

B.E. CHEMICAL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2024
CHEMICAL TECHNOLOGY- II

Time: 3 hours

Full Marks: 100

Answer all questions

Q. No.	CO No.		Marks
1.	1.	<p>a) Why drying is essential for paraffins up to three carbon atom before usage?</p> <p>b) Why dehydration and desalting of crude are essential?</p> <p>c) Write the different products derived from the crude distillation unit with diagram and corresponding temperatures.</p> <p>d) Classify the hydrocarbon compositions (from C₁ to C₂₀) of the different fractions derived from the crude distillation unit.</p> <p>e) Write the difference between octane number and cetane number.</p> <p>f) Briefly explain the vacuum distillation unit (VDU) with diagram.</p> <p>g) A petroleum stock at a rate of 1200 bb/hr of sp.gr. 0.8524 is passed through a train of heat exchangers and is allowed to enter directly the radiant section of box type heater at 220°C. The heater is designed to burn 3,500 kg/hr of refinery off gases as fuel. The net heating value of fuel is 47.46x10³ kJ/kg. The radiant section contains 150 m² of projected area of one row of tubes (10.5 cm OD, 12 m long and spaced at 2OD). Estimate the outlet temperature of the petroleum stock. Given: α=0.88, air-fuel ratio=25, avg. sp. heat of stock=2.268 kJ/kg°C.</p>	<p>1+1+1+1+</p> <p>1+7+3=15</p>
2.	2.	<p>a) How catalytic cracking is distinguished from thermal cracking and in which case stable structured compounds are formed?</p> <p>b) Why H₂S is beneficial for naphtha cracking?</p> <p>c) How sulphur affects the coke yield?</p> <p>d) What are the factors affect the FCC operations?</p> <p>e) Briefly explain the viscosity index.</p> <p>f) Briefly describe cracking in riser of the FCC operation and draw the profile of different parameters w.r.to riser height.</p>	<p>1+1+1+1+</p> <p>1+10=15</p>
3.	3.	<p>a) What are the properties of cracking materials?</p> <p>b) What do you mean by catalytic reforming?</p> <p>c) Which type of vis-breaker produces less coke and why?</p> <p>d) What do you mean by coking?</p> <p>e) What are the general methods of petroleum coke production?</p> <p>f) Briefly explain the catalytic reforming operation with diagram.</p>	<p>1+1+1+1+</p> <p>1+10=15</p>

4.	4.	<p>a) What is the difference between hydrodesulphurization and hydrotreatment?</p> <p>b) What are the different tests for gasoline?</p> <p>c) What is delayed coking?</p> <p>d) How octane rating improvement is accomplished?</p> <p>e) Write the properties of cracked fractions.</p> <p>f) Briefly explain the catalytic desulfurization of gasoline with process flow-sheet diagram.</p>	<p>1+1+1+1+</p> <p>1+5=10</p>
5.	5.	<p>a) Why fatty acids are passed overhead to a flash tank for soap production?</p> <p>b) Why dilute glycerine is put through successive beds of anion and action exchange resins?</p> <p>c) What are the design principles for sterile operations?</p> <p>d) What is called slops in ethyl alcohol industry?</p> <p>e) Write the major engineering problems of fermentation?</p> <p>f) Briefly explain the ethyl alcohol production by fermentation with flow sheet diagram.</p>	<p>1+1+1+1+</p> <p>1+10 =15</p>
6.	6.	<p>a) What are the economics of the fermentation industry?</p> <p>b) Why commercial fermentation vessels are usually constructed from stainless steel?</p> <p>c) What is the Corfam in leather industry?</p> <p>d) Briefly describe the manufacture of leather with process flow sheet diagram.</p>	<p>2+2+1+10</p> <p>=15</p>
7.	7.	<p>a) What do you mean by degree of polymerisation?</p> <p>b) What do you mean by vulcanisation?</p> <p>c) Briefly describe the bulk suspension polymerisation and emulsion polymerisation.</p> <p>d) Briefly explain the polyamides and acrylic fibres.</p> <p>e) Briefly explain the polyvinyl chloride synthesis by polymerisation technique?</p>	<p>1+1+3+5+</p> <p>5=15</p>