

1. A. K. Mukhopadhyay - Microprocessor, Microcontroller and their Applications, Narosa Publishing / Alpha Publication, Oxford University
2. Microprocessor and Microcontroller – Gaonkar

Reference Book:

1. A. K. Mukhopadhyay – Microprocessor based Laboratory experiments and Projects, I. K. International

BASICS OF PEDAGOGY AND ACADEMIC MANAGEMENT

EMM 301

L-T-P=4-0-0

Course Outcomes (CO):

Upon successful completion of this course, students should be able :

CO1: To Use the collaborative learning into a course in a way that aligns with students learning objectives and intended outcomes.

CO2: Develop knowledge, Understanding and an insight of the various underlying concepts of research.

CO3: To understand Research designs , tools and techniques of gathering data.

CO4: To understand Academic Institution Management, Quality-concept-deciphering, PERT, CPM – SWOT Analysis.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3						3				3	
CO2	3						2	3		3	2	
CO3	3		3				3			1	3	
CO4	3		2				2	3			2	3

Course Contents:

Unit I

Fundamentals of Pedagogy - Psychology of learning – Introduction – Theories of Learning – Memory and Forgetting – Personality and Attitude – student Motivation.

Class room management - Effective Classroom Communication - Classroom Motivation principles and techniques - Techniques of Class room management.

Student evaluation - Principles of evaluation - Tools and techniques of evaluation - Statistical analysis of evaluation process.

Student feedback - Tools and techniques - Evaluation of teacher performance

Unit II

Research methodology and tools - Definition of research and research methodology - objectives and types research - criteria of a good research.

Data collection – primary data (questionnaire, interview, etc.) and secondary data (case study, journals, etc.) – sampling - census and sample survey - need for sampling - characteristics of a good sample - criteria of selecting sampling procedure - different types of sample design

Data analysis - frequency distribution - measures of central tendency - correlation and regression (concepts only) Research proposal - selection of topic - literature survey - development of hypothesis - hypothesis testing (concepts only)

Report writing - Interpretation and report writing – techniques of interpretation - significance of report writing - different steps in report writing and format for report writing.

Plagiarism in research.

Unit III

Intellectual Property Right and Patent Laws in India

What is intellectual property - importance of IPR. Patent -types of patents - patentable inventions - what is not patentable - application and registration of patents - who can apply - rights and duties of patentee - infringement and remedies.

Copyright - coverage provided by copyright - Transfer of copyright - Infringement of copyright

Trademark - Well-known trademarks and associated trademarks - Service marks - Certification Trademarks. R & D activities in educational institutes – IPR and patent issues

Unit IV

Academic Institution Management - Organisation - Types- structure-Institution as an organization

Institutional process - objectives - purpose - responsibilities

Management - functions - skills - motivational theories- communication- types- nature-importance-channel richness - how to increase effectiveness of organisational communication.

Transparency in academic institutions. Quality-concept-deciphering quality aspect of different

products, services as also that of educational system and institution. Quality improvement in institutional activities - identification of potential areas. Washington Accords – goal – salient features – implications Customer – different classes - orientation – satisfaction of stake holders Basics of project management - concept - types - life - cycle - phases - feasibility - viability - cost benefit analysis – PERT and CPM – SWOT Analysis -dimensions of educational projects – case studies

Text Book:

1. Rao and Reddy - Learning & Teaching, , Commonwealth Publishers, New Delhi, 1992
2. Chauhan S S - Advanced Educational Psychology, Vikas Publishing House Pvt. Ltd, 2002
3. Cooper J.M.(Ed) - Classroom Teaching Practice, D.C.Heath and Co
4. Romiszowski A J - Designing Instructional Systems, Kogan Page
5. Gronlund N E - Measurement and Evaluation in Teaching, Macmillan Publishing Co., New York, 1981
6. Kulkarni M V - Research Methodology, EPH
7. Das N G – Statistical Methods (Vol I and II), M Das and Co.
8. Natarajan, S - Introduction to Economics of Education, Sterling Publishers, New Delhi
9. Rao Usha – Education Technology, Himalaya Publishing House, Delhi.
10. Hirwade and Hirwade – Fundamentals of Intellectual Property Right, Himalaya Publishing House, Delhi.
11. Pandya S R – Administration and Management of Education, Himalaya Publishing House, Delhi.
12. Chary S N – Production and Operations Management, TMH

