Ref. No.: Ex/Che/PC/B/T/324/2025

B.E. CHEMICAL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2025

CHEMICAL TECHNOLOGY- II

Time: 3 hours **Full Marks: 100**

Answer all questions

Q. No.	CO No.		Marks
1.	1.	**a)** Define cloud point of fuel and briefly explain why it is important for aviation industry. **b)** Why corrosion is occurred in distillation unit and how it can be prevented? **c)** What do you mean by reduced crude and residuum? **d)** Write the different products derived from the crude distillation unit with diagram and corresponding temperatures. **e)** Classify the hydrocarbon compositions (from C_1 to C_{20}) of the different fractions derived from the crude distillation unit. **f)** Briefly explain the crude oil exploration from mines with diagrams. **g)** In a fractionation unit a light fraction, boiling range of 225 to 325 °C, is to be separated from a high waxy distillate (405-425°C) using steam distillation technique. If the distillation temperature should not exceed 200°C, find the number of moles of steam required for equimolal mixture of this stock. Pressure of the system remains at 760 mm of Hg. Given: Vapor pressure of light component at 200°C=650 mm of Hg Vapor pressure of heavy component at 200°C=35 mm of Hg Mol. wt. of light fraction= 225, CP= 0.47 Mol. wt. of heavy fraction=435, Cp=0.42 Lt heat of steam at 200°C= 769.6 kcal/g	1+1+1+1+ 1+7+3=15
2.	2.	**a)** What are the different tests for gasoline? **b)** What do you mean by sour crude? **c)** Briefly explain the virgin gasoline? **d)** How octane rating improvement is accomplished? **e)** Write the difference between octane number and cetane number? **f)**) Briefly describe the FCC operation with diagram.	1+1+1+1+ 1+10=15
3.	3.	**a)** What do you mean by coking? **b)** What do you mean by catalytic reforming? **c)** What are the general methods of petroleum coke production? **d)** Define visbreaking operations? **e)** Briefly explain the viscosity index. **f)** Briefly explain the naphtha cracking operation with flow sheet diagram.	1+1+1+1+ 1+10=15 *P.T.O.*

4.	4.	**a)** What is the difference between hydrodesulphurization and hydrotreatment? **b)** What is delayed coking? **c)** How does sulfur affect the coke yield? **d)** Write the properties of cracked fractions. **e)** How catalytic cracking is distinguished from thermal cracking and which case stable product is formed and why? **f)** Briefly explain the catalytic desulfurization of gasoline with process flow-sheet diagram.	1+1+1+1+ 1+5=10
5.	5.	**a)** What are the major engineering problems of ethyl alcohol production? **b)** What are the different methods of glycerine production? **c)** What are the design principles for sterile operations? **d)** Why fatty acids are passed overhead to a flash tank for soap production? **e)** Why does pretreatment of biomass essential for biofuel synthesis? **f)** Briefly explain the biofuel synthesis from biomass including brief explanation of all pretreatments methods.	1+1+1+1+ 1+10 =15
6.	6.	**a)** Why commercial fermentation vessels are usually constructed from stainless steel? **b)** Why dilute glycerine is put through successive beds of anion and action exchange resins? **c)** What is the Corfam in leather industry? **d)** Briefly describe the manufacture of leather with process flow sheet diagram.	2+2+1+10 =15
7.	7.	**a)** What do you mean by vulcanisation of synthetic polymer and rubber? **b)** Define degree of polymerisation? **c)** Briefly describe the bulk suspension polymerisation and emulsion polymerisation. **d)** Briefly explain the polyamides and acrylic fibres. **e)** Briefly explain the polyvinyl chloride synthesis by polymerisation technique?	2+1+2+5+ 5=15