

<b>MEDE 803</b>	<b>Power Economics</b>	L	T	P	C
<b>Version 1.0</b>		3	0	0	3
<b>Pre-requisites/Exposure</b>	Graduate in Engineering/Science discipline				
<b>Co-requisites</b>	Basic understanding about power sector				

### Course Objectives

1. To provide students with a thorough grounding in the key concepts of power economics.
2. To illustrate how these concepts and standard economic tools can be used to analyse power-related policy issues.
3. To be able to apply this knowledge to the analysis of specific Power economics issues in India

### Course Outcomes

On completion of this course, the students will be able to exhibit.

- CO1.** Students will be exposed to the concepts and models related to Power Economics.
- CO2.** Students will understand basic Economics theories required for power sector understanding and issues of power sector.
- CO3.** Students will be able to demonstrate clear understanding of concepts Power economics.
- CO4.** Students will exhibit the ability to integrate technical, economic, social and regulatory frameworks for power sector planning and resource management.

### Catalog Description

This power Economics course would provide an understanding of economic concepts and theories related to the supply and utilization of power (Electricity) resources, and technologies at various levels- economy, firm and individual. In this course, we will learn how to apply economic tools and frameworks and use empirical data for economic analysis in the power systems domain to support and influence decision-making in the context of resource planning, energy efficiency, climate change and sustainable development.

## Course Content

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### **Unit I: 3.0 lecture hours**

Introduction to General Economics and Power Economics: Theory of Demand, Theory of Supply, Market Equilibrium. Overview of Power Sector.

### **Unit II: 6.0 lecture hours**

Elasticity of demand and supply in Power Sector: Price, Cross, Income elasticity of Demand, Different methods of measuring of elasticity of demand, Energy Demand Forecasting: methods, Practice and challenges

### **Unit III: 10.0 lecture hours**

Theory of Production: Production Function; Laws of Production — Law of Variable Proportions; Law of Returns to Scale. Production with Two Variable Inputs — Isoquants: Slopes and Properties, Isoquant Map, Iso-cost Lines, Producer's Equilibrium; Expansion Path, Ridge Lines, Cobb-Douglas and CES production function.

Theory of Costs: Opportunity Cost; Traditional and Modern Theories of Cost. Derivation of Cost Function from Production Function

### **Unit IV: 13.0 lecture hours**

**Market Structure:** Market: Definition; Concepts of Product and Factor Markets; Features and the Shapes of the Demand (or Average Revenue) Curve under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly Market Structures; Concepts of Firm and Industry; Equilibrium of the Firm

**Theory of Product Pricing:** Perfect Competition: Price-output Determination in the Short and Long Run; the impact of lump sum taxes and subsidies; Equilibrium of the Firm under Perfect Competition; Monopoly; Monopoly Power: Sources and Measurement; Price Discrimination in power sector: Concept and Conditions; Typology — First, Second and Third Degree Price Discrimination; Monopolistic Competition: Product Differentiation, Advertising, Concepts of the 'industry' and the 'group'; Price-output Determination; Excess Capacity; Oligopoly: Equilibrium in an Oligopolistic Market; Nash Equilibrium; the Cournot Model; Price Rigidity; Price Leadership in power sector .

### **Unit V: 4.0 lecture hours**

Tariff: Different Types of Tariffs. Regulatory Framework and Subsidy, Integrated Energy Policy, Electricity Act 2003, Electricity Policy, COP 21, Tariff Policy.

### **Text Books**

1. Macro-Economic Theory by M.L. Jhingan

2. Kumar, Anil ( 2015): Power Sector Structure, Technology, Regulation and Functioning, , Shree Publisher, New Delhi

1.

### Reference Books

1. Kirschen, D. S., & Strbac, G. (2018). Fundamentals of power system economics. John Wiley & Sons.
2. Biggar, D. R., & Hesamzadeh, M. R. (2014). *The economics of electricity markets*. John Wiley & Sons.

