REG.NO.:

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF CHEMICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: G1+TG1

Programme Name & Branch : B.Tech (Chemical Engineering)
Course Code and Course Name : BCHE314L, Fuels and Combustion
Faculty Name : D Chitra
Class Number : VL2024250103312
Date of Examination : 19-10-2024
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction:

- Assume necessary and appropriate data if required

Q. No	Question	Marks
1.	Mention the variables influencing the catalytic reforming process. Discuss it elaborately.	10
2.	A gas producer gasifies coke containing 10% moisture and 20% ash. If the carbon content of the coke is 95% dry ash free and the gas analysis shows CO_2 = 5.3 %, CO = 25%, H_2 =12%, and CH_4 = 0.5%, calculate the cold gas efficiency of the producer. (Neglect other elements in the coke in the calculation and assume N_2 as the remainder in the gas analysis) Data: The calorific value of gas is 27195 kcal/kmol The calorific value of coke is 5700 kcal/kg	10
3.	Discuss the process and the reactions that may take place in a suction gas producer supplied with carbon, air, and steam. What are the advantages of adding steam with air?	10
4.	A fuel with composition $C_{10}H_{22}$ is burnt using an air-fuel ratio of 13:1 by mass. Determine the complete volumetric analysis of the combustion products, assuming that the whole amount of hydrogen burns to form water vapor. There is neither any free oxygen nor any free carbon left. The carbon is burning to CO_2 and CO.	10
5.	A fuel oil of the following composition is burned to completion in a metallurgical furnace. C = 84%; H = 12%; O = 1.5%; S = 2.5% Determine, (i) the theoretical air required to burn 100 kg of the fuel at NTP. (ii) the sensible heat in the total flue gases when 50% excess air is used and the gases leaving the furnace are at 535°C. The mean specific heat of flue gases is 1.476 kJ/m^3·°C at NTP.	10

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