Mandsaur University

Subject Code: - EEE311
Subject Name: - Instrumentation & Control in Energy System
Semester: - III

L	T	P	C
3	1	-	4

Course Objectives:
The Primary Objective of the Course is to introduce in-Depth Knowledge of Instrumentation & Control System in Advance Engineering Field.

Unit-I
Elements of a Measurement System; Basic Instrumentation System; Errors and Uncertainties; Mechanical Transducers: Temperature- Bimetallic Element and Fluid Expansion Type Thermometers; Pressure- Manometers and Bourdon Gauges; Load Cells and Elastic Force Devices; Electrical Transducers: Resistive Transducers; Inductive Transducers; Capacitive Transducers; Thermoelectric Transducers and Photoelectric Transducers; Piezoelectric Transducers.

Unit-II
Basic Signal Conditioning Elements: DC Bridges, AC Bridges, Wheatstone Bridge, Balance & Deflection Measurements - Amplifiers- Non Electrical and Electrical Types; Op Amps- Summing, Differential, and Charge Amplifiers; Differentiating and Integrating Elements; Filters; Data Transmission Elements- Electrical, Pneumatic, Position and Radio Frequency Transmission Types, Basic Display Elements.

Unit-III
Industrial Measurements Velocity Measurement – Contact Type: AC-DC Tachometers Non Contact Type: Magnetic, Photoelectric & Stroboscopic Methods Acceleration Measurement – Seismic Accelerometer & Piezoelectric Accelerometer Measurement of Force – Different Methods; Strain Gauge Load Cell Method Measurement of Torque – Strain Gauge Method Radiation Measurement – Radiation Fundamentals; Radiation Detectors; Optical Pyrometer.

Unit-IV
Control Systems: Open & Closed Loop Systems, Linear Time-Invariant Systems, Transfer Function Analysis, Mason's Gain Formula, Transient Response Analysis, Stability Analysis, RH Criterion, Relative Stability.

Unit-V
Frequency Response Analysis: Bode Plots, Nyquist Stability Criterion, Gain Margin & Phase Margin (Simple Problems Only)-Introduction to State Space Analysis (Elementary Treatment Only – No Numerical); Concept of State, State Variables & State Models; State Transition Matrix.

Course Outcomes:
After Learning the Course the Students should be able to understand the Technical Terms of Instrumentation & Control System & Various Instruments Principles and their Engineering Usage.

References:

1. Albert D Helfrick and William D Cooper; Modern Electronic Instrumentation and Measurement Techniques; 2004, PHI
2. BC Nakra, and KK Chaudhry; Instrumentation, Measurement and Analysis; 2 ed, 2004, Tata McGraw-Hill
3. DVS Murthy; Transducers and Instrumentation; 2003, PHI
4. CS Rangan, GR Sarma, and VSV Mani; Instrumentation Devices and Systems; 2 ed, Tata McGraw-Hill
5. Doeblin and Ernest; Measurement Systems Application and Design; 5 ed, 2004, Tata McGraw-Hill.
1. 6 Measurement Systems – Applications & Design by Doeblin E.O. 4 ed. Mc. Graw Hill
6. Principles of Industrial Instrumentation by Patranabis D. TMH – 1997
7. Mechanical & Industrial Measurements by Jain R.K, Khanna Publishers – 1986
8. Process Instruments and Control Hand book by Considine D.M, 4th ed, Mc.Graw Hill
9. Instrument Technology – Vol 1 by Jones E.B., Butterworths – 1981
10. Control Systems Engineering by Nagrath & M.Gopal, Wiley Eastern
11. Automatic Control Systems by B.C.Kuo, John Wiley, 2009
12. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall

Mandsaur University

Subject Code: - EEE312
Subject Name: - Economics & Planning of Energy System
Semester:- III

L	T	P	C
3	1	-	4

Course Objectives:
The course Objective is to equip the student with technology, economics and policy involving energy systems and supply with renewable energy sources.

- Understand the economics and planning of energy supply demand chain.
- Articulate environmental sustainability of energy supply system.
- Appreciate the policy, financing and regulatory frameworks within which decisions on energy future are made.

