ECON-7003	**Understanding Energy Sector**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Basic level of Economics				
Co-requisites					

Course Objectives

The objectives of this course are:
1. To understand the basic concepts of energy and it measurement.
2. To explain public utility economics as a theoretical underpinning .
3. To develop habit of observation and try to relate the concepts.
4. To understand & develop skills of analysis with respect to the Energy sector.
5. To know, analyze and interpret various approaches and tools of energy economics.
6. To help in understanding institutional framework, regulation and governance of energy sector in India and other countries.

Course Outcomes

Upon successful completion of the course a student will be able to:

CO1. To give **conceptual clarity** of energy and its measurement.
CO2. To **apply** the micro economics concepts for theoretical underpinning.
CO3. To know the **application** of tools of energy market structure.
CO4. To **comprehend** various energy market structure in the world.
CO5. To **extend** the concepts to the energy sector in India.

Course Content

Unit I: 9 lecture hours

Module: 1 Introduction to Energy:

Introduction, Energy Basics Energy Defined, Alternative Classifications of Energy, Introduction to the Energy System, Energy Information, Energy Accounting Framework, Components of the Energy Account, Commodity Accounts and Overall Energy Balance, Units, Conversion Factors and Aggregation of Energy Flows, Accounting of Traditional Energies, Features of TEs, Data Availability, Data Collection and Reporting, Special Treatments of Some Entries in the Energy Balance, Treatment of Primary Electricity Production, Treatment of Electricity in Final Consumption, Self-Generation, Analysis of Energy Balance Information, Alternative Presentation of Energy Accounting Information.

Unit II: 7 lecture hours
Understanding the Nature of Energy Sector

Public Utility Economics: Meaning, Importance, Government Ownership, Rate Level Determination in Public Utilities, Rate Structure Determination in Utilities. The Concept of Natural Monopoly, Price Discrimination, Degrees of Price Discrimination, Discriminatory Charging, Case of Discriminatory Charging, Pricing Issues in Energy Sector in India, Full Cost Pricing, Marginal Cost Pricing, Average Cost Pricing, Peak Load Pricing, Ramsey Pricing, Congestion Pricing, Comparison between Market

Price, Marginal Cost Price, Average Cost Pricing. Understanding the Parliamentary System of India, Central, States and Concurrent Issues.

Unit III: **10 lecture hours**

Mapping the Energy Sector

Understanding Electricity Sector of India: Electricity Mix, Generation, transmission and Distribution and its current status, the institutional framework for Generation, Transmission and Distribution, Issues and Challenges in Generation, Transmission and Distribution, Understanding Renewable Energy Sector .

Understanding Oil and Gas Sector: Energy mix in terms of primary energy demand, secondary energy demand, Understanding Upstream, Midstream and Downstream sector, The institutional framework of Upstream, Midstream and Downstream sector ,Issues and Challenges of Oil and Gas sector.

10lecture hours

Module:4 Global Energy Sector

International Institutions in Energy Sector: International Energy Agency, Energy International Administration, Organization of Petroleum Exporting Countries (OPEC), Understanding Energy Sector of few Emerging Economies : United States, Brazil, China, Russia

Text Books

1. Owens, G. (2002). Best practices guide economic & financial evaluation of renewable energy projects. Institute of International Education: Washington, DC, USA.
2. Peirce, W. S. (1996). Economics of the energy industries. Greenwood Publishing Group.
3. James L. Sweeney (n.d). Economics of Energy, Department of Management Science and Engineering Terman Engineering Center, 323 Stanford University Stanford, CA 94305-4026 accessed on March 15, 2018, retrieved from https://web.stanford.edu/~jsweeney/paper/Energy%20Economics.PDF
4. Conkling, R. L. (2011). Energy Pricing: economics and principles. Springer Science & Business Media.
5. Bhattacharyya, S. C. (2011). Energy economics: concepts, issues, markets and governance. Springer Science & Business Media.
6. Sun-Joo Ahn and Dagmar Graczyk (2012), Understanding Energy Challenges in India, Partner Country Series, Policies, Players and Issues accessed on March 15, 2018 retrieved from https://www.iea.org/publications/freepublications/publication/India_study_FINAL_WEB.pdf

Reference Books

1. Klimstra, J., & Hotakainen, M. (2011). Smart power generation. Avain.
2. CRISIL Infrastructure Advisory (2012), Assessment of achievable potential of new and renewable energy resources in different states during 12th Plan period and determination of RPO trajectory and its impact on tariff, Report, accessed on March 15, 2018, retrieved from http://www.forumofregulators.gov.in/Data/Reports/Final_Report_FOR_RPO_Study.pdf

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Test	Assignment	Presentation	ESE
Weightage (%)	10	20	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	To give **conceptual clarity** of the theory Public Utility Economics, Monopoly.	PO 1,2, 3,4,7,8,9,10, 11,13, 14
CO2	To **apply** the principle of natural monopoly to firms and consumers.	PO 1,2, 3, 7,8,9,10, 11,14
CO3	To know the **application** of various energy concepts.	PO 1,2, 3, 8,9,10,11, 13,14
CO4	To **comprehend** various market structure and its real world application.	PO 4,5, 8,12,13, 14
CO5	To **extend** the understanding the energy sector of various emerging economies. .	PO 1,2, 3, 4,8,13,14

