INTRODUCTION TO MANAGEMENT

Course Code: PSM-301

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1. **Course Pre-requisites:**
   NIL

2. **Course Learning Objectives:**

   This course introduces students to the learning theories The evolution of learning theories reflects a shift from viewing learners as passive recipients of information to active constructors of knowledge within a complex social and technological landscape. It talks about research methodology and different types of research the need for data collection sampling how data will be collected (sampling, methods), and how it will be analysed to address research objectives and ensure reliable, valid results. It talks about what is IPR (Intellectual Property Rights), the importance of IPR, the types, the features, etc. The course also discusses what type of R&D activities should be there in Educational Institutes. It also talks about the different structures of the institution as an organisation and the objectives and responsibilities of an institute thus increasing the effectiveness and transparency of academic institute.

3. **Course Name: INTRODUCTION TO MANAGEMENT**

   Course Code: PSM-301
   Hours per Week: 4
   Credits: 4

Course Contents:

Module	Topics	38L
1.	**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	09

2.	**Research methodology and tools** - Definition of research and research methodology - objectives and types research - criteria of 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.**	08
3.	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.	09
4.	Academic Institution Management - Organisation - Types- structure- Institution as an organisation 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 institutions 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	12

4. Text Books:

T1: C.R. Kothari, Gaurav Garg, Research Methodology (Methods and Techniques), New Age International Publishers, 5/e 2023, ISBN-13:9789389802559

T2: G. Viswanathappa, M.S. Prasanth, Classroom Teaching, A.P.H. Publishing Corporation 1st.ed.; 2013 ; ISBN. 9789331319272.

T3: Asha Vijay Durafe Dhanashree K. Toradmalle, Intellectual Property Rights, ISBN: 9789390395910

5. Reference Book:

R1: Neha Sinha, Smita Singh, Institutional Management , OSN Academy, Lucknow

6. Course Outcomes:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CO1	To teach the student about learning theories and its evaluation in modern day education	Represent, Identify	Understand, Remember
CO2	To learn about student evaluation tools and techniques	Analyze, Evaluating	Understand, Apply, Evaluating
CO3	To explain Research methodology, data collection sampling, research proposal, plagiarism.	Understand, Analyze	Understand, Apply
CO4	To define IPR, its relevance and importance, in modern day society.	Analyze, Evaluating	Understand, Apply, Analyze
CO5	To inform and expose about the research activities and ecosystem pertaining to academic institutes.	Understand, Remember	Evaluate
CO6	To learn about structures of institutes as an organization and to learn about objectives and responsibilities of an institute and to increase its effectiveness.	Design	Create

7. Mapping of course outcomes to module/course content:

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	2	2	-	-	-	-
2	-	-	2	-	-	-
3	-	-	-	3	3	-
4	-	-	-	-	-	2

8. Mapping of CO to PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	-	-	-	-	-	-	-	1
CO2	3	3	1	1	-	2	-	-	-	-	-
CO3	-	3	1	1	-	-	-	-	-	-	-
CO4	-	-	-	2	-	2		2	2	2	-
CO5					-	2	2	3	3	2	-
CO6					-	2	2	2	2	2	-

9. Mapping to PSO:

	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	2
CO2	-	1	1	-
CO3	3	2	-	-
CO4	3	-	2	-
CO5	3	-	1	2
CO6	3	-	-	2

NON-CONVENTIONAL ENERGY

Course Code: PSM-302

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1. **Course Pre-requisites:**
   1. Power System-I
   2. Power System-II
   3. Power Plant Engineering

2. **Course Learning Objectives:**
   This course aims to elucidate the principles and categories of renewable energy sources, analyze their components and applications, assess their economic feasibility and environmental advantages, and evaluate their contribution to fulfilling future energy requirements and attaining sustainable development objectives. Students must acquire understanding of energy saving methods and the capability to build and assess renewable energy systems, including hybrid solutions. Natural replenishment renders non-conventional energy sources renewable and inexhaustible. This is crucial for the energy sustainability of future generations.

