NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	Fuels and combustion technology		
Course Code	EN 615	**No. of Credits**	3
Department	DEE	**Faculty**	Mr.G.Suriya narayanan/Mr.Ramesh R
Pre-requisites Course Code	Fundamental knowledge in basic chemistry, thermodynamics and chemical reactions are required		
Course Coordinator	None		
Other Course Teacher(s)/Tutor(s) E-mail		**Telephone No.**	+91 88074 52059
Course Type	☐ **Core course**	☑ **Elective course**	

COURSE OVERVIEW

This course is formulated to teach about fuels and its types, analysis of fuels, reactions involved in fuels combustion, heat formation from the reaction, types and modes of furnaces and burners, and industrial burners and applications.

COURSE OBJECTIVES

This course aims to educate the students about properties of fuels, basic mechanisms and thermodynamics involved in combustion of the fuels, flame analysis, combustion appliances and burners & furnaces used in industries.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. Explain the concepts of fuels; devise combustion characteristics of various fuels using various analysis and thermal properties. 2. Apply the fundamental principles of thermodynamics for assessing the combustion performance of various fuels.	PO1, PO2, PO3, PO4, PO5 & PO8

3. Describe the concepts of recuperator and regenerator using waste heat recovery. 4. Determine flame properties such as propagation, velocity and ignition mechanism of fuels. 5. Selection of type of burners/firing system for gaseous fuels.	

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	1,2 & 3	Fuels & Fuel Analysis - Combustion stoichiometry, theoretical & actual combustion processes – Air fuel ratio.	Chalk & talk, ppt, problems
2	4 & 5	Combustion Thermodynamics- calculation of heat of formation & heat of combustion – First law analysis of reacting systems	Chalk & talk, ppt, problems
3	6	**Cycle test - I**	**Examination**
4	7 & 8	Heat Treatment Furnaces- Industrial furnaces – process furnaces – Kilns – Batch & continuous furnaces	Chalk & talk, ppt, problems
5	9 & 10	Flame, Flame Structure, Ignition and Igniters – flame propagation – deflagration – detonations- flame front – Ignition – self & forced ignition – Ignition temperature	Chalk & talk, ppt, problems
6	11	**Cycle test - II**	**Examination**
7	12 & 13	Combustion Appliances- Gas burners - Functional requirement of burners – Gas burner Classification – Stoker firing – pulverized system of firing	Chalk & talk, ppt, problems

8	14	**Semester Examination**	**Examination**

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assigments (1-4)	End of week 2, 4, 6 and 8	1 week	5
2	Cycle test – I	Week 6		20
3	Cycle test – II	Week 11		20
4	Seminar	Week 12	Presentation time - 10mins	5
5	Semester Examination	Week 14		50

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. S.P. Sharma & Chander Mohan, "Fuels & Combustion", Tata McGraw Hill Publishing Co. Ltd., 1984

2. Dr. Samir Sarkar, "Fuels & Combustion", Orient Longman, Second edition, 1990.

3. Blokh A.G, "Heat Transmission in Steam Boiler furnaces", Hemisphere PublishingCorpn. ISBN-089-116-626-2

4. Gupta O.P, "Elements of Fuels, Furnaces & Refractories", 3rd edition, KhannaPublishers, 1996.

5. Combustion Fundamentals by Roger A. Strehlow – McGraw-Hill

6. Combustion Engineering and Fuel Technology by Shaha A.K. – Oxford and IBH.

7. Principles of Combustion by Kenneth K. Kou – John Wiley & Sons.