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BTECH
(SEM V) THEORY EXAMINATION 2024-25
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	CO	Level
a.	Define fuel? Give an example of a primary fuel and a secondary fuel.	1	K1
b.	What is Metamorphism? Arrange the varieties of coal in the ascending order of hardness value.	1	K1
c.	Define petroleum. What is the composition of the crude oil found in the earth's crust?	2	K1
d.	What is the significance of Wobbe's index of gaseous fuel?	2	K1
e.	What do you meant by stoichiometry and stoichiometric air?	3	K1
f.	Define flame propagation.	3	K1
g.	How combustion takes place in gas turbine?	4	K1
h.	List the advantages of Fluidised Bed Boiler over commercial Boiler.	4	K1
i.	Define air pollution.	5	K1
j.	What are the major sources of air pollution?	5	K1

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

Q no.	Question	CO	Level
a.	Discuss the differences between Proximate analysis and Ultimate analysis for the quality of coal.	1	K2
b.	Explain Hydro cracking. Discuss the differences between Fractional distillation as ADU and VDU.	2	K2
c.	Explain how Enthalpy of formation is co related with Heating value of fuel. How cold mixture and preheated mixture affects adiabatic flame temperature.	3	K2
d.	With the help of neat and labeled sketch, discuss the analysis of flue gas by Orsat apparatus. Also write down the significance of the same.	4	K2
e.	Classify the air pollutants available in the air. List out the adverse effects caused by the same on Human health.	5	K2

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

Q no.	Question	CO	Level
a.	Define calorific value. Calculate the gross and net calorific values of coal having the following composition: Carbon = 70%, Oxygen = 20%, Hydrogen = 5%, Sulphur = 0.25%, Nitrogen = 1.75% and rest Ash. Take latent heat of steam = 600 Kcal/kg.	1	K3
b.	Interpret differences between the following:	1	K3



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	i. Low temperature carbonization and High temperature carbonization. ii. Solid fuels, Liquids fuels and gaseous fuels.		
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4. Attempt any one part of the following:**1 x 10 = 10**

Q no.	Question	CO	Level
a.	Write a short note on the following: i. Natural gas ii. Marsh gas iii. LPG	2	K2
b.	What is gasification? Explain the working of a updraft gasifier with the help of well-labeled diagram.	2	K2

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

Q no.	Question	CO	Level
a.	Calculate the minimum amount of air required for the complete combustion of 250 kg of fuel containing Carbon 80%, Hydrogen 15 % Sulphur 1% and the rest Nitrogen by weight.	3	K3
b.	Octane is burned with 250 percent theoretical air during a combustion process. Determine AF ratio and dew-point temperature of the products. Also write down the assumptions taken to solve the problem.	3	K3

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

Q no.	Question	CO	Level
a.	What is combustion? Explain the difference between Petrol engines and Diesel engines.	4	K2
b.	What is burner? What the features affecting the performance of a burner. Discuss the differences between Gas burners and oil burners.	4	K2

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

Q no.	Question	CO	Level
a.	Identify the major pollutants from IC Engines? List down the factors to control the pollutants by the same.	5	K2
b.	How fossil fuels are contributing as a major portion to Air pollution? What are its affect on Environment in long run. Select some ways to control it.	5	K2