3. **Course Name: NON-CONVENTIONAL ENERGY**
   Course Code: PSM-302

   Hours per Week: 4

   Credits: 4

   Course Contents:

	Topics	**40L**
1.	**Introduction to Energy sources:** Renewable, non-renewable, conventional and non-conventional energy sources, energy consumption as an indicator of national progress; strategies for addressing future energy demands. International and Domestic contexts, Potential of renewable energy sources. Effects of renewable energy production on the environment, carbon credits..	03
2.	**Solar Energy:** Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors. Solar photo voltaic cells: different types of PV Cells, Mono-poly Crystalline and amorphous Silicon solar cells. Equivalent circuit of solar cell, I-V and P-V characteristics, partial shedding effect, efficiency calculation, Design of PV array. MPPT controller. Global and Local MPPT, Technology to achieve MPPT, Integration of Solar panel with Chopper and inverter. Grid integration layout.	10

3.	**Wind Energy:** Working Principle of wind energy conversion system. Classification of WECS. Design considerations of horizontal and vertical axis wind turbine: analysis of aerodynamic forces acting on wind mill blades and estimation of power output. Tip-Speed ratio. Yaw and pitch control technology. Types of generator used and their characteristics.	09
4	**Hydel energy:** Introduction to hydro power. Brief description of Mini, micro and pico hydel plant. Fundamental concepts of converting water's energy into electricity and the different types of hydro power plants, including storage, run-of-river, and pumped-storage. Different types of turbine and generator used in hydel power plant.	06
	Geothermal Energy: Assessment and characteristics of geothermal energy, including geothermal sources and resources such as hydrothermal, geo-pressured hot dry rock, and magma. Benefits, drawbacks, and utilization of geothermal energy, as well as the future potential of geothermal energy in India.	04
6.	**Magneto Hydro dynamic Energy:** Principle of MHD power generation, MHD system, Different types of MHD system, gas conductivity, materials for MHD generators and future prospects.	04
7.	**Fuel cell and Hydrogen Energy:** Working principle of fuel cell, Different types of fuel cell with their operational procedure, conversion efficiency and application. Methods of Hydrogen production technology, Hydrogen storage, transportation, and usage.	04

4. Text Books:

T1: Non-conventional Energy sources, G.D. Rai, Khanna Publishers.
T2: Non-conventional Energy Resources, B. H. Khan, Tata McGraw Hill.
T3: Renewable energy sources and conversion technology, Bansal, Keemann and Meliss, Tata McGraw Hill.
T4: Energy Technology, O.P. Gupta, Khanna Publishing House.
T5: Renewable energy resources and emerging technologies, D.P. Kothari, PHI.

5. References:

R1: Non-conventional Energy, Ashok V. Desai, New Age International Publishers Ltd.

R2: Non-Conventional Energy Resources, Chandra and Chandra, Khanna Publishing House.

6. Course Outcomes:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CO1	To understand the fundamentals, importance, and scope of renewable energy sources in comparison	Analyze, Identify	Understand, Remember

	to conventional energy systems.		
CO2	To understand methods of conversion of solar energy to other form of energy.	Identify, Select	Apply, Analyze, Evaluate
CO3	To understand methods of conversion of wind energy.	Identify, Select	Apply, Evaluate
CO4	To understand the principle of operation of hydro power generation.	Analyze	Analyze, Evaluate
CO5	To understand methods harnessing energy from Geothermal and MHD system	Analyze	Apply, Analyze
CO6	To understand the principle and operation of fuel cell and hydrogen energy	Identify	Analyze

7. Mapping of course outcomes to module/course content:

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	-	-	
2	1	3	-	-	-	
3	1	-	3	-	-	
4	1	-		3	-	
5	1	-	-	-	3	
6	1				3	
7	1					3

8. Mapping of CO to PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	-	-	1	1	-	-	-	1
CO2	3	3	3	2	3	1	1	-	-	3	1
CO3	3	3	3	3	2	2	1	-	-	3	1
CO4	3	3	3	3	2	1	1	-	-	-	1
CO5	3	3	3	3	2	1	1	-	-	-	1
CO6	3	3	3	2	2	2	1	1	-	3	1

9. Mapping to PSO:

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1
CO2	3	3	1	2
CO3	3	2	1	2
CO4	3	2	1	1
CO5	3	2	1	2
CO6	3	3	1	2

ENERGY MANAGEMENT

Course Code: PSM-303

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1. **Course Pre-requisites:**
   1. Renewable energy sources
   2. Power System

2. **Course Learning Objectives:**

To make students aware of present energy scenario. To make students understand the energy management approach. To prepare energy audit report for different energy conservation instances. To inculcate sustainable technology development competence into students.

