Name: **Enrolment No:**	

UPES
End Semester Examination, December 2023

Course: Fuel chemistry
Semester: III
Program: B.Sc. (H) Chemistry **Time: 03 hrs.**
Course Code: CHEM 2016K **Max. Marks: 100**

Instructions: Read all the below mentioned instructions carefully and follow them strictly:

1) Mention Roll No. at the top of the question paper.
2) ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	What are oxygenated fuels? Explain with examples.	**4**	**CO1**
Q 2	What is natural gas? Discuss its primary components.	**4**	**CO3**
Q 3	Compare the composition of coal gas and producer gas?	**4**	**CO2**
Q 4	Describes the coal gasification reaction in brief.	**4**	**CO2**
Q 5	Write the difference between reforming and cracking with examples.	**4**	**CO2**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	What are the main products of fractional distillation of crude oil? Write the names of products with their boiling point range.	**10**	**CO2**
Q7	What are synthetic fuels? Describe the synthesis of petrol by Fischer Tropsch process.	**10**	**CO2**
Q 8	What do you mean by net and gross calorific value of fuel? Calculate the gross and net calorific value of a coal sample having the following composition C=75%, H=5%, O=8 %, S=1.5%, N=5% and ash 5.5%.	**5+5**	**CO2**
Q 9	Answer the following questions. a. Write the main constituents of LNG. b. Which type of fuel contains a high proportion of aromatic hydrocarbons and is commonly used in jet engines? c. Write the composition of power alcohol.	**10**	**CO1**

	d. What is the primary product of combustion of hydrogen gas (H_2)? e. What is the chemical formula of natural gas? f. Which instrument is used to determine the Calorific value? g. Which hydrocarbon has maximum cetane number? h. With increase in the number of carbon and hydrogen atoms in hydrocarbon molecules, the viscosity of petroleum products……. ……(increases/decreases). i. Oxidation stability of a fuel increases with increasing amount of …….. ……. alkanes. (saturated/unsaturated) j. …….. fuel is typically used in fuel cell as a clean and efficient energy source. (hydrogen/propane)		
SECTION-C (2Qx20M=40 Marks)			
Q 10	a. What is petroleum cracking? Why is it important? Explain the moving bed catalytic cracking. b. Mention the different routes for the synthesis of propylene oxide petrochemicals. **OR** Explain different routes of bioethanol production from lignocellulosic biomass with the help of suitable diagrams and reactions.	**15+5** **20**	**CO2** **CO3**
Q11	Write the short notes on any four. i. Transesterification ii. Fuel cell and its applications iii. Biofuels environmental impact iv. Octane number and cetane number v. CO_2 to hydrocarbon fuels vi. LPG	**20**	**CO3**