# Madhav Institute of Technology & Science Gwalior-5

| Department : ELECTRICAL ENGINEERING | | | Year 2019-2023 | | |
|---|---|---|---|---|---|
| | | | CO Attainment | | |
| S.No | Course | Course Outcome | Direct Attainment | Indirect Attainment | Total Attainment |
| 1 | 2100025: Engineering Mathematics II | CO1 Explain the fundamental concepts of Complex Variables, Linear Programming | 2.10 | 2.03 | 2.09 |
| | | CO2 Categorize the principles of Complex Variables, Linear Programming Problems, | 2.14 | 2.02 | 2.12 |
| | | CO3 Solve complex engineering problems using Numerical methods & LPP. | 2.23 | 2.15 | 2.21 |
| | | CO4 Evaluate the application of Complex Variables, Linear Programming Problems, and | 1.97 | 2.20 | 2.02 |
| | | CO5 Create innovative strategies using Numerical Methods and Linear Programming to | 1.92 | 2.00 | 1.94 |
| 2 | 130301: Electro Magnetic Field Theory | CO1 interpret Maxwell's equations in differential and integral forms, both in time and | 2.10 | 2.20 | 2.12 |
| | | CO2 Define complex permittivity, permeability, conductivity and perfect electric and | 2.10 | 2.10 | 2.10 |
| | | CO3 Derive Poyntings theorem from Maxwells equations and interpret the terms in the | 2.30 | 2.41 | 2.32 |
| | | CO4 Apply vector calculus to understand the behavior of static electric fields in standard | 2.30 | 1.90 | 2.22 |
| | | CO5 Solve engineering problems of Electromagnetic, Electrostatic and Magnetic to | 2.50 | 1.90 | 2.38 |
| | | CO6 Formulate and solve engineering problems of Electromagnetic. | 2.25 | 1.90 | 2.18 |
| 3 | 130302: Measurement & Instrumentation | CO1 Explain the basic concepts of electrical and electronic measurement and measuring | 2.30 | 2.03 | 2.25 |
| | | CO2 Determine errors in a measurement system. | 2.30 | 2.02 | 2.24 |
| | | CO3 Describe the construction and working of AC and DC bridges and their applications | 2.20 | 2.15 | 2.19 |
| | | CO4 Select suitable measuring instrument, signal Generator, frequency counter, CRO | 2.30 | 2.34 | 2.31 |
| | | CO5 Select appropriate passive, active transducers and A/D & D/A converters for | 2.30 | 2.00 | 2.24 |
| | | CO6 Describe working principle of CT & PT and their applications | 2.20 | 1.87 | 2.13 |
| 4 | 130302: Measurement & Instrumentation (LAB) | CO1 Handle an instrument and perform basic calibration | 2.10 | 2.30 | 2.14 |
| | | CO2 Estimate the deviations in measurements due to possible errors and measures to | 2.20 | 2.20 | 2.20 |
| | | CO3 Measure unknown resistance, inductance and capacitance | 2.43 | 2.20 | 2.38 |
| | | CO4 Teamwork skills for working effectively in groups and develop analytical skills to | 2.32 | 2.20 | 2.30 |
| | | CO5 Prepare and present an organized written engineering report on electronic testing of | 2.30 | 2.00 | 2.24 |
| | | CO1 State different AC and DC networks laws & theorems. | 2.20 | 2.40 | 2.24 |

| S.No | Course | | Course Outcome | Direct Attainment | Indirect Attainment | Total Attainment |
|---|---|---|---|---|---|---|
| 5 | 130303: Network Analysis | CO2 | Apply the knowledge of basic circuital law and simplify the network using | 2.20 | 2.40 | 2.24 |
| | | CO3 | Solve the complicated network using theorems | 2.30 | 2.30 | 2.30 |
| | | CO4 | Infer and evaluate transient response, steady state response and network functions. | 2.30 | 2.30 | 2.30 |
| | | CO5 | Analyze the series resonant and parallel resonant circuit, | 2.51 | 2.39 | 2.49 |
| | | CO6 | Evaluate two-port network parameters. | 2.40 | 2.32 | 2.38 |
| 6 | 130303: Network Analysis (LAB) | CO1 | Analyze the Thevenin's equivalent circuits and linear superposition and apply them | 2.02 | 2.22 | 2.06 |
| | | CO2 | Relate physical observations and measurements involving electrical circuits to | 2.30 | 2.40 | 2.32 |
| | | CO3 | Predict and measure the transient and sinusoidal steady-state responses of simple | 2.37 | 2.18 | 2.33 |