Reference Book:

1. Saylor A. and Lewis H - Curriculum Planning for Better Teaching & Learning, Rinehart & Winston, Inc., 1981.
2. Beard I. J. and Senior I. J. - Motivating Students, Routledge & Kegan Paul Ltd, 1980.
3. Barnard H C - An Introduction to Teaching, University of London Press Ltd., London, 1965
4. Bigge M L - Learning Theories for Teachers, Harper & Row, Publication, New York, Second edition, 1971
5. Heywood J - Pitfalls and Planning in Student Teaching, Kogan Page
6. Reay G D - Selecting Training Methods, Kogan Page Ltd., London, 1994
7. Lorin W A - The Effective Teacher, McGraw-Hill Book Company, 1981.
8. Brown G - Lecturing & Explaining, Methuen & Co.
9. Cohen L and Manion L - A Guide to Teaching Practice, Methuen & Co
10. Romiszowski A J - Producing Instructional Systems, Kogan Page
11. Betrand A and Cebula J P - Tests, Measurement and Evaluation – A
12. Taylor B, Sinha G and Ghoshal T - Research Methodology, Prentice Hall of India.
13. Chakraborty S K – Business Statistics New Age International Publishing.
14. Trochim W M K – Research Methods, Biztantra
15. Sallis E - Total Quality Management in Education, Kogan page, London,1996.
16. Bulchandani K R -: Business Law, Himalaya Publishing.
17. Gopalkrishnan and Ramamoorthy - Text Book of Project Management; McMillan
18. Chandra, P – Projects, TMH, 6th Edition.

NON CONVENTIONAL ENERGY

PSM 301 (A)

L-T-P=4-0-0

Course Outcomes (CO):

Upon successful completion of this course, students should be able :

CO1: To identify various renewable energy resources available for power generation

CO2: Conceptual knowledge of the technology, economics and regulation related issues associated with wind and solar energy.

CO3: To Advocacy of strategic and policy recommendations on usage of wind, solar energy and Bio-mass energy.

CO4: To conceptualize operation of renewable sources in standalone mode and grid connected mode.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	3							
CO2	3	3		2	3							
CO3	3	3	1	3	2							
CO4	3	3		3	3							

Course Contents:

Unit I

Introduction to solar energy: Recent trends in energy consumption – World energy scenario – Energy sources and their availability – Need to develop new energy technologies – Solar radiation and measurement – Solar cells and their characteristics – Electrical storage with batteries – Production and transfer of solar energy – Sun-Earth angles – Availability and limitations of solar energy – Measuring techniques and estimation of solar radiation – Solar thermal collectors – General description and characteristics – Flat plate collectors – Short term and long term collector performance – Solar concentrators – Design, analysis and performance evaluation. – Analysis of PV systems

Unit II

Wind energy conversion system: Basic principle of wind energy conversion – nature of wind – Wind survey in India Site selection considerations– Power in the wind –components of a wind energy conversion system -Types of wind power conversion systems – Wind data analysis, tabulation, Wind resource estimation, Betz’s Limit, Turbulence Analysis Performance of Induction Generators for WECS – Classification of WECS.

Unit III

Bio-mass energy: Biomass: Generation and utilization, Properties of biomass, Agriculture Crop & Forestry residues used as fuels. Biochemical and Thermo-chemical Conversion, Combustion, Gasification, Biomass gasifiers and types etc. Concept of Bio-energy: Photosynthesis process, Biomass resources Bio based chemicals and materials Thermo-chemical Conversion: Pyrolysis, Combustion, Gasification, Liquification. Bio-Chemical Conversion: Aerobic and Anaerobic conversion, Fermentation etc.

