| ECON7008 | Power Economics | L | T | P | C |
|---|---|---|---|---|---|
| Version 1.0 | | 3 | 0 | 0 | 3 |
| Pre-requisites/Exposure | Graduate in Engineering/Science discipline | | | | |
| Co-requisites | 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 analyze basic Economics theories and Models required for power sector understanding.
**CO3.** Students will exhibit the ability to integrate technical, economic, social and regulatory frameworks for power sector planning and resource management.
**CO4.** Students will be able to demonstrate and apply clear understanding of concepts Power economics.

**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**

**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 challeges

**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. Koutsoyiannis, A. (1975). Modern microeconomics. Springer.
2. Varian, H. R. (1987). Intermediate Microeconomics; a modern approach (No. 04; HB172, V3y.).


**Reference Books**


1. Stonier, A.W. and D.C. Hague (1972). A Textbook of Economic Theory, ELBS & Longman Group, London.
2. Mehta, Prem L. et al. (2005). Microeconomics, Pearson Education, Delhi.

**Modes of Evaluation (100 Marks)**
Quiz: 20 marks
Assignment/Presentation: 30 marks
Written Exam (End-semester): 50 marks

**Examination Scheme**

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

**Program Outcomes**

| | |
|---|---|
| **PO 1** | Students will have strong conceptual knowledge in the core areas of management and respective domains |
| **PO 2** | Students will demonstrate an ability to critically analyse problems using an in depth understanding of the domain dynamics |
| **PO 3** | Students will effectively apply their learnings to evaluate business situations and evolve alternative solutions to real world managerial issues |
| **PO 4** | Students will be able to integrate functional knowledge with domain capabilities to implement comprehensive solutions |
| **PO 5** | Students will have excellent oral and written communication |
| **PO 6** | Students will be able to exhibit leadership, networking and team building skills in handling business situations |
| **PO 7** | Students will be sensitive to ethical and moral issues arising in the course of their careers and learn to address them professionally |
| **PO 8** | Students will demonstrate desirable qualities to facilitate sustainable employment / deployment |

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

| Mapping between COs and POs | | |
|---|---|---|
| | **Course Outcomes** | **Mapped Programme Outcomes** |
| **CO1** | Conceptual knowledge of the technology, economics and regulation related issues associated with various power generation and power station management | **PO1,** |
| **CO2** | Ability to analyse the viability of various power generation options | **PO1, PO2, PO8** |
| **CO3** | Capability to integrate various options and assess the business and policy environment regarding power generation from various energy resources | **PO1, PO2, PO3, PO4, PO8** |

| | | |
|---|---|---|
| **CO4** | Advocacy of strategic and policy recommendations on implementation of power generation projects | **PO1, PO3, PO4, PO5, PO6, PO8** |

| **Course Outcomes** | **CO 1** | **CO 2** | **CO 3** | **CO 4** |
|---|---|---|---|---|
| **PO 1** | 3 | 3 | 3 | 3 |
| **PO 2** | 3 | 3 | 2 | 3 |
| **PO 3** | 3 | 3 | 3 | 2 |
| **PO 4** | 1 | 1 | 1 | 1 |
| **PO 5** | 1 | 1 | 1 | 1 |
| **PO 6** | 2 | 1 | 2 | 2 |
| **PO 7** | 1 | 1 | 1 | 1 |
| **PO 8** | 3 | 3 | 2 | 3 |

| Course Code | Course Title | PO1: Students will have strong conceptual knowledge in the core areas of management and respective domains | PO2: Students will demonstrate an ability to critically analyse problems using an in depth understanding of the domain dynamics | PO3: Students will effectively apply their learnings to evaluate business situations and evolve alternative solutions to real world managerial issues | PO4: Students will be able to integrate functional knowledge with domain capabilities to implement comprehensive solutions | PO5: Students will have excellent oral and written communication | PO6: Students will be able to exhibit leadership, networking and team building skills in handling business situations | PO7: Students will be sensitive to ethical and moral issues arising in the course of their careers and learn to address them professionally | PO8: Students will demonstrate desirable qualities to facilitate sustainable employment / deployment |
|---|---|---|---|---|---|---|---|---|---|
| **ECON7008** | Power Economics | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 |