| | | CO4 | Teamwork skills for working effectively in groups and develop analytical skills to | 2.42 | 2.49 | 2.43 |
| | | CO5 | Prepare and present an organized written engineering report on electronic testing of | 2.30 | 2.42 | 2.32 |
| 7 | 130304: Analog Electronics | CO1 | Define working principles of electronic devices e.g. Diode, Zener Diode, LED, | 2.19 | 2.31 | 2.21 |
| | | CO2 | Categorize the different types of Diode, Power Amplifier, Oscillators and Op-Amp | 2.20 | 2.16 | 2.19 |
| | | CO3 | Explain the different types of characteristic of Diode, Transistor, Power Amplifier | 2.30 | 2.34 | 2.31 |
| | | CO4 | Illustrate the various mathematical model of transistor eg. Hybrid model, re model. | 2.30 | 2.26 | 2.29 |
| | | CO5 | Develop an ability and skill to design different types of diode rectifier, transistor | 2.30 | 2.00 | 2.24 |
| | | CO6 | Apply the various principles of electronics to design different types of Analog | 2.20 | 2.27 | 2.21 |
| 8 | 130304: Analog Electronics (LAB) | CO1 | Develop the understanding of diode biasing conditions. | 2.20 | 2.22 | 2.20 |
| | | CO2 | Investigate the operation of half-wave and full-wave rectifier, and find their | 2.15 | 2.05 | 2.13 |
| | | CO3 | Compare transistor configurations on the basis of input-output characteristics. | 2.34 | 1.98 | 2.27 |
| | | CO4 | Implement transistor based circuits (Darlington pair, differential amplifier and two- | 2.00 | 2.10 | 2.02 |
| | | CO5 | Explain operation of operational amplifier (Op-amp), and design Op-amp based | 1.97 | 1.88 | 1.95 |
| 9 | 130305: Software Lab-I | CO1 | Design engineering problem and validate the results using MATLAB environment. | 2.20 | 1.95 | 2.15 |
| | | CO2 | Validate the concepts of network theorems by writing MATLAB codes | 2.13 | 2.31 | 2.16 |
| | | CO3 | Analyze the waveforms on parameter variation of PV Array module using | 2.27 | 2.49 | 2.31 |
| | | CO4 | Compare the performance of basic converters using MATLAB environment | 2.02 | 2.52 | 2.12 |
| | | CO5 | Prepare and present an organized written engineering report on electronic testing of | 1.95 | 2.10 | 1.98 |

| S.No | Course | | Course Outcome | Direct Attainment | Indirect Attainment | Total Attainment |
|---|---|---|---|---|---|---|
| 10 | 130306 : Self learning | CO1 | Refer various technical recourses available from multiple field | 2.30 | 2.22 | 2.28 |
| | | CO2 | Adhere to deadlines and commitment to complete the assignment | 2.50 | 2.05 | 2.41 |
| | | CO3 | Improve performance in self learning domain | 2.20 | 1.98 | 2.16 |
| | | CO4 | Acquire additional knowledge for competitive examinations | 2.50 | 2.10 | 2.42 |
| 11 | 130309 : Summer Internship | CO1 | Relate the theoretical aspects learned in classes into practical world | 2.20 | 2.20 | 2.20 |
| | | CO2 | Apply the new skills and supplement knowledge other than curriculum | 2.40 | 2.20 | 2.36 |
| | | CO3 | Practice communication and teamwork skills | 2.27 | 2.15 | 2.24 |
| | | CO4 | Apply the knowledge for placement & higher education | 2.02 | 2.08 | 2.03 |
| | | CO5 | Troubleshoot the problems related to particular experiment | 2.10 | 2.31 | 2.14 |
| 12 | 100003:Mathematics- III | CO1 | Formulate Complex Variable Functions | 2.20 | 2.20 | 2.20 |
| | | CO2 | Solve the Complex Integral Problems | 2.50 | 2.20 | 2.44 |
| | | CO3 | Find the Optimal Solution using Various Methods of Linear Programming Problem. | 2.10 | 1.95 | 2.07 |
| | | CO4 | Apply different numerical methods in engineering problem | 2.02 | 1.99 | 2.01 |
| | | CO5 | Solve Ordinary Differential Equation by Numerical Techniques | 1.95 | 2.00 | 1.96 |
| 13 | 130402: Electrical Machines-I | CO1 | Comprehend the principles and construction of different AC and DC machines. | 2.30 | 1.90 | 2.22 |
| | | CO2 | Demonstrate an understanding of the fundamental control practices such as starting, | 2.30 | 2.10 | 2.26 |