Bio-fuels: Types of Bio-fuels, Bio fuel applications, Ethanol as a fuel for I.C. engines, Importance of biogas technology,

Different Types of Biogas Plants. Aerobic and anaerobic bioconversion processes, various substrates used to produce Biogas. Removal of CO₂ and H₂O, Bio-hydrogen production

Unit IV

Geothermal, tide and wave energy: Availability of Geothermal Energy-size and Distribution, Recovery of Geothermal Energy, Various Types of Systems to use Geothermal Energy, Direct heat applications, Power Generation using Geothermal Heat, Sustainability of Geothermal Source, Status of Geothermal Technology, Economics of Geothermal Energy.

Unit V

Power conditioning converters: DC Power conditioning converters – Maximum Power point tracking algorithms – AC power conditioners – Line commutated inverters – synchronized operation with grid supply – Harmonic problem

Text Book:

1. B. Reddy, McGraw Hill Book Company, N.Y. 2002
2. Rai G.D., “Non – Conventional Energy Sources”, Khanna Publishers, 1993.
3. Rai G.D., “Solar Energy Utilisation”, Khanna Publishers, 1993.
4. Gary L. Johnson, “Wind Energy Systems”, Prentice Hall Inc., 1985.

Reference Book:

1. Eastop T.D & Croft D.R, Energy Efficiency for Engineers and Technologists,. Logman Scientific & Technical, ISBN- 0-582-03184, 1990.
2. D. Yogi Goswami, Frank Kreith, Jan. F. Kreider, “Principles of Solar Engineering”, 2nd Edition, Taylor & Francis, 2000, Indian reprint, 2003
3. Chakraverthy A, “Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes”, Oxford & IBH publishing Co, 1989.
4. Shah, Kanti L., Basics of Solid & Hazardous Waste Management Technology, Printice Hall, 2000.
5. Hand Book of Batteries and Fuel cells, 3rd Edition, Edited by David Linden.

POWER SYSTEM HARMONICS

PSM 301 (B)

L-T-P=4-0-0

Course Outcomes (CO):

Upon successful completion of this course, students should be able :

CO1: To identify various renewable energy resources available for power generation

CO2: To identify various Types of harmonic sources in various machines.

CO3: To understand various effects of Harmonic Distortion in Power Systems and on consumer equipments.

CO4: Apply the various methods of firing and harmonic reduction techniques.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	3							
CO2				3	3							
CO3			3	2	2							
CO4	3	3		3	2							

Course Contents:

Unit I

Harmonic Analysis: Representation of harmonics, Fourier series and Coefficients, odd, even and half wave symmetry, phase sequence. Measures of harmonic distortion: voltage and current distortion factors, active and reactive power, apparent power, distortion power, power factor, current and voltage crest factors. Power in passive elements: power in a pure resistance, power in a pure inductance and power in a pure capacitance. Series and parallel resonance

Unit II

Harmonic Sources: Types of harmonic sources, Harmonic in transformers, normal excitation characteristics, determination of current waveshape in transformers, inrush current harmonics in transformers, Harmonic in rotating machines: mmf distribution of ac windings, slot harmonics, voltage harmonics produced by synchronous machines, rotor saliency effects, voltage harmonics produced by induction motors. Distortion caused by arcing devices: Electric arc furnaces and discharge type lighting. Distortion caused by dc power supplies.

Unit III

Effects of Harmonic Distortion in Power Systems: Thermal losses in harmonic environment: Copper losses, iron losses, dielectric losses. Harmonic amplification in capacitor banks. Effects of harmonics in transformers. Effects of harmonics in rotating machines: induced emf, chording windings, distributed winding, winding factor. Harmonic interference with power system protection: harmonic problems during fault conditions. Effects of harmonics on consumer equipment. Interference with Communications

Unit IV

Limits of Harmonic Distortion: Voltage harmonic distortion limits: IEEE limits, IEC limits EN limits and NORSOK limit. Current harmonic distortion limits: IEEE limits IEC limits and NORSOK limits

