SEMESTER S8

FUEL ENGINEERING

Course Code	OEBBT832	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30Min.
Prerequisites (if any)	Nil	Course Type	Theory

Course Objectives:

1. To understand the atmospheric pollutants, standards, regulations, emission sources, and their fate.
2. To understand the fundamentals of atmospheric stability and air pollutant transport, characteristics of emission sources, and their control methods.

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Global and Indian Energy production & consumption patterns and energy resources. Solid Fuels: Biomass, Wood, and Charcoal. Classification & Rank of Coal, Peat, Lignite, Sub-Bituminous coal, Bituminous coal, Anthracite coal, Cannel &Bog head coal. Physical Properties of coal, Proximate & Ultimate Analysis of Coal, Cleaning, washing & Storage of coal. Theory of coal Pyrolysis and Carbonization: Low-Temperature Carbonization (LTC), High-Temperature Carbonization(HTC), Properties of solid fuels.	9
2	Liquid fuels: Origin and classification of petroleum, crude exploration, petroleum refining processes, transportation, storage and handling of liquid fuels, properties & testing of petroleum products. Liquid fuel from coal: Bergius and Fischer Tropsch process. Other Synthetic Liquid fuels.(Benzol, shale oil, Gashol, power alcohol Colloidal fuel).	9
3	Gaseous fuels: Classification of gaseous fuel; Physico-chemical principles, Calorific Value, Wobbes index, and flame speed. Types of gaseous fuels:	9

	natural gases, methane from coal mines, manufactured gases, producer gas, water gas, biogas, refinery gas, LPG, cleaning and purification of gaseous fuels. Manufactured fuels: Agro fuels, Bio-Fuels: types of bio-fuels, production processes and technologies, biofuel applications.	
4	Combustion stoichiometry and thermodynamics, calculation of heat of combustion, theoretical & actual combustion processes - air-fuel ratio, estimation of dry and wet flue gases for known fuel composition, calculation of the composition of fuel & excess air supplied, flue gas analysis.	**9**

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain energy resources, global and Indian energy production and consumption.	**K2**
CO2	Summarize the origin, classification, analysis, properties of solid fuels and their applications	**K2**
CO3	Explain the origin, classification, analysis, properties of liquid, fuels and their applications	**K2**
CO4	Explain the origin, classification, analysis, properties of gaseous and manufactured fuels and their applications. Outline basics of combustion stoichiometry and thermodynamics.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

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CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3	3					3
CO2						3	3	3				3
CO3	2	3					3					2
CO4			3				3					2
CO5							3					3

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Fuels & Combustion	Dr. Samir Sarkar	Orient Longmans	Third edition, 2009
2	"Modern Petroleum Technology", Vol. 1, Upstream	Dave, R.A.(Ed)	John Wiley and sons.	Sixth,2001
3	"Modern Petroleum Technology", Vol. 2, Downstream	Lucas, A.G. (Ed.)	John Wiley and sons.	Sixth,2002
4	"Combustion",	Glassman, I	Academic Press	Second,2014.

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	"Modern Petroleum Refining Processes"	Rao, B.K.B	Oxford & IBH Publishing Co. Pvt. Ltd	Fourth ,2018
2	Fundamentals of Renewable Energy Systems,	D. Mukherjee and S. Chakrabarti,	New Age International Publishers	First, 2004

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Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://nptel.ac.in/courses/105107213
2	https://nptel.ac.in/courses/105107213
3	https://nptel.ac.in/courses/105107213
4	https://nptel.ac.in/courses/105107213