| | | CO3 | Distinguish between the application and performance of AC and DC machines. | 2.05 | 1.79 | 2.00 |
| | | CO4 | Develop the equivalent circuits and compute the induced emf, torque, efficiency, | 1.98 | 2.20 | 2.02 |
| | | CO5 | Describe the different test conducted for testing the performance of different AC | 2.10 | 1.88 | 2.06 |
| | | CO6 | Formulate the various performance parameters of machines under different | 2.30 | 2.10 | 2.26 |
| 14 | 130402: Electrical Machines-I (LAB) | CO1 | Estimate which apparatus at what rating is required for a particular experiment | 2.42 | 2.20 | 2.38 |
| | | CO2 | Utilise a DC machine for a specific purpose, requirement | 2.39 | 2.20 | 2.35 |
| | | CO3 | Predetermine the efficiency of any transformer, regulation of any transformer | 2.14 | 1.50 | 2.01 |
| | | CO4 | Prepare and present an organized written engineering report on electronic testing of | 2.20 | 1.80 | 2.12 |
| | | CO5 | Develop the ability to work is team and learns professional ethics. | 2.10 | 2.50 | 2.18 |
| | | CO1 | Define Number systems and codes, Logic family, Digital circuits and | 2.20 | 2.40 | 2.24 |

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|------|--------|-----|----------------|-------------------|---------------------|-------------------|
| 15 | 130401: Digital Electronics & Microprocessor | CO2 | Simplify the logic expressions using Boolean laws, map method and design them by | 2.30 | 2.10 | 2.26 |
| | | CO3 | Explain the concept of different number system, logic Families and Microprocessor. | 2.50 | 2.30 | 2.46 |
| | | CO4 | Illustrate different types of Number system, Combinational circuits, sequential | 2.30 | 2.26 | 2.29 |
| | | CO5 | Develop an ability to design combinational and sequential circuits using Logic gates | 2.10 | 2.10 | 2.10 |
| | | CO6 | Apply the various principle of digital electronics and programming skill to develop | 2.00 | 2.10 | 2.02 |
| 16 | 130401: Digital Electronics & Microprocessor (LAB) | CO1 | Develop skill to build, and troubleshoot digital circuits | 2.20 | 2.32 | 2.22 |
| | | CO2 | Correctly operate standard electronic test equipment such as oscilloscopes, signal | 2.20 | 2.10 | 2.18 |
| | | CO3 | Apply troubleshooting techniques to test digital circuits. | 2.00 | 2.14 | 2.03 |
| | | CO4 | Prepare and present an organized written engineering report on electronic testing of | 2.30 | 2.20 | 2.28 |
| | | CO5 | Develop the ability to work is team and learns professional ethics. | 2.40 | 2.10 | 2.34 |
| 17 | 130403 : Control Systems | CO1 | Develop mathematical models of mechanical system, electrical system and | 2.30 | 2.28 | 2.30 |
| | | CO2 | Represent the complex system into standard canonical form by signal flow graph | 2.50 | 2.57 | 2.51 |
| | | CO3 | Compute the time and frequency-domain responses of first and second-order | 2.30 | 2.05 | 2.25 |
| | | CO4 | Formulate control engineering problems in state-variable form | 2.40 | 2.37 | 2.39 |
| | | CO5 | Evaluate the stability of a closed-loop control system in time-domain as well as in | 2.40 | 2.20 | 2.36 |
| | | CO6 | Predict the nature of response for the given input | 2.20 | 2.03 | 2.17 |
| 18 | 130404: Power System-I | CO1 | Explain general structure of power systems. | 2.30 | 2.43 | 2.33 |
| | | CO2 | Develop the knowledge of generation of electricity based on conventional and | 2.10 | 2.07 | 2.09 |
| | | CO3 | Determine the transmission line parameters. | 2.60 | 2.46 | 2.57 |
| | | CO4 | Analyze the performance of overhead transmission line. | 2.80 | 2.37 | 2.71 |
| | | CO5 | Apply the concept of power plant economics. | 2.10 | 2.00 | 2.08 |
| | | CO6 | Compare different types of tariffs and power factor improvement methods | 2.30 | 2.32 | 2.30 |
| 19 | 100004: Cyber Security | CO1 | Explain basic terminologies of cyber security. | 1.90 | 2.18 | 1.96 |