Unit V

Elimination of Power System Harmonics

Passive filters: Tuned filters and damped filters

Active filters: Series and parallel connection of active filters

Role of power converters, transformers, rotating machines and capacitor banks in reduction of harmonics. Harmonic filter design: Series tuned filters and second order damped filters

Text Book:

1. "Power System Harmonics" by J. Arrillaga and N. R. Watson, Wiley

Reference Book:

1. "Power Systems Harmonics" by George J. Wakileh, Springer

ENERGY MANAGEMENT & AUDIT

PSM 301 (C)

L-T-P=4-0-0

Course Outcomes (CO):

Upon successful completion of this course, students should be able :

CO1: To Understand the need and significance of energy audit and management.

CO2: Identify the equipment and domain of energy conservation and audit in power system.

CO3: To know the concepts of metering and factors influencing cost function.

CO4: Learners will learn about basic concepts of economic analysis and load management.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	3							
CO2				3	3							
CO3			3	2	2							
CO4	3	3		3	2							

Course Contents:

Unit I

Introduction: Energy Scenario – global, sub continental and Indian, Energy economy relation, Future energy demand and supply scenario, Integrated energy planning with particular reference to Industrial Sector in India, Captive power units and others – demand v/s supply

Unit II

Types of Energy: Physical Aspects of Energy: Classification of energy – Hydel, Thermal, Nuclear, Wind, & from Waste Products. Efficiency and effectiveness of energy utilization in Industry. Energy and energy analysis. Renewable and non- renewable energy, Conventional and unconventional energy

Unit III

Demand Side Management:

Energy Demand Management:

Energy utilization, Instrumentation and data analysis, Financial aspects of energy management, Energy management as a separate function and its place in plant management hierarchy.

Energy Planning, Energy Staffing, Energy Organization, Energy Requirement. Energy Costing, Energy Budgeting, Energy Monitoring, Energy Consciousness, Energy Conversions, Energy Efficient Equipment, Energy Management Professionals, Environment Pollution due to Energy

Use, Components of Pollution, Harmful Effects of Pollution, Measures taken to combat Pollution.

Unit IV

Energy Audit and Energy Saving: Energy Audit and analysis, Energy load measurements, System evaluation and simulation, Energy saving techniques and guidelines: Administrative control, Proper Measurement and monitoring system, Process control, proper planning & scheduling, Increasing capacity utilization, Improving equipment control, waste heat recovery, Change of energy source. Upgradation of Technology. Change of product specifications, Use of High efficiency equipment, Design modification for better efficiency, Improved periodic maintenance

Unit V

Energy Control Centers: Remote Telemetry; Remote Terminal Units; IEC TC 57 (870-5-1) Protocol Standard; Data Acquisition Procedure; Data Handling and Organization; Real Time Database; Alarm and Events; Disturbance Processing; Fault Locating Technology; Real Time Display; MIMIC Boards; Supervisory Remote Control; Load Dispatch Control Centers; Distribution Control Centers; Time Keeping Systems

Unit VI

Integration of Distributed and Renewable Energy Systems to Power Grids: DC-to-AC Converters; AC-to-AC Converters; DC-to-DC Converters; Plug-In Hybrid Electric Vehicles; Energy Storage Technologies; Micro grids

Unit VII

Legal Provisions: The Prevention and Control of Pollution Act, 1974, The Energy Conservation Act, 2001, The Environmental Protection Act, 1986. The Electricity Act, 2003. National Electricity Policy. Rural Electrification

Text Book:

1. Paul W., O'callaghan; "Energy Management", McGraw Hill Book Company
2. Steve Doty, Wayne C. Turner; "*Energy Management Handbook*", Fairmont Press. Inc., GA 30047
3. Barny L. Capehart, Wayne C. Turner, William J. Kennedy; "*Guide to Energy Management*", Fairmont Press Inc., GA 30047

Reference Book:

1. Handbook of Energy Engineering, Albert Thumann & Paul Mehta, The Fairmont Press, INC.
2. NPC energy audit manual and reports