JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-III[rd] Semester (BT)

COURSE CODE (CREDITS): 18B11BT313(4) MAX. MARKS: 35

COURSE NAME: Thermodynamics and Chemical processes

COURSE INSTRUCTORS: Dr. Poonam Sharma MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	(a). A hot object is placed next to a cold object so that they are touching. Which law is to be followed?	I	2
	(b). What are fouling factors?	VI	3
Q2.	(a). Explain energy coupling with example	II	3
	(b). Elaborate classification of fluids on basis of viscosity.	VI	3
	(c). Discuss the two types viscometers.	V	4
Q3	Corn steep liqour (125 kg) contains 2.5% invert sugars and 50% water; rest can be considered as solids. Beet molasses (45 kg) containing 50% sucrose, 1% invert sugars, 18% water and the remainder solids. Both mixtures mixed together in mixing tank. Water is also added as separate component. Final product containing 2% invert sugars as one component is obtained. Draw the flow sheet and mass balance table only	IV	5
Q4	*Candida utilis* cells convert glucose to CO_2 and H_2O during growth. The cell composition is $CH_{1.84}O_{0.55}N_{0.2}$ plus 5% ash. Yield of biomass from substrate is 0.5 $g\,g^{-1}$. Ammonia is used as nitrogen source. (i) What is the oxygen demand ? (ii) *C. utilis* is also able to grow with ethanol as substrate, producing cells of the same composition as above. On a mass basis, how does the maximum possible biomass yield from ethanol compare with the maximum possible yield from glucose?	IV	7
Q5.	Absolute or 100% ethanol is produced from a mixture of 95% ethanol and 5% water using the Keyes distillation process. A third component, benzene, is added to lower the volatility of the alcohol. Under these conditions, the overhead product is a constant-boiling mixture of 18.5% cthanol, 7.4% H_2O and 74.1% benzene. Use the following data to calculate the volume of benzene which should be fed to the still in order to produce 250 litres of Absolute ethanol: (density 100% alcohol = 0.785 g cm^{-3}) ; (density benzene = 0.872 g cm^{-3}).	IV	8