### Modes of Evaluation

Quiz/Assignment/Presentation/Extempore/ Written Exam

### Examination Scheme

Components	Internal Assessment (Quiz/Assignment/Presentation/Extempore)	End-Semester Exam (Written Exam)
Weightage (%)	50%	50%

### Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Programme Outcomes
CO1	Students will be exposed to the concepts and models related to Power Economics.	PO1, PO2, PO3, PO4
CO2	Students will understand basic Economics theories required for power sector understanding and issues of power sector.	PO1, PO2, PO3, PO8, PO9, PO10, PO11, PO12
CO3	Students will be able to demonstrate clear understanding of concepts Power economics	PO1, PO2, PO3, PO4, PO8, PO9, PO10, PO11, PO12, PO13, PO14
CO4	Students will exhibit the ability to integrate technical, economic, social and regulatory frameworks for power sector planning and resource management.	PO3, PO4, PO8, PO9, PO10, PO11, PO12, PO13, PO14

### Program Outcome / Course Outcome mapping

<b>Course Outcomes</b>	<b>CO 1</b>	<b>CO 2</b>	<b>CO 3</b>	<b>CO 4</b>
<b>PO 1</b>	3	3	3	
<b>PO 2</b>	3	3	3	
<b>PO 3</b>	3	3	3	2
<b>PO 4</b>	3		2	3
<b>PO 5</b>				
<b>PO 6</b>				
<b>PO 7</b>				
<b>PO 8</b>		3	3	3
<b>PSO 9</b>	3	3	3	1
<b>PSO 10</b>		3	3	2
<b>PSO 11</b>		3	3	2
<b>PSO 12</b>		1	1	3
<b>PSO 13</b>		1	3	3
<b>PSO 14</b>			3	3

		Students will be able to develop and evaluate alternate managerial choices and identify optimal solutions.	Macroeconomics and trade theories to the renewable and non- Students will demonstrate effective application capabilities of their theoretical understanding of economics	Students will exhibit effective decision-making skills, employing analytical and critical thinking ability.	Students will demonstrate effective oral and written communication skills in presenting frameworks, models and regulations of the energy sector.	Students will be able to work effectively in teams and demonstrate team-working capabilities.	Students will exhibit leadership and networking skills.	Students will demonstrate sensitivity towards ethical and moral issues and have ability to address them in energy	Students will demonstrate employability traits in line with the needs of the energy sector.	Students will demonstrate strong conceptual knowledge of economic theory in the context of renewable and non-	Students will demonstrate effective understanding of economics as it is applicable to energy markets, energy	Students will demonstrate analytical skills in designing solutions for energy efficiency.	Students will exhibit the ability to evaluate working of energy policies.	Students will have domestic and global perspective towards legal frameworks and environmental regulations with	Students will exhibit deployable skills pertinent to the renewable and non-renewable energy sectors.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
MEDE811	ECON7005	2	2	3	1				2	3	2	2	1	2	2

1=weakly mapped

2= moderately mapped

3=strongly mapped

### Model Question Paper

Name:

Enrolment No:



**End Semester Examination-May 2018****Program/course: MA – Economics****Subject: Power Economics Max. Marks : 100****Code : ECON 7008****Semester : II****Duration : 3 Hrs****Section A ( attempt all)**

1.	What are the steps of Capital Budgeting?	[2]	CO1
2.	Why NPV and IRR sometimes select two different projects.	[2]	CO1
3.	Mention two disadvantages of NPV	[2]	CO2
4.	Mention two important tariff determination techniques	[2]	CO2
5.	Mention the variable cost components of tariff	[2]	CO3
6.	What are the problems of demand forecasting for the discoms?	[2]	CO1
7.	What are the two project category in type-I small scale – CDM Projects	[2]	CO1
8.	What is meant by Debundling	[2]	CO1
9.	Define GDP- Energy elasticity	[2]	CO5
10.	Mention two reasons why regulatory framework is needed?	[2]	CO1
<b>SECTION B (Answer all the questions)</b>			
1.	Discuss the general goals of power sector reforms.	[5]	CO1
2.	Calculate and interpret the NPV and IRR based on following Operating Cash Flow  1st year Rs. 5, 50,000 2nd year Rs. 7, 00,000 3rd Year Rs. 4, 00, 000 Discounting Factor 20 % and 22%	[5]	CO1, CO4
3.	Discuss the segment wise impact of Electricity Act 2003	[5]	CO1, CO5

4.	Discuss the changing phases of power sector scenario	[5]	CO4, CO5
<b>SECTION C (Answer all)</b>			
7.	Discuss the evolution of Indian Power Industry	[15]	CO1, CO2
8.	Critically discuss the third phase of power sector reform in India.	[15]	CO1, CO2
<b>Section D (Answer all)</b>			
1.	Discuss the salient features Electricity Act 2003. What are the amendments made in Electricity Act 2003?	[15]	CO4, CO5
2.	Discuss the issues of subsidy in Indian Power Sector. Give your opinion should subsidy be eliminated?	[15]	CO2, CO3