Energy Theory of Value: Principles and Systems of Energy Flows, Methods of Energy Analysis.

Energy Intensity Method, Process Analysis Input –Output Method Based Energy Accounting.

Energy Cost of Goods and Services Energy to Produce Fuels; Coal, Oil, Natural Gas, Energy Cost of Various Modes of Passenger & Freight Transportation.

Industrial Energy Analysis; Aluminum, Steel, Cement, Fertilizers. Energetic of materials Recycling, Energetic of Renewable Energy Utilization.

Energy and Energy Analysis of Thermal & Chemical Plants.

Course Outcomes:

- Understand basic economics and costs of energy infrastructure investments.
- Be engaged in continuously learning the new practices, principles and techniques of the electrical power industry.

References:

1. Electrical Energy Systems: Theory & Introduction by L Olle Elgerd
2. Industrial Organization &Engineering Economics by T R Banga
3. Engineering Economics by R Pannersewan
4. Managerial Economics by Joel Deal

Mandsaur University

Subject Code: - EEE313
Subject Name: - Industrial and Commercial Applications of Renewable Energy Sources
Semester: III

L	T	P	C
3	1	-	4

Course Objectives:
There is vast potential of usage of renewable energy in industries and commercial sector. With the study of this course one can quantify the energy saved and carbon dioxide mitigation impact. Related latest technologies and economics of renewable energies would also be studied.

Unit-I: Introduction, Commercial and Industrial Energy Demand; Qualitative and Quantitative Features and Characteristics, Renewable & Electricity for a Growing Economy.

Unit-II: Water Heating, Process Heating and Drying Applications, Solar, Biomass and Geothermal Energy Based Systems, Combined Space and Building Service Hot Water Systems.

Unit-III: Electricity Generation from Renewable to Meet Commercial and Industrial Power Requirement, Stand Alone and Grid Connected Systems, Ethanol and Methanol from Cellulosic Biomass.

Unit-IV: Use of Renewable in Commercial and Industrial Buildings for Load Leveling, Lighting and Space Heating and Cooling.

Unit-V: Economics of Renewable Energy Based Commercial and Industrial Installations Case Studies, Thermal Low and Medium Energy Requirements of Different Industries.

Course Outcomes:
- Understand and be aware of the importance of renewable energy.
- Understand the commercial and industrial energy demand.
- Design and develop consumer products for the betterment of human kind.

References:

1. Solar Applications in Industry and Commerce, First Edition, 1984, by JD Myers, Prentice-Hall Inc.
2. Fundamentals of Renewable Energy Processes, Second Edition, 2009, by Aldo V da Rosa, Academic Press.

Mandsaur University

Subject Code: - EEE321
Subject Name: - Bio and Solid Waste Management
Semester: III

L	T	P	C
3	1	-	4

Course Objectives:
To provide the engineering graduates (all disciplines) with technical expertise in environmental management which will enable them to have a career and professional accomplishment in the public or private sector to develop, implement, monitor and maintain environmental strategies, policies, programme and systems that promote sustainable development.

Unit I
Solid Wastes, Types of Solid Wastes, Sources - Industrial, Mining, Agricultural and Domestic, Characteristics. Solid Waste Problems, Impact on Environmental Health, Concepts of Waste Reduction, Recycling and Reuse.
Handling and Segregation of Wastes at Source, Collection and Storage of Municipal Solid Wastes; Analysis of Collection Systems. Transfer Stations: Labeling and Handling of Wastes.

Unit II
Solid Waste Processing Technologies. Mechanical and Thermal Volume Reduction. Biological and Chemical Techniques for Energy and Other Resource Recovery: Composting, Vermicomposting, Termigradation, Fermentation. Incineration of Solid Wastes. Disposal in Landfills: Site Selection, Design, and Operation of Sanitary Landfills; Leachate and Landfill Gas Management; Landfill Closure and Post-Closure Environmental Monitoring; Landfill Remediation. Regulatory Aspects of Municipal Solid Waste Management.