| | | CO2 | Explain the basic concept of networking and internet. | 2.30 | 2.27 | 2.29 |
| | | CO3 | Apply various method used to protect data in the internet environment in real world | 1.90 | 2.00 | 1.92 |
| | | CO4 | Discover the concept of IP security and architecture. | 2.20 | 2.03 | 2.17 |

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|---|---|---|---|---|---|---|
| | | CO5 | Compare various type of cyber security threats and vulnerabilities. | 2.30 | 2.12 | 2.26 |
| | | CO6 | Develop the understanding of cyber crime investigation and IT ACT 2000. | 2.10 | 2.06 | 2.09 |
| 20 | 130405: Simulation Lab-II: | CO1 | Simulate the performance of DC motor using MATLAB Simulink environment | 2.40 | 2.18 | 2.36 |
| | | CO2 | Validate the concepts of Induction motor by writing MATLAB codes. | 2.50 | 2.40 | 2.48 |
| | | CO3 | Analyze the waveforms on parameter variation of PV Array module using | 2.30 | 2.00 | 2.24 |
| | | CO4 | Compare the performance of renewable energy sources using MATLAB | 2.40 | 2.03 | 2.33 |
| | | CO5 | Design engineering problem and validate the results using MATLAB environment | 2.40 | 2.12 | 2.34 |
| 21 | 100005: Ethics, Economics, Entreprenership & Management | CO1 | Impart knowledge and awareness regarding | 2.20 | 2.18 | 2.20 |
| | | CO2 | Develop spoken ability in a student so that | 2.20 | 2.27 | 2.21 |
| | | CO3 | Predict the situation and to be good decision | 2.20 | 2.00 | 2.16 |
| | | CO4 | Develop a sound knowledge about economy and | 2.30 | 2.03 | 2.25 |
| | | CO5 | Work out needs so as to develop a | 2.10 | 2.12 | 2.10 |
| | | CO6 | Find out ways of solving / overcoming hurdles that crop up while establishing / | 2.10 | 2.06 | 2.09 |
| 22 | 130501: Signals & Systems | CO1 | Explain the process of sampling and the effects of under sampling. | 2.10 | 2.22 | 2.12 |
| | | CO2 | Classify systems based on their properties and determine the response of LSI system | 2.40 | 2.05 | 2.33 |
| | | CO3 | Apply the concepts of linear algebra to signals. | 2.30 | 2.40 | 2.32 |
| | | CO4 | Analyze the spectral characteristics of continuous-time periodic and a periodic | 2.42 | 2.00 | 2.34 |
| | | CO5 | Analyze system properties based on impulse response and Fourier analysis. | 2.29 | 2.03 | 2.24 |
| | | CO6 | Apply the Laplace transform and Z- transform for analysis of continuous-time and | 2.34 | 2.12 | 2.30 |
| 23 | 130502: Power System II | CO1 | Explain the concepts of single line diagram and per unit system | 2.45 | 2.07 | 2.37 |
| | | CO2 | Apply different load flow techniques to solve load flow problem | 2.30 | 2.26 | 2.29 |
| | | CO3 | Perform fault calculations for symmetrical and unsymmetrical faults | 2.18 | 2.37 | 2.22 |
| | | CO4 | Explain the theoretical and practical aspects of Power System Stability, and its | 2.30 | 2.27 | 2.29 |
| | | CO5 | Elucidate the automatic generation control reactive power, voltage control, series | 2.60 | 2.32 | 2.54 |
| | | CO6 | Discuss the insulation resistance, capacitance of various types of cables and the | 2.15 | 2.20 | 2.16 |
| | | CO1 | Demonstrate the performance EHVAC transmission on simulation panel. | 2.20 | 2.43 | 2.25 |

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|------|--------|---|----------------|-------------------|---------------------|------------------|
| 24 | 130502: Power System II (Lab) | CO2 | Determine transmission line parameters. | 2.20 | 2.07 | 2.17 |
| | | CO3 | Simulate the different types of faults in transmission line using MATLAB. | 2.20 | 2.25 | 2.21 |
| | | CO4 | Prepare report for presentation. | 2.30 | 1.64 | 2.17 |
| | | CO5 | Display team work. | 2.20 | 2.00 | 2.16 |
| 25 | 130503: Electrical Machine-II | CO1 | Analyze the performance of 3-phase induction and synchronous machines using | 2.30 | 2.24 | 2.29 |
