


Name:			
Enrolment No:			
<b>UPES</b> <b>End Semester Examination, May 2023</b>			
<b>Course: Fuel chemistry</b> <b>Semester: IV</b> <b>Program: B.Sc. (H) Chemistry &amp; Int. B.Sc.-M.Sc Chemistry</b> <b>Course Code: CHEM 2016K</b>		<b>Time : 03 hrs.</b> <b>Max. Marks: 100</b>	
<b>Instructions:</b> Read all the below mentioned instructions carefully and follow them strictly: <ol style="list-style-type: none"> <li>1) Mention Roll No. at the top of the question paper.</li> <li>2) ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY.</li> </ol>			
<b>SECTION A</b> <b>(5Qx4M=20Marks)</b>			
S. No.		Marks	CO
Q 1	Differentiate between renewable and non-renewable fuels. Why renewable fuels are considered better than fossil fuels?	4	CO1
Q 2	What is coal? Classify the coal on the basis of carbon content. Write the significance of proximate and ultimate analysis of coal?	4	CO1
Q 3	State the application of aromatics hydrocarbons like benzene and xylene.	4	CO3
Q 4	Explain the octane number of a fuel. Give some chemicals name used to improve octane number	4	CO3
Q 5	a. Define the pour and cloud point of a fuel. b. What is power alcohol? Discuss the advantages of power alcohol.	2+2	CO1
<b>SECTION B</b> <b>(4Qx10M= 40 Marks)</b>			
Q 6	a. What is implied by the term 'Refining of Petroleum'? What are various fractions obtained by the fractional distillation of petroleum? Give one use of each. b. Explain aniline point c. Explain calorific value of a fuel	8+1+1	CO2
Q 7	a. Define lubricants. Differentiate between conducting and non-conducting lubricant oils? b. Mention the route for manufactures of isoprene petrochemicals	5+5	CO3

Q 8	<p>a. 0.5 g of coal sample on complete combustion was found to increase the weight of <math>\text{CaCl}_2</math> tube by 0.2 g and KOH tube by 1.2 g. calculate % C and % H in the given sample.</p> <p>b. Washing of bomb pot when 1.9 g of the coal sample in bomb calorimeter experiment is treated with <math>\text{BaCl}_2</math> solution to give 0.41 g <math>\text{BaSO}_4</math>. Calculate % S in coal sample.</p> <p>c.</p>	7+3	CO2
Q 9	<p>a. What is cracking? Classify the different cracking processes. Why is cracking economically important?</p> <p>b. Write a short note on CNG.</p>	7+3	CO2
<b>SECTION-C</b> <b>(2Qx20M=40 Marks)</b>			
Q 10	<p>a. What is biogas? Explain the different steps involved in anaerobic digestion. Write the advantages and disadvantages of biogas.</p> <p>b. Explain the mechanism of steam cracking by using ethane as model molecule.</p> <p style="text-align: center;">Or</p> <p>c. Mention the different routes for the manufactures of butadiene and propylene oxide petrochemicals.</p>	10+10	CO2 CO2 CO3
Q11	<p>Write the short notes on any four.</p> <p>i. Water gas</p> <p>ii. Biofuels</p> <p>iii. Viscosity index</p> <p>iv. Synthetic lubricants</p> <p>v. Coal tar distillates</p> <p>vi. Difference between coal carbonization and gasification</p>	20	CO2