Unit III
Sources and Characteristics: Handling, Collection, Storage and Transport, TSDF Concept. Hazardous Waste Treatment Technologies - Physical, Chemical and Thermal Treatment of Hazardous Waste: Solidification, Chemical Fixation, Encapsulation, Pyrolysis and Incineration. Hazardous Waste Land Fills - Site Selections, Design and Operation. HW Reduction, Recycling and Reuse, Regulatory Aspects of HWM.

Unit IV
Biomedical Waste: Definition, Sources, Classification, Collection, Segregation Treatment and Disposal. Chemical Treatment Processes for MSW (Combustion, Stabilization and Solidification of Hazardous Wastes); Physicochemical Processes for Hazardous Wastes (Soil Vapour Extraction, Air Stripping, Chemical Oxidation); Ground Water Contamination and Remediation.

Unit V
Composting; Bioreactors; Anaerobic Decomposition of Solid Waste; Principles of Biodegradation of Toxic Waste; Inhibition; Co-Metabolism; Oxidative and Reductive Processes; Slurry Phase Bioreactor; In-Situ Remediation.

Course Outcomes:
By the time of their graduation, the students are expected to be able to recognize, evaluate, and control factors in the workplace and the environment that cause health and environmental

hazards and utilize quantitative knowledge and skills and modern tools and technologies to access, analyze, plan, and implement environmental management systems.

References:

1. Hazardous Waste Management Charles A. Wentz. Second Edition 1995. McGraw Hill International.
2. Integrated Solid Waste Management George Tchobanoglous, Hilary Theisen & Sammuel A. Vigil.
3. Criteria for Hazardous Waste Landfills – CPCB Guidelines 2000.
4. Hazardous Waste Management by Prof. Anjaneyulu.
5. Environmental Sciences by Daniel B. Botkin and Edward A. Keller, Wiley Student, 6th Edition- 2009.
6. Standard Handbook of Hazardous Waste Treatment and Disposal by Harry M. Freeman, McGraw Hill 1997.
7. Management of Solid Waste in Developing Countries by Frank Flintoff , WHO Regional Publications 1976.

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Subject Code: - EEE322
Subject Name: - Environmental Audit & Impact Assessment
Semester: III

L	T	P	C
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Course Objectives:
This course will take the students on an academic journey of environmental impact assessment (EIA) and auditing with an exposure to important aspects involved in it. From the initial phase of project proposal to the actual project establishment, students will be introduced to various processes of EIA. Students will gain an insight into the development and fundamental concepts of EIA in national and international context, including the environmental, cultural, legal and institutional framework that has shaped EIA's implementation in "real world" settings. Useful concepts complemented with case-studies will equip the students to effectively communicate with other EIA practitioners and provide quality information to decision-makers through the use of project alternatives designed to avoid, minimize, and mitigate negative impacts to the environment.

Unit I: Introduction
The Rationale for EIA, Nexus between Development and Environment, Evolution of EIA, Relationship of EIA to Sustainable Development, Different Types of Impact Assessment: Project Level Impact Assessment, Regional Level Impact Assessment, and Strategic Environmental Assessment, Comprehensive and Rapid EIA. QCI/NABET Requirement for EIA Consultant.

Unit II: Methods for Impact Assessment
Planning and Management of Environmental Impact Studies, Impact Indentation Methodologies: Baseline Studies (Primary and Secondary Data Collection), Screening, Scoping, Impact Analysis, Prediction and Evaluation of Impacts.
Impact Analysis Techniques: Ad-hoc Method, Checklist Method, Matrix Method, Overlay Method, Network Method and GIS and Computer Expert Systems.

Unit III: Prediction, Assessment and Mitigation of Impacts
Basic Information, Identification of Type and Quantity of Pollutants, Existing Quality and Applicable Standards, Impact Prediction, Assessment and ,Mitigation Procedures (Case Studies)- Air, Noise, Water and Biological Environment.
Cultural and Social-Economic Impact Analysis- Basic Information on Cultural Resources, Rules and Regulation on Cultural Resources like Archaeological, Historical Structures, Prediction and Assessment of Impacts and Mitigation. Description of Existing Socioeconomic Environment, Analysis of Social Impacts, Fiscal impact Analysis, Impacts of Economic profile of the Community, Mitigation. (Case Studies).