Program Outcome / Course Outcome mapping

Course Outcomes	CO 1	CO 2	CO 3	CO 4	CO5
PO 1	3	3	3		3
PO 2	3	3	3		3
PO 3	3	3	3		3
PO 4	3			3	3
PO 5				3	
PO 6					
PO 7	3	3			
PO 8	3	3	3	3	3
PSO 9	3	3	3		
PSO 10	3	3	3		
PSO 11	3	3	3		
PSO 12				2	
PSO 13	3		3	3	3

PSO 14	3	3	3	3	3

		Students will be able to develop and evaluate alternate managerial decisions and identify optimal solutions	Students will demonstrate effective application capabilities of their conceptual understanding to the real world business situations	Students will be able to exhibit effective decision making skills, employing analytical and critical thinking ability	Students will demonstrate effective oral and written communication skills in the professional context	Students will able to work effectively in teams and demonstrate team building capabilities	Students will exhibit leadership and networking skills while handling business situations	Students will demonstrate sensitivity towards ethical and moral issues and have ability to address them in the course of business	Students will demonstrate employability traits in line with the changing dynamics of the industry	Students will demonstrate strong conceptual knowledge in the functional area of management as well as Energy Economics domain	Students will demonstrate effective understanding of relevant functional areas of management and their application in Energy Economics	Students will demonstrate analytical skills in identification and resolution of business problems pertaining to Energy Economics	Students will exhibit the ability to integrate functional areas of management with domain perspective for the purpose of planning, implementation & control of Energy Economics	Students will have global perspective towards business situations in the area of Energy Economics	Students will exhibit deployable skills pertinent to the Energy sector
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 9	PSO 10	PSO 11	PS12	PSO 13	PSO14
Econ 7003	**Understanding Energy Sector**	2	2	2	2	1		1	3	2	2	2		2	3

1 – Weakly mapped
2 – Moderately mapped
3 – Strongly mapped

Model Question Paper

Name: **Enrolment No:**	UPES

End Semester Examination-December, 2017

Program/course: MA Economics (With Specialization in Energy Economics) **Semester : I**

Subject: Understanding Energy Sector **Max. Marks : 100**

Code : Econ 7003 **Duration : 3 Hrs**

	Section A (attempt all)		
1.	Explain definition of Crude Oil and Petroleum?	**[2]**	**CO1**
2.	Since 2000, GDP growth has been 8.6% and energy consumption growth rate has been 5.6%, what will be GDP elasticity?	**[2]**	**CO2**
3.	Explain the following concepts: (2 Marks each) a) Production and consumption equivalence of energy measurement b) Self-reliance in supply c) Energy supply mix d) Per capita consumption of primary energy and final energy e) Energy Intensity	**[10]**	**CO1**
4.	State whether the following statements are True or False with reasons. **(4 Marks)** 1. Demand for energy is a derived demand. 2. All essential services are public utilities while all public utilities are not essential services.	**[4]**	**CO1**
5.	Explain the concept of Upstream facilities and systems of Oil and Gas sector. Based on your visit to ONGC Museum.	**[2]**	**CO3**
	SECTION B (Answer Any Four questions)		
1.	How is the demand for energy related to GNP of the country?	**[5]**	**CO1**
2.	Given Demand Function P = 70-Q, Supply Function P = 10+ 0.5Q, Equilibrium Price P = $ 30 and the government establishes a price ceiling of $ 20 per unit. Calculate equilibrium quantity (Q), and define & calculate Dead Weight Loss?	**[5]**	**CO3**
3.	What are the differences between conventional and non-conventional energy sources and primary and secondary energy classifications?	**[5]**	**CO5**
4.	A thermal power plant of 210 MW capacity has the maximum load of 160 MW. Its annual load factor is 0.6. The coal consumption is 1kg per kWh of energy generated and the cost of coal is Rs. 450.0 per tonne. Calculate (a) the annual revenue earned if energy is sold at Re.1 per kWh and (b) the capacity factor of the plant.	**[5]**	**CO1**
5.	Share your understanding on any one of the energy systems based on your Bidholi Campus Tour for Energy Systems.	**[5]**	**CO1**
	SECTION C (Answer Any Two Questions)		
7.	Critically evaluate that how far three main energy policies in India- the Integrated Energy Policy, five-year plans and National Action Plan on Climate Change have been successful to achieve India's three energy objectives.	**[15]**	**CO2, CO3, CO5**
8.	'India's federal system and coalition-based politics make much-needed policy reform complex and difficult'.	**[15]**	**CO2, CO3**

9.	Categorize the companies and institutions of power sector and oil and gas sector on the continuum of producing to service providing.	**[15]**	**CO4, CO5**
10.	How can you visualize the effects of demonetization on energy sector. You can explain the effect on different sectors, long term and short term effects, positive and negative effects etc.	**[15]**	**CO1 to CO4**
	Section D (Answer all the questions)		
2.	Answer the following questions to understand the Electricity Bill: **(30 Marks)** **Q.1** What are the tariff categories? **(5 Marks)** **Q.2** Explain the type of supply and connected load. **(5 Marks)** **Q.3** What is Fuel Adjustment Charge? **(5 Marks)** **Q.4** What is the frequency of change in FAC? **(5 Marks)** **Q.5** Analyze the effect on Electricity Bill, with respect to change in volume of consumption, type of consumer, connected load, FAC etc. with the help of example. **(10 Marks)**	**[30]**	**CO2-CO5**