

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2020

Programme Name: B.Tech(CE+RP)

Semester : VIII

Course Name : Petrochemical Process Technology

Time : 03 hrs

Course Code : CHEG 432

Max. Marks : 100

Nos. of page(s) : 3

Instructions :

SECTION A

10 X 1.5 = 15 Marks

Just enter only the answer to fill into the blanks

S. No.		Marks	CO
Q 1	Styrene is the example for ----- generation petrochemical.	1.5	CO1
Q 2	Mass of bioethanol required is ----- than ethane to form same mass of ethylene.	1.5	CO1
Q 3	Anionic polymerization is used to polymerise monomers containing electron group.	1.5	CO2
Q 4	Ziegler-Natta polymerization gives Polymers.	1.5	CO2
Q 5	H ₂ /CO ratio of syngas is _____ by recycling the CO ₂ present in the product of steam reforming.	1.5	CO3
Q 6	Acrylonitrile is produced from propylene by ----- process.	1.5	CO3
Q 7	Name of the linear phenol-formaldehyde resin is -----	1.5	CO4
Q 8	Polycarbonate is produced by ----- polycondensation.	1.5	CO4
Q 9	Phosphoric acid is produced by the digestion of ----- with sulphuric acid.	1.5	CO5
Q 10	Moving mercury electrode is used in ----- process for the manufacture of caustic soda.	1.5	CO5

SECTION B

10 X 1.5 = 15 Marks

Choose the correct answer

Q 11	Which one of the following process involves separation of aromatics in reformat? (a) Parex (b) Molex (c) Udex (d) Olex	1.5	CO1
Q 12	Manufacturing process for linear alkyl benzene was first commercialized by	1.5	CO1

	(a) UOP. (b) BASF (c) DuPont (d) ICI		
Q 13	Which of the following radical propagation reaction of steam cracking yield olefins? (a) Decomposition (b) Isomerization (c) Addition (d) Substitution	1.5	CO2
Q 14	Which of the following is a cationic initiator for polymerization of isobutylene? (a) Acetyl peroxide (b) n-butyl lithium (c) Sulphuric acid (d) Hydrogen peroxide	1.5	CO2
Q 15	Which of the process of manufacture of monomer methyl methacrylate involves toxic HCN as raw material? (a) Acetone Cyanohydrin (ACH) Route (b) Isobutene Route (c) Alpha Process (d) None	1.5	CO3
Q 16	Which of the following is the reaction that converts n-hexane to benzene? (a) Cyclization (b) isomerization (c) Hydrodecyclization (d) Dehydrocyclization	1.5	CO3
Q 17	Solution Styrene-Butadiene rubber is produced by (a) Cationic polymerization (b) Anionic polymerization (b) Free radical polymerization (d) Ziegler-Natta polymerization	1.5	CO4
Q 18	Which of the following is not an engineering resin? (a) Polycarbonate (b) Polyethylene (c) Nylon – 6 (d) Polyphenylene oxide	1.5	CO4
Q 19	Drivers for refinery integration with petrochemicals production is to achieve (a) Higher margin (b) feedstock and product flexibility (c) low Capex (d) all the three	1.5	CO5
Q 20	Oxidation of ammonia to nitric oxide is catalyzed by (a) Pt-Rh (b) Ni (c) Fe (d) Pt-Re	1.5	CO5
SECTION-C 10 X 1.5 = 15 Marks			
Identify the following statements as TRUE or FALSE			
Q 21	The largest end use of plastics is in packaging sector.	1.5	CO1
Q 22	Recovery of high purity p-xylene from mixture of para and meta xylenes was made highly economical by Molex process.	1.5	CO1
Q 23	In the benzene alkylation, first step is the formation of carbocation by the olefin, which is the alkylating agent.	1.5	CO2
Q 24	Condensation polymerization does not have distinct initiation and termination steps.	1.5	CO2
Q 25	In the manufacture of ammonia H ₂ :N ₂ ratio in the feedstock is 1:3	1.5	CO3

Q 26	Undesirable biuret formation during the manufacture