GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: V
METALLURGY ENGINEERING

Subject Name: **Fuels, Furnaces and Refractory**
Subject Code: **152104**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
4	2	0	6	70	30	50

Sr. No.	Course content
1.	**Fuels - General :** Definition. Their importance in human life (historical background).Comparative study of solid, liquid and gaseous fuels. Constitution, classification and grading of coal. Metallurgical. coke.Testing of fuels.
2.	**Fuels - Manufacturing :** Carbonization of coal-Coke making and by-products, Producer gas, Water gas, Natural gas, LPG, Blast furnace gas. Coke oven gas, LD gas. Storage of fuels, Fuels in transport.
3.	**Fuels - Non-conventional Resources:** Nuclear fuel. Other energy sources such as Solar, Wind, Geo-thermal, Bio-mass, Hydrogen.
4.	**Furnaces - Fundamentals :** Evolution of heat and flame temperature. Available heat. Combustion of fuels and problems based on air supplied, excess air and products of combustion. Natural, forced, induced and balanced draft. Chimney height, Heat losses in furnaces and minimization. Waste heat recovery.
5.	**Furnaces - Types :** Classification based on heating methods, application wise and temperature ranges. Batch furnaces, Continuous furnaces, Construction and working of furnaces like Cupola, Induction furnace, Arc furnace, Resistance furnace, Pit furnace, Rotary furnace, Muffle furnace, etc. Special furnaces- Plasma heating, Optical furnaces, Uses of Laser.
6.	**Refractories - General :** Definition. Properties and testing of refractories.
7.	**Refractories - Manufacturing and Applications:** Production of different types of refractories, Selection of refractories for metallurgical applications, Special refractories.

8.	**Temperature Measurement and Control:** Basic concept of temperature measurement and control. Optical and Radiation pyrometers- principle, construction, working and advantages.

Reference Books:

1. Elements of Fuels, Furnaces and Refractories, O. P. Gupta
2. Fuels, Furnaces and Refractories, J. D. Gilchrist
3. Fuels, Furnaces, Refractories and Pyrometry,-A.V.K. Suryanarayana, (B. S. Pub.)
4. Industrial Furnaces - Vol. I & II, W. Trinks and M. H. Mawhiney, (Wiley)
5. Refractories, M. L. Mishra