, 2013.* | 1. *Morris Mano M, Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, 5th ed., Pearson Education, 2014.* 2. *Charles H Roth (Jr), Larry L. Kinney, Fundamentals of Logic Design, 5th ed.,Cengage Learning India Edition, 2010.Thomas L. Floyd, Digital Fundamentals, 10th ed., Pearson Education, 2013.* |

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| **Learning Assessment** | | | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | | | *Summative*  *Final Examination*  *(0% weightage)* | |
| *CLA-1 Average of first cycle experiments*  *(30%)* | | *CLA-2 Average of second cycle experiments*  *(30%)* | | *Practical Examination*  *(40% weightage)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *-* | *20%* | *-* | *20%* | *-* | *20%* | *-* | *-* |
| Level 2 | *Understand* | *-* | *20%* | *-* | *20%* | *-* | *20%* | *-* | *-* |
| Level 3 | *Apply* | *-* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *-* |
| Level 4 | *Analyze* | *-* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* |  | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* |  |  | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100%* | | *0 %* | |
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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
|  | 1. *Mr. Saivineeth, ML Accelerator Architect @ Google* | 1. *Mrs. A. Ramya, SRMIST* |
|  |  | 1. *Dr. J. Manjula, SRMIST* |

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| **Course Code** | 21LEM201T | **Course**  **Name** | PROFESSIONAL ETHICS | **Course**  **Category** | M | Mandatory Courses | L | T | P | C |
| 1 | 0 | 0 | 0 |

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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *English and Foreign Languages* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *To connect the learners to their potential - understand moral, professional and personal values.* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *To introduce the learners to professional ethics and to enable them towards decision making skills* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *To draw the learners’ attention towards business ethics.* | |  |
| ***CLR-4 :*** | *To strengthen and enhance professional ethics through psychological approach* | |  |
| ***CLR-5 :*** | *To cultivate a spirit of working in diverse world by understanding workplace ethics.* | |  |
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| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Equip themselves with an understanding of moral, professional and personal values* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *-* | *-* | *3* | *-* | *-* | *-* |
| ***CO-2:*** | *Understand the need of ethics in shaping their profession The learners will hone their decision - making skills.* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *-* | *-* | *3* | *-* | *-* | *-* |
| ***CO-3:*** | *Refine their business ethics based on psychological and philosophical perspective.* | | | *-* | *-* | *-* | *-* | *-* | *3* | *-* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| ***CO-4:*** | *Have an edge over the ethical systems in workplace.* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *-* | *-* | *3* | *-* | *-* | *-* |
| ***CO-5:*** | *assess the need for a balance between ecology, engineering and economy* | | | *-* | *-* | *-* | *-* | *-* | *2* | *3* | *3* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |

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| ***Unit-1 - Introduction*** | ***Hour*** |
| *Individual and Professional Ethics: Introduction to Professional Ethics, Morals, Values and Ethics - Personal and Professional - Sensé of Engineering Ethics - Code of Ethics by NSPE - Making decisions with ethical dimensions - definition - roadmap to ethical decision making - common standards - internal obstacles - bias - empathy.* | |
| ***Unit-2 - Business Ethics*** | ***Hour*** |
| *Philosophical approaches to Business Ethics - ethical reasoning - ethical issues in business - Social Responsibility of Business - conflict of interest - cultural relativism - Ethical leadership - Resisting un - ethical authority and domination - Global Business Ethics.* | |
| ***Unit-3 - Psychological Approaches*** | ***Hour*** |
| *Ethical Theories - Psychological and Philosohpical approaches - Myths about Morality - conflict of interest in psychological perspective - Courage - Integrity - ethical dilemma - Emotional Intelligence.* | |
| ***Unit-4 - Workplace Ethic*** | ***Hour*** |
| *Ethics in changing domains of Research - academic integrity - intellectual honesty - Role of Engineers and Managers - Ethical issues in Diverse workplace - competition - free will - Confidentiality - employee rights - Intellectual property rights - discrimination.* | |
| ***Unit-5 - Safety, Responsibilities and Rights*** | ***Hour*** |
| *Ecology, Engineering, Economy - Risk benefit analysis and reducing risk - SDGs - Corporate social responsibility and Corporate Sustainability - CSR in India - Sustainability Case Studies.* | |