| | | CO2 | Explain the constructional details and working principle of three phase transformer | 2.30 | 2.38 | 2.32 |
| | | CO3 | Develop phasor diagram and determine voltage regulation of an alternator and its | 2.30 | 2.28 | 2.30 |
| | | CO4 | Determine time constant, various sequence reactance and equivalent circuit | 2.30 | 2.14 | 2.27 |
| | | CO5 | Analyze the behavior of synchronous machine connected to infinite bus and parallel | 2.30 | 2.21 | 2.28 |
| | | CO6 | Analyze the performance of 3-phase induction and synchronous machines using | 2.30 | 2.24 | 2.29 |
| 26 | 130503:Electrical Machine-II (Lab) | CO1 | Demonstrate an understanding of the fundamental control practices associated with | 2.23 | 1.76 | 2.14 |
| | | CO2 | Use accepted national and international standards (such as NEMA, IE Code) to | 1.40 | 1.20 | 1.36 |
| | | CO3 | Conduct testing and experimental procedures on different types of electrical | 1.90 | 1.24 | 1.77 |
| | | CO4 | Develop the ability to work is team and learns professional ethics | 2.30 | 1.76 | 2.19 |
| | | CO5 | Prepare an organized written report | 2.34 | 1.20 | 2.11 |
| 27 | 130504 : Power Electronics | CO1 | Explain static & dynamic characteristics of power electronics devices like Diode | 2.20 | 2.20 | 2.20 |
| | | CO2 | Explain the configuration of different commutation methods. | 2.40 | 2.17 | 2.35 |
| | | CO3 | Describe the configuration of AC to DC converter, Dual converter, chopper, cyclo- | 2.30 | 2.13 | 2.27 |
| | | CO4 | Classify converters and identify their applications. | 2.10 | 2.17 | 2.11 |
| | | CO5 | Develop different model of different converters to calculate their performance | 2.30 | 2.03 | 2.25 |
| | | CO6 | Identify the problems/limitations of power electronics devices, converters and | 2.25 | 2.10 | 2.22 |
| 28 | 130504: Power Electronics (Lab) | CO1 | Demonstrate VI characteristics of Semiconductor Devices and Various Firing | 2.40 | 2.20 | 2.36 |
| | | CO2 | Demonstrate the performance of various converters AC to DC and DC to AC | 3.00 | 2.17 | 2.83 |
| | | CO3 | Compare the performance of single and three phases VSI Inverter. | 2.30 | 2.13 | 2.27 |
| | | CO4 | Demonstrate the performance of converters in its different modes of operation. | 2.40 | 2.17 | 2.35 |
| | | CO5 | Prepare an organized written report. | 2.30 | 2.03 | 2.25 |

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|---|---|---|---|---|---|---|
| | | CO6 | Develop the ability to work is team and learns professional ethics. | 2.25 | 2.10 | 2.22 |
| 29 | 130505: Minor Project-I | CO1 | Formulate the real-world problems. | 2.40 | 2.24 | 2.37 |
| | | CO2 | Express the technical ideas, strategies and methodologies. | 2.10 | 2.38 | 2.16 |
| | | CO3 | Utilize the new tools, algorithms, techniques to obtain solution of the project. | 2.30 | 2.28 | 2.30 |
| | | CO4 | Prepare oral demonstrations. | 2.00 | 2.14 | 2.03 |
| 30 | 130506: Summer Internship Project-II | CO1 | Know the characteristics of industrial environment. | 2.53 | 2.20 | 2.46 |
| | | CO2 | Apply the technical knowledge in real industrial situations. | 2.64 | 2.17 | 2.55 |
| | | CO3 | Write the report in technical work/project. | 2.30 | 2.13 | 2.27 |
| | | CO4 | Show engineer's responsibilities & ethics. | 2.53 | 2.17 | 2.46 |
| 31 | 130507:Seminar/Self Study | CO1 | Refer various technical recourses available from multiple field. | 2.40 | 2.08 | 2.34 |
| | | CO2 | Adhere to deadlines and commitment to complete the assignment. | 2.30 | 2.15 | 2.27 |
| | | CO3 | Improve his/her performance in self-learning domain. | 1.98 | 2.23 | 2.03 |
| | | CO4 | Acquire additional knowledge helpful for competitive examinations. | 2.10 | 2.12 | 2.10 |
| 32 | 130601: Switchgear & Protection | CO1 | Explain the concepts, theories and features associated with protective devices and | 2.30 | 2.08 | 2.26 |