Unit IV: The Legal and Policy Framework in India
Institutional framework of EIA, examples of national and international EIA legislation, Environmental Clearance (EC) process in India (Role of EAC and SEAC), project categorization, EIA Notification and directives (1994, 2006 etc. and amendments). Limitations of EIA, Guidelines of preparation of project report and its evaluation, Terms of Reference

(TOR's), participation of public (public hearing and its relevance) and non-governmental organizations in environmental decision making. Validity of EC process, post EC monitoring, costs and benefits of EIA.

Unit V: Environmental Audit

Definition of Environment Audit and Its Importance, Types of Audits, General Audit Methodology and Basic Structure of Audit. Elements of an Audit Process and Its Importance, Concept of 1SO Management Standards.

Course Outcomes:

Upon Successful Completion of this Course, Students should:

- Have an in depth knowledge of the processes associated with EIA and environmental audit.
- Plan, design, interpret and critically reflect on a range of assessment (environment, social-economics; traffic; landscape; ecology) tasks employed in EIA.
- Have an ability to identify the potential impacts of proposed developments and propose solutions to address these impacts in a range of contexts.
- Critically review the EIA process and the regulatory frameworks in which EIA operates in a range of countries.
- Explain the importance of environmental impact assessment to the principle of sustainable development.

References:

1. Environmental Impact Assessment, L. W. Canter, Mc Graw Hill, New York, 1996.
2. Handbook of Environmental Impact Assessment Vol I and II, J. Petts, Blackwell Science, London, 1999.
3. The Theory and the Practice of Environmental Impact Assessment, S. A. Abbasi and N. Ramesh, DPH, New Delhi, 2003.
4. Complete Guide to ISO 14000, R. B. Clements. Simon & Schuster, 1996.
5. Environmental Management, Kulkarni, V. and Ramachandra T.V., Capitol Pub. Co., New Delhi. 2006
6. Environmental Risks and Hazards, Cutter, S.L. Prentice Hall of India, New Delhi. 1999
7. Handbook of Environmental Impact Assessment, Petts, J. - Volume 1 and 2. Blackwell Publishers, UK 2005.
8. Introduction to Environmental Impact Assessment, Glasson, J. Therivel, R. and Chadwick, A. Routledge, London. 2006

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Subject Code: - EEE323
Subject Name: - Project Evaluation & Management
Semester: III

L	T	P	C
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Course Objectives:
This course prepares the students for project development and work in project form within the culture. On completion of the course, the student should be able to formulate and present a practicable project idea, prepare a realistic economic plan, describe models and methods to lead, carry out, document and evaluate project, describe an intended project in a complete project plan, review and evaluate own and others project plans critically.

Unit-I: Construction Administration, Control of Quality in Construction, Organizational Structure, Responsibility for Co-Ordination of the Trade-Introduction to Project Planning and Scheduling-Processes of Project Planning- Project Scheduling- Progress Control.

Unit-II: Project Planning and Scheduling Techniques- Network Scheduling Techniques. Project Planning Using Computer Based Models- Principles of Project Management.

Unit-III: Certainty, Risk and Uncertainty, Risk Management, Identification and Nature of Construction Risks, Contractual Allocation of Risk, Types of Risks, Minimizing Risks and Mitigating Losses, Use of Expected Values, Utility in Investment Decisions, Decision Trees, Sensitivity Analysis.

Unit-IV: Resource Management and Inventory-Implementation of Project Planning Management.

Unit-V: Analysis and Design of Planning and Control System- Disputes and Claims Management-Use of Computer Based Project Management Tools.

Course Outcomes:
- Students will work with efficiency as they had knowledge about the subject.
- With the backup knowledge their performance will be definitely much better in their workplace.

References:

1. Callahan, M.T., Quackenbush, D.G., and Rowing, J.E., Construction Project Scheduling, McGraw Hill ,New York,1992.
2. Cleland, D.I .and Ireland, L.R., Project Management: Strategic Design and Implementation,4th Edition, McGraw-Hill, New York,2002.
3. Fisk, D.R. 2000 Construction Project Administration, Prentice Hall International, London.
4. K Wakye, A.A 1997, Construction Project Administration: Adisson Wesley Longman, London.