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| **Learning**  **Resources** | 1. *Subramanian. R., Professional Ethics, Oxford Publication, 2013.* 2. *Nagarasan. R.S. Professional Ethics and Human Values. New Age International Publications, 2006.* 3. *Mike W Martin and Roland Schinzinger, Ethics in Engineering,4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi,2014* 4. [*https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN. pdf*](https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN.%20pdf) | 1. [*https://www.nspe.org/resources/ethics/code - ethics*](https://www.nspe.org/resources/ethics/code-ethics) 2. [*https://www.toolshero.com/tag/ethical - decision - making/*](https://www.toolshero.com/tag/ethical-decision-making/) 3. [*https://pagecentertraining.psu.edu/public - relations - ethics/introduction - to - public - relations - ethics/lesson - 1/ethical - theories/*](https://pagecentertraining.psu.edu/public-relations-ethics/introduction-to-public-relations-ethics/lesson-1/ethical-theories/) 4. [*https://www.ewh.ieee.org/soc/pes/switchgear/presentations/tp\_files/2017 - 1\_Thurs\_Shiffbauer\_Singer\_Engineering\_Ethics.pdf*](https://www.ewh.ieee.org/soc/pes/switchgear/presentations/tp_files/2017-1_Thurs_Shiffbauer_Singer_Engineering_Ethics.pdf) 5. [*https://peer.asee.org/case - studies - in - engineering - ethics.pdf*](https://peer.asee.org/case-studies-in-engineering-ethics.pdf) |

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| **Learning Assessment** | | | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | | | *Summative*  *Final Examination*  *(0% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(20%)* | | *Life Long Learning*  *CLA-2 –*  *(60%)* | | *Summative*  *(20%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *30%* | *-* | *20%* | *-* | *20%* | *-* | *-* | *-* |
| Level 2 | *Understand* | *40%* | *-* | *20%* | *-* | *20%* | *-* | *-* | *-* |
| Level 3 | *Apply* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *-* | *-* |
| Level 4 | *Analyze* | *-* | *-* | *30%* | *-* | *30%* | *-* | *-* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100%* | | *-* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
| 1. *Ms. Woanyuh Zoe Tsou Founder and proprietor, IF Lingua Cultural studio, Hsinchu,Taiwan.* | 1. *Dr. S. Soundiraraj, Professor and Head, Dept.of English, College of Engineering, Anna University Guindy Campus, Chennai.* | 1. *Dr. P. Tamilarasan Associate Prof & Head(i/c), Dept. of EFL, SRMIST.* |
|  | 1. *Dr. J. Mangayakarasi, Dean of Academics Affairs & Head, PG and Research, Dept.of English, Ethiraj College for Woman, Chennai.* | 1. *Dr. J. Michael Raj Asst. Professor (SG), Dept. of EFL SRMIST* |
|  |  | 1. *Dr. S. Ramya Asst. Professor(Sr.G), Dept. of EFL, SRMIST* |
|  |  | 1. *Dr. K.R. Sondaraya Asst. Professor, Dept. of EFL, SRMIST.* |

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| **Course Code** | 21PDM201L | **Course**  **Name** | VERBAL REASONING | **Course**  **Category** | M | Mandatory Courses | L | T | P | C |
| 0 | 0 | 2 | 0 |

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| **Pre-requisite Courses** | *Nil* | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *Career Development Centre* | | | **Data Book / Codes / Standards** | *Nil* | |

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| **Course Learning Rationale (CLR):** | | ***The purpose of learning this course is to:*** |  | **Program Outcomes (PO)** | | | | | | | | | | | | **Program**  **Specific**  **outcomes** | | |
| ***CLR-1 :*** | *Understand the structure, organization, tone, and main idea of the passage* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***CLR-2 :*** | *Determine the grammatical, syntactical, and logical accuracy of sentences* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| ***CLR-3 :*** | *Comprehend an argument’s line of reasoning* | |  |
| ***CLR-4 :*** | *Enable students understand subtle meanings of words used in academic texts* | |  |
| ***CLR-5 :*** | *Recognize the logical coherence of ideas in a text* | |  |
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| **Course Outcomes (CO):** | | ***At the end of this course, learners will be able to:*** | |
| ***CO-1:*** | *Build vocabulary through methodical approaches and nurture passion for enriching vocabulary* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *3* | *-* | *3* | *-* | *-* | *-* |
| ***CO-2:*** | *Detect and correct grammatical, syntactical, and logical fallacies* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *3* | *-* | *3* | *-* | *-* | *-* |
| ***CO-3:*** | *Hone critical thinking skills by analyzing arguments with explicit and implicit premises to validate the author’s point of view* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *3* | *-* | *3* | *-* | *-* | *-* |
| ***CO-4:*** | *Analyze and evaluate texts critically in multifarious ways* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *3* | *-* | *3* | *-* | *-* | *-* |
| ***CO-5:*** | *Identify relationships between sentences based on their function, usage and characteristics* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *2* | *3* | *-* | *3* | *-* | *-* | *-* |