1=weakly mapped
2= moderately mapped
3=strongly mapped

## Model Question Paper

| | | | |
|---|---|---|---|
| **Name:**<br>**Enrolment No:** | | UPES | |
| **Course: ECON7008– Power Economics**<br>**Programme: MBA (Power Management)** | | **Semester: EVEN-2016-17**<br>**Time: 03 hrs.** | **Max. Marks: 100** |
| **Section A (Answer all questions) (2 marks * 5 = 10 marks)**<br>1. All the questions in this section carry 2 marks each, | | | |
| **A.** | Mention two basic features of Electricity Act 2003? | **[2]** | **CO1** |
| **B.** | Which section of Electricity Act 2003 deals with tariff policy? | **[2]** | **CO1** |
| **C.** | Which section of Electricity Act 2003 deals with cross subsidy? | **[2]** | **CO1** |
| **D.** | What is meant by Iso- cost line? | **[2]** | **CO3** |
| **E.** | Define Cobb-Douglas Production function? | **[2]** | **CO3** |
| **2** | **Section B (Answer any four questions) (5 Marks * 4 = 20 marks)**<br>All the questions in this section carry 5 marks each, | | |
| **A** | If demand function and supply functions are $Q = \alpha - \beta P$, $Q = \gamma + \delta P$, what is equilibrium price and quantity? Also represent this with the help of diagram. | **[5]** | **CO1** |
| **B** | If capital and labour are perfect substitutes in a production, then explain the shape of the production function and its implication. | **[5]** | **CO2,** |
| **C** | Show how economies of scale and economies of scopes are calculated? | **[5]** | **CO2,** |
| **D** | Difference between Arch elasticity and Point elasticity of demand. | **[5]** | **CO2** |
| **E** | Explain Break –even analysis | **[5]** | |
| | **Section C (Answer any three questions) (10 marks *3 = 30 marks)** | | |
| A | Why does the government regulate telephone and electric power companies if the profit motive serves such an important function in the operation of a free-enterprise system? | **[10]** | **CO3, CO2, CO3. CO4** |
| B | Explain the different types of power tariff and what is the tariff determination methodology? | **[10]** | **CO1, CO2** |

| | | | |
|---|---|---|---|
| C | Distinguish between perfect competition market and monopoly market? In power sector which forms of market operate at present? Discuss. | **[10]** | **CO1, CO2** |
| D | Discuss the different techniques of electricity demand forecasting. Which method in your view is unique for power sector demand forecasting? | **[10]** | **CO1, CO2** |
| | **Section D (Answer any one question) (40 marks * 1 = 40 marks)** | | |
| A | The Electricity Act of 2003 has created a new paradigm for the development of the power sector in the country. It has abolished the monopoly of the state electricity boards created through the Electricity (Supply) Act of 1980 and has created a new competitive framework for the development of the power sector in the country, with focus on the consumers and the safeguarding of their interests by independent regulatory commissions. The Act has eliminated/reduced entry barriers in the entire chain of the electricity supply business. With this background, BSES, a company of Anil Ambain's Reliance, has entered for power supply in Delhi and Mumbai.<br>In the supply of power, price discrimination is inevitable. Even in a normal situation, when a monopoly supplier faces different markets, prices differ from one market to another. Monopoly power and price discrimination have been described as Siamese twins. However, in India, it is not only the varying demand cures in the different markets but also the socio-economic consideration that lead to different prices. Subsidies are, once again, inevitable in such a situation. In determining the cost to various users, there are obviously many problems. Determination of the cost to serve is not easy in a multi-user situation.<br><br>**Table: Electricity Charged by BSES in Delhi in 2007**<br>**User** / **KW** / **Units consumed/month** / **Rate Rs./unit**<br>Domestic / 2-5 / 0-100 / 2.40<br>101-200 / 2.40<br>201-400 / 3.90<br>>400 / 4.60<br>Non-Domestic / up to KW / 5.35<br>10-100 KW / 4.87<br>Industrial / up to 10 KW / 5.00<br>10-100 KW 4.32<br>Agriculture / 1.50<br><br>**Answer the following questions**<br><br>**1.**Discuss the concept of price discrimination and its applicability in Power Sector with the help of given case let.<br><br>**(20 Marks)** | **[40]** | **CO3, CO2 CO1** |

| | | | |
|---|---|---|---|
| | 2.Under which degree of price discrimination does the issue share in the case falls? Explain. **(20 Marks)** | | |
| B | Analyze the important features of Electricity Act 2003 with respect to all the three segments of power business. Discuss critically is there any requirement for amendments in this Act **(40 Marks)** | **[40]** | **CO2, CO3, CO4** |