| | | CO2 | Classify relays and circuit breakers based on criterion such as construction, type of | 2.30 | 2.15 | 2.27 |
| | | CO3 | Select relays and circuit breakers for specific equipments and applications. | 2.30 | 2.23 | 2.29 |
| | | CO4 | Design protection schemes for generators, motors, transformers and transmission lin | 2.30 | 2.12 | 2.26 |
| | | CO5 | Analyze the behavior and performance of relays under different loading levels and | 2.10 | 2.04 | 2.09 |
| | | CO6 | Select the protective devices and their locations for protecting power systems | 2.20 | 2.00 | 2.16 |
| 33 | 130601: Switchgear & Protection Lab | CO1 | Operate the Over/Under voltage & over current relays and observe the performance | 2.39 | 2.17 | 2.35 |
| | | CO2 | Analyze the effect of time and current settings on the operating characteristics of an | 2.30 | 2.13 | 2.27 |
| | | CO3 | Validate the characteristics of percentage biased differential relay for different bias | 2.74 | 2.17 | 2.63 |
| | | CO4 | Prepare an organized written report. | 2.30 | 2.03 | 2.25 |
| | | CO5 | Develop the ability to work is team and learns professional ethics. | 2.25 | 2.10 | 2.22 |
| | 130602: Electrical | CO1 | Describe properties and applications of conducting materials | 2.30 | 2.12 | 2.26 |
| | | CO2 | Explain behavior of semiconductor materials, their classification and applications. | 2.50 | 2.08 | 2.42 |

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|---|---|---|---|---|---|---|
| 34 | Engineering Materials | CO3 | Explain application of magnetic materials, different terms, classification, hysteresis | 2.45 | 2.15 | 2.39 |
| | | CO4 | Explain dielectric materials, their behavior in different fields, polarization and | 2.10 | 2.23 | 2.13 |
| | | CO5 | Select appropriate material depending upon specific requirement | 2.20 | 2.12 | 2.18 |
| 35 | 130611 : Computer Aided Power System Analysis (DE-1) | CO1 | Explain unit commitment and different methods for Solving UC problem | 2.40 | 1.90 | 2.36 |
| | | CO2 | Apply direct method and lamda iteration method for solving economic dispatch | 2.10 | 2.17 | 2.83 |
| | | CO3 | Discuss the concept of reactive power, control of active power and reactive power | 2.30 | 2.40 | 2.27 |
| | | CO4 | Solve the AGC problem in isolated and interconnected power systems | 2.30 | 2.17 | 2.83 |
| | | CO5 | Illustrate Operations Control Centre functions, System monitoring and Contingency | 2.30 | 2.40 | 2.25 |
| | | CO6 | Describe various types of ANN and their applications to power system. | 2.25 | 2.60 | 2.22 |
| 36 | 130612:Industrial Automation (DE1) | CO1 | Analyze architecture of industrial automation system | 2.30 | 2.12 | 2.26 |
| | | CO2 | Select appropriate sensors | 2.63 | 2.24 | 2.55 |
| | | CO3 | Acquire PLC knowledge | 2.10 | 2.38 | 2.16 |
| | | CO4 | Acquire the knowledge of PID control technique | 2.60 | 2.28 | 2.54 |
| | | CO5 | Develop small application using PLC & transducer, | 2.30 | 2.14 | 2.27 |
| | | CO6 | Compare AC and DC drives for particular applications | 2.30 | 2.12 | 2.26 |
| 37 | 130603: Minor Project-II | CO1 | Formulate the real-world problems. | 2.20 | 2.08 | 2.18 |
| | | CO2 | Express the technical ideas, strategies and methodologies. | 2.45 | 2.15 | 2.39 |
| | | CO3 | Utilize the new tools, algorithms, techniques to obtain solution of the project. | 1.90 | 2.23 | 1.97 |
| | | CO4 | Prepare oral demonstrations. | 1.90 | 2.12 | 1.94 |
| 38 | 130651: Non Conventional Energy Resources DE2(SWAYAM/ NPTEL) | CO1 | Identify energy demand and relate with available energy resources | 2.20 | 2.30 | 2.22 |
| | | CO2 | Analyze harnessing of solar energy. | 2.20 | 2.30 | 2.22 |
| | | CO3 | Analyze harnessing of wind energy | 2.20 | 2.30 | 2.22 |
| | | CO4 | Analyze harnessing of Biomass energy | 2.20 | 2.30 | 2.22 |
| | | CO5 | Analyze harnessing of Geothermal and Ocean energies. | 2.20 | 2.30 | 2.22 |