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| ***Unit-1 -*** | ***6 Hour*** |
| *Reading Comprehension, Spotting Errors – Subject Verb Agreement, Pronouns, Tense, Comparisons* | |
| ***Unit-2 -*** | ***6 Hour*** |
| *Sentence Correction – Modifiers, parallelism, Subjunctive Mood* | |
| ***Unit-3 -*** | ***6 Hour*** |
| *Sentence Completion – Single Blank, Double and Triple blanks, Sentence Completion- Grammar, Synonyms and Antonyms* | |
| ***Unit-4 -*** | ***6 Hour*** |
| *Critical Reasoning – Facts, Inference, Judgement, Strengthening and Weakening an Argument* | |
| ***Unit-5 -*** | ***6 Hour*** |
| *Para jumble, Para Completion, One word substitution,* | |

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| **Learning**  **Resources** | 1. *Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002* 2. *Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition* | 1. *Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014Wiley’s GMAT Reading Comprehension Grail, Wiley, 2016* 2. *Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition* |

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| **Learning Assessment** | | | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | | | *Summative*  *Final Examination*  *(0% weightage)* | |
| *CLA-1 Average of first cycle experiments*  *(30%)* | | *CLA-2 Average of second cycle experiments*  *(30%)* | | *Practical Examination*  *(40% weightage)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* |  | *40%* |  | *30%* |  | *30%* |  |  |
| Level 2 | *Understand* |  |  |  |  |  |  |  |  |
| Level 3 | *Apply* |  | *40%* |  | *40%* |  | *40%* |  |  |
| Level 4 | *Analyze* |  |  |  |  |  |  |  |  |
| Level 5 | *Evaluate* |  | *20%* |  | *30%* |  | *30%* |  |  |
| Level 6 | *Create* |  |  |  |  |  |  |  |  |
|  | *Total* | *100 %* | | *100 %* | | *100%* | | *-* | |

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| **Course Designers** | | |
| **Experts from Industry** | **Experts from Higher Technical Institutions** | **Internal Experts** |
| 1. *Mr.Pratap Iyer, Study Abroad Mentors,pratap.iyer30@gmail.com* | 1. *Mr Nishith Sinha, dueNorth India Academics LLP, nsinha.alexander@gmail.com* | 1. *Dr. P. Madhusoodhanan, SRMIST* |
| 1. *Mr. Ajay Zener, Director, Gradsquare ajayzenner@gmail.com* | 1. *Dr.Dinesh Khattar, Delhi University, dinesh.khattar31@gmail.com* | 1. *Dr Jayapragash J, SRMIST* |
|  |  | 1. *Dr. M. Snehalatha, SRMIST* |

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| **Course Code** | 21LEM202T | **Course**  **Name** | UHV-II: Universal Human Values – Understanding Harmony and Ethical Human Conduct | **Course**  **Category** | M | CREDIT | L | T | P | C |
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| **Pre-requisite Courses** | *Nil.* Desirable : UHV-I: Universal Human Values – Introduction | | **Co- requisite**  **Courses** | *Nil* | | **Progressive Courses** | *Nil* |
| **Course Offering Department** | | *Value Education Cell* | | | *Data Book / Codes / Standards* | *Nil* | |

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| Course Learning Rationale (CLR): | | *The purpose of learning this course is to:* |  | Program Learning Outcomes (PO) | | | | | | | | | | | |
| *CLR-1 :* | *Help the students to understand need of value education, appreciate the essential complimentarily between 'values' and 'skills' and to ensure sustained happiness and prosperity which are the core aspirations of all human beings,* | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| *CLR-2 :* | *Help students initiate a process of dialog within themselves to know what they really want to be’ in their life and profession.* | |  | Engineering Knowledge | Problem Analysis | Design/development of solutions | Conduct investigations of complex problems | Modern Tool Usage | The engineer and society | Environment & Sustainability | Ethics | Individual & Team Work | Communication | Project Mgt. & Finance | Life Long Learning |
| *CLR-3 :* | *Help students to understand the meaning of happiness and prosperity for a human being. understanding holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.* | |  |
| *CLR-4 :* | *Help students on right understanding of the Human reality and the rest of existence, harmony at all the levels of human living, and live accordingly.* | |  |
| *CLR-5 :* | *Highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.* | |  |
|  |  | |  |
| Course Learning Outcomes (CO): | | *At the end of this course, learners will be able to:* | |
| *CO-1:* | *Evaluate the significance of value inputs in formal education and start applying them in their life and profession* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *-* | *-* | *3* |
| *CO-2:* | *Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *-* | *-* | *3* |
| *CO-3:* | *Analyze the value of harmonious relationship based on trust and respect in their life and profession* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *-* | *-* | *-* |
| *CO-4:* | *Examine the role of a human being in ensuring harmony in society and nature.* | | | *-* | *-* | *-* | *-* | *-* | *2* | *2* | *3* | *-* | *-* | *-* | *3* |
| *CO-5:* | *Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.* | | | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *3* | *2* | *-* | *-* | *3* |

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| ***Unit-1 : Introduction-Basic Human Aspiration, its fulfillment through All- encompassing Resolution*** | **9 Hour** |
| *The basic human aspirations and their fulfillment through Right understanding and Resolution, Right understanding and Resolution as the activities of the Self, Self being central to Human Existence; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of Resolution* | |
| ***Unit-2: Right Understanding (Knowing)- Knower, Known & the Process*** | **9 Hour** |
| *The domain of right understanding starting from understanding the human being (the knower, the experiencer and the doer) and extending up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).* | |
| ***Unit-3: Understanding Human Being*** | **9 Hour** |
| *Understanding the human being comprehensively as the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Basis for harmony/contradiction in the self* | |
| ***Unit-4: Understanding Nature and Existence*** | ***9 Hour*** |
| *A comprehensive understanding (knowledge) about the existence, Nature being included; the need and process of inner evolution (through self-exploration, self- awareness and self-evaluation), particularly awakening to activities of the Self: Realization, Understanding and Contemplation in the Self (Realization of Co-Existence, Understanding of Harmony in Nature and Contemplation of Participation of Human in this harmony/ order leading to comprehensive knowledge about the existence).* | |
| ***Unit-5: Understanding Human Conduct, All-encompassing Resolution & Holistic Way of Living*** | **9 Hour** |
| *Understanding Human Conduct, different aspects of All-encompassing Resolution (understanding, wisdom, science etc.), Holistic way of living for Human Being with All- encompassing Resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work (participation in the larger order) leading to harmony at all levels from Self to Nature and entire Existence* | |

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| **Learning**  **Resources** | 1. *Gaur R.R., Sangal R., Bagaria G.P., 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi.* 2. *Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA* 3. *E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.* 4. *Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991* 5. *Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.* 6. *A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.* 7. *P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.* | 1. *A N Tripathy, 2003, Human Values, New Age International Publishers.* 2. *Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.* 3. *E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, Oxford University Press* 4. *M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.* 5. *B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.* 6. *B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.* |

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| **Learning Assessment** | | | | | | | | | |
|  | *Bloom’s*  *Level of Thinking* | *Continuous Learning Assessment (CLA)* | | | | | | *Summative*  *Final Examination*  *(0% weightage)* | |
| *Formative*  *CLA-1 Average of unit test*  *(20%)* | | *Life Long Learning*  *CLA-2 –*  *(60%)* | | *Summative*  *(20%)* | |
| *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* | *Theory* | *Practice* |
| Level 1 | *Remember* | *30%* | *-* | *20%* | *-* | *20%* | *-* | *-* | *-* |
| Level 2 | *Understand* | *40%* | *-* | *20%* | *-* | *20%* | *-* | *-* | *-* |
| Level 3 | *Apply* | *30%* | *-* | *30%* | *-* | *30%* | *-* | *-* | *-* |
| Level 4 | *Analyze* | *-* | *-* | *30%* | *-* | *30%* | *-* | *-* | *-* |
| Level 5 | *Evaluate* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
| Level 6 | *Create* | *-* | *-* | *-* | *-* | *-* | *-* | *-* | *-* |
|  | *Total* | *100 %* | | *100 %* | | *100%* | | *-* | |

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| **Course Designers** | | |
| Experts from Industry | Experts from Higher Technical Institutions | Internal Experts |
|  |  | *1.Dr.P.Supraja, SRMIST* |
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