Students will be aware of energy scenario in various energy sectors. Students will understand the energy management approach. Students will learn to prepare energy audit report for different energy conservation instances. Sustainable technology development competence will be inculcated in the student.

3. Course Name: ENERGY MANAGEMENT

Course Code: PSM-303
Hours per Week: 4
Credits: 4

Course Contents:

Module	Topics	38L
1.	**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. Indian energy scenario, Sectorial energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy scenario, energy pricing, energy security, energy conservation and its importance, energy strategy for the future.	09
2.	**Energy Management and Energy Planning**: Definitions and significance, Energy strategy, energy policy and energy planning, objectives of energy management, Trade – off between energy and environment, energy and economy, Transportation of energy, Seven principles of energy management. Types of Energy: Classification of energy – Hydel, Thermal, Nuclear, Wind. Efficiency and effectiveness of energy utilization in Industry. Energy analysis. Renewable and non- renewable energy.	10
3.	**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 Management & Audit: Definition, energy audit, need, types of energy audit. Energy management (audit) approach- understanding energy costs, Bench marking, energy performance, matching energy use to requirement, maximizing	09

	system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering.	
4.	**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. Energy and environment, air pollution, climate change United Nations Framework Convention on Climate Change (UNFCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), CDM Procedures case of CDM – Bachat Lamp Yojna and industry; Prototype Carbon Fund (PCF).	10

4. Text Books:

T1: Amlan Chakrabarti, Energy Engineering and management, PHI Publication, 2011.
T2: G.D. Rai, Non-conventional Energy sources, Khanna Publishers.
T3: B. H. Khan, Non-conventional Energy Resources, Tata McGraw Hill.
T4: Bansal, Keemann and Meliss, Renewable energy sources and conversion technology, Tata McGraw Hill.
T5: O.P. Gupta, Energy Technology, Khanna Publishing House.

5. References:

R1: Ashok V. Desai, Non-conventional Energy, New Age International Publishers Ltd.

R2: W.C. Turner, Energy Management Handbook, John Wiley and Sons.
R3: Bureau Energy Efficiency Reference book: No. 1, 2, 3 4.

6. Course Outcomes:

Course Outcomes	Details/Statement	Action Verb	Knowledge Level
CO1	To understand the global energy scenario & energy sources	Analyze, Identify	Understand, Remember
CO2	To understand methods of Energy planning in India.	Identify, Select	Understand, Apply, Analyze
CO3	To understand methods of conversion of wind energy.	Identify, Select	Understand, Apply
CO4	To understand methods harnessing energy from Biomass, Geothermal and ocean	Analyze	Understand, Apply, Analyze
CO5	To understand the Energy utilization, Instrumentation and data principle and operation and planning	Identify	Analyze
CO6	To Understand, Energy Staffing, Energy Organization, Energy Requirement. Energy Costing, Energy Budgeting, Energy Monitoring, Energy Consciousness	Identify	Analyse

7. Mapping of course outcomes to module/course content:

Module	CO1	CO2	CO3	CO4	CO5	CO6
1	3	-	-	1	1	-
2	2	3	-	1	1	-
3	2	-	3	1	1	-
4	2	-	-	3	1	3

8. Mapping of CO to PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	-	-	1	1	-	-	-	-
CO2	3	3	3	2	2	1	1	-	1	1	-
CO3	3	3	3	3	2	2	1	-	-	1	1
CO4	3	3	3	3	2	1	1	-	-	1	-
CO5	3	3	3	3	2	1	1	-	-	1	1
CO6	3	3	3	2	2	2	2	1	-	1	1

9. Mapping to PSO:

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1
CO2	3	3	1	2
CO3	3	2	1	2
CO4	3	2	1	1
CO5	3	2	1	2
CO6	2	2	1	1