| | | CO6 | Analyze Magneto hydrodynamics and Fuel cell technology | 2.20 | 2.30 | 2.22 |
| | | CO1 | Propose disaster prevention and mitigation approaches. | 2.20 | 2.24 | 2.21 |

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|---|---|---|---|---|---|---|
| 39 | 100007:Disaster Management | CO2 | Classify global and national disasters, their trends and profiles. | 2.10 | 2.30 | 2.14 |
| | | CO3 | Appreciate the impacts of various disasters. | 2.40 | 2.28 | 2.38 |
| | | CO4 | Apply Disaster Risk Reduction in management. | 2.20 | 2.40 | 2.24 |
| | | CO5 | Find the linkage between disasters, environment and development | 2.30 | 2.12 | 2.26 |
| 40 | 900103: (OC1) Energy Conservation & Management | CO1 | Explain the basic concepts of Energy Audit & its various terminologies, rules and | 2.30 | 2.12 | 2.26 |
| | | CO2 | Acquire fundamental knowledge on the science of energy and on both the | 2.30 | 2.08 | 2.26 |
| | | CO3 | Describe different energy auditing methods and the implementation procedures | 2.23 | 2.15 | 2.21 |
| | | CO4 | Identify present scenario of energy utilization, management and corresponding ACT | 2.10 | 2.23 | 2.13 |
| | | CO5 | Recognize process billing, energy tariff and power factor improvements to achieve | 2.20 | 2.12 | 2.18 |
| 41 | 130711: Electrical Drives (DE3) | CO1 | Describe various components of a drive system along with modes of operation, | 2.20 | 2.20 | 2.20 |
| | | CO2 | Explain various drives & loads, their characteristics and control methods under | 2.40 | 2.17 | 2.35 |
| | | CO3 | Explain performance analysis & control of dc drives | 2.30 | 2.13 | 2.27 |
| | | CO4 | Explain performance analysis & control of ac drives | 2.20 | 2.17 | 2.19 |
| | | CO5 | Employ the various static converters for speed control of different types of drives | 2.30 | 2.03 | 2.25 |
| | | CO6 | Illustrate the functioning of solar, battery powered and traction drives and explain | 2.25 | 2.10 | 2.22 |
| 42 | 130712: Renewable Energy System (DE3) | CO1 | Evaluate the environmental impacts of conventional energy sources and the need of | 2.20 | 2.30 | 2.22 |
| | | CO2 | Explain the process of PV generation, wind power generation | 2.40 | 2.30 | 2.38 |
| | | CO3 | Describe stand-alone and grid connected configuration | 2.36 | 2.30 | 2.35 |
| | | CO4 | Explain the process of fuel cell power generation and its applications. | 2.28 | 2.30 | 2.28 |
| | | CO5 | Identify the need of hybrid energy systems. | 2.41 | 2.30 | 2.39 |
| 43 | 130714: Intelligent Sensors and Instrumentation (DE3) | CO1 | Describe transduction principle of sensor based on various energy forms. | 2.20 | 2.20 | 2.20 |
| | | CO2 | Explain Smart Sensor Technologies | 2.30 | 2.00 | 2.24 |
| | | CO3 | Explain the MEMS, Intelligent and Network Sensors | 2.20 | 2.10 | 2.18 |
| | | CO4 | Identify the component of sensor networking | 2.28 | 2.20 | 2.26 |
| | | CO5 | Discuss Intelligent Instrumentation techniques | 2.30 | 2.30 | 2.30 |
| | | CO1 | Identify the role and significance of microgrid in future power systems | 2.10 | 2.17 | 2.11 |

| S.No | Course | | Course Outcome | Direct Attainment | Indirect Attainment | Total Attainment |
|---|---|---|---|---|---|---|
| 44 | 130713: IoT in MicroGrid (DE3) | CO2 | Describe different types and modes of operation of Microgrids | 2.20 | 2.13 | 2.19 |
| | | CO3 | Explain the different control strategies available for Microgrid | 2.30 | 2.17 | 2.27 |
| | | CO4 | Select proper energy storage devices for smooth operation of microgrid | 2.30 | 2.03 | 2.25 |
| | | CO5 | Describe applications of IoT in Microgrid | 2.20 | 2.10 | 2.18 |
| 45 | 130751: Introduction to Smart Grid DE4) (NPTEL) | CO1 | Apply advanced knowledge of electrical power system operations and control to | 2.10 | 2.03 | 2.09 |
| | | CO2 | Conceptualize the design of smart grid by selecting appropriate communication | 2.10 | 2.03 | 2.09 |
