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**BTECH**  
**(SEM V) THEORY EXAMINATION 2023-24**  
**FUELS AND COMBUSTION**

TIME: 3 HRS

M.MARKS: 100

**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief. 2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Explain what is meant by "fuels".	2	1
b.	Briefly explain various important properties of coal.	2	1
c.	What are agro fuels? Explain the storage & handling procedure of agro fuels.	2	2
d.	State any two potential applications of oxygen rich combustion.	2	3
e.	Explain with neat sketch the pot type burner.	2	3
f.	What is impact of air pollution on environment?	2	4
g.	Define primary and secondary air pollutants.	2	4
h.	What do you understand by laminar flame?	2	5
i.	What do you mean by elementary reaction?	2	5
j.	What is the difference between premixed laminar flame and premixed turbulent flame?	2	6

**SECTION B**

**2. Attempt any three of the following: 10 x 3 = 30**

a.	What is liquefaction of coal? Why is that necessary? Discuss about the direct and indirect methods used in coal liquefaction.	10	1
b.	What are the different thermodynamic functions of combustion processes? Explain enthalpy of combustion.	10	3
c.	Enumerate the steps to be taken to control air pollution in India.	10	4
d.	Explain any two tests to determine change in physical properties of fuels.	10	5
e.	Derive the equation for constant pressure adiabatic flame temperature.	10	6

**SECTION C**

**3. Attempt any one part of the following: 10 x 1 = 10**

a.	Discuss in detail the history of coal formation with different stages of transformation.	10	1
b.	What is dew-point temperature? Explain the method to determine the dew-point temperature of the combustion products.	10	1

**4. Attempt any one part of the following: 10 x 1 = 10**

a.	Explain various Rebuilding processes involved in refining of petroleum.	10	2
b.	Explain any two tests to determine change in physical properties of fuels.	10	2

**5. Attempt any one part of the following: 10 x 1 = 10**

a.	State the types of combustion process and explain any one in detail.	10	3
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PAPER ID-311053

Printed Page: 2 of 2  
Subject Code: KME058

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b.	A sample of coal has the following composition by mass, carbon 76%, Hydrogen 5%, Oxygen 8.5%, Nitrogen 2%, Sulphur 1.5% and Ash 7% calculate higher and lower calorific value of fuel per Kg.	10	3
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**6. Attempt any one part of the following: 10 x 1 = 10**

a.	Explain with neat sketch the working principle of electro static precipitator with its advantage and disadvantage.	10	4
b.	Gasoline is burned steadily with air in jet engine. Determine the air to fuel ratio and the percentage excess air used for combustion. Assume the complete combustion of gasoline.	10	5

**7. Attempt any one part of the following: 10 x 1 = 10**

a.	Discuss the working and industrial application of traveling grate stoker boiler.	10	5
b.	Draw a schematic diagram of Orsat's apparatus and explain how flue gas analysis is done?	10	6

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