| | | CO3 | Describe the principles and requirements of the next generation future power | 2.10 | 2.03 | 2.09 |
| | | CO4 | Describe the latest trends in IoT for power systems | 2.10 | 2.03 | 2.09 |
| 46 | 900201:Applications of Electrical Motor & Equipment | CO1 | Discuss the various types of electrical equipments and their suitable applications. | 2.20 | 2.00 | 2.16 |
| | | CO2 | Describe the various schemes of AC, DC drives, traction schemes and different | 2.10 | 2.28 | 2.14 |
| | | CO3 | Explain the basics of lighting and illumination and its parameters and able to design | 2.20 | 2.10 | 2.18 |
| | | CO4 | Apply the concepts of power electronics technology in efficient utilization of | 2.32 | 2.20 | 2.30 |
| | | CO5 | Identify the area for research in field of electric traction & utilization of Electric | 2.20 | 2.13 | 2.19 |
| 47 | 130701:Control System Lab | CO1 | Discuss the need of MATLAB to illustrate modeling and simulation of any system | 2.40 | 2.20 | 2.36 |
| | | CO2 | Classify and evaluate the performance parameters of a system and then with | 2.40 | 2.00 | 2.32 |
| | | CO3 | Prepare professionals in laboratory to compute or to predict the characteristics of a | 2.23 | 2.17 | 2.22 |
| | | CO4 | Evaluate possible causes of discrepancy in practical experimental observations in | 2.30 | 1.80 | 2.20 |
| | | CO5 | Demonstrate the ability to interact via team work | 2.40 | 1.90 | 2.30 |
| 48 | 130702: Summer Internship Project | CO1 | Formulate the real world problems. | 2.30 | 2.30 | 2.30 |
| | | CO2 | Express the technical ideas, strategies & methodologies. | 2.30 | 2.40 | 2.32 |
| | | CO3 | Utilize the new tools, algorithms, techniques to obtain solution of the project. | 2.30 | 2.19 | 2.28 |
| | | CO4 | Test & validate the developed prototype/results. | 2.20 | 2.30 | 2.22 |
| | | CO5 | Write a project report. | 2.30 | 2.40 | 2.32 |
| | | CO6 | Prepare oral demonstrations. | 2.50 | 2.50 | 2.50 |
| 49 | 130703: Creative | CO1 | Identify real time problems | 2.10 | 2.30 | 2.14 |
| | | CO2 | Practice various methods to solve problems | 2.10 | 2.40 | 2.16 |

| S.No | Course | | Course Outcome | Direct Attainment | Indirect Attainment | Total Attainment |
|---|---|---|---|---|---|---|
| 49 | Problem Solving | CO3 | Produce solutions to various problems | 2.10 | 2.30 | 2.14 |
| | | CO4 | Demonstrate various problems solving skills | 2.10 | 2.20 | 2.12 |
| 50 | 100008:Intellectual Property Rights(IPR) | CO1 | Imbibe the knowledge of Intellectual Property and its protection through various | 2.40 | 2.20 | 2.36 |
| | | CO2 | Apply the knowledge of IPR for professional development | 2.45 | 2.15 | 2.39 |
| | | CO3 | Develop a platform for protection and compliance of Intellectual Property Rights | 2.10 | 2.23 | 2.13 |
| | | CO4 | Create awareness amidst academia and industry of IPR and Copyright compliance | 2.20 | 2.12 | 2.18 |
| | | CO5 | Deliver the purpose and function of IPR and patenting. | 2.60 | 2.30 | 2.54 |
| 51 | 130801 : Internship/ Project | CO 1 | Formulate the real world problems. | 2.30 | 2.42 | 2.32 |
| | | CO 2 | Express the technical ideas, strategies & methodologies. | 2.20 | 2.37 | 2.23 |
| | | CO 3 | Utilize the new tools, algorithms, techniques to obtain solution of the project. | 2.30 | 2.40 | 2.32 |
| | | CO 4 | Test & validate the developed prototype/results. | 2.50 | 2.25 | 2.45 |
| | | CO 5 | Write a project report. | 2.50 | 2.44 | 2.49 |
| | | CO 6 | Prepare oral demonstrations. | 2.20 | 2.51 | 2.26 |
| 52 | 130802 : Professional Development | CO 1 | Develop intellectual curiosity, competency and skills | 2.30 | 2.42 | 2.32 |
| | | CO 2 | Develop critical thinking, creativity and effective communication | 2.10 | 2.37 | 2.15 |
| | | CO 3 | Display professionalism and ownership of professional growth and learning | 2.40 | 2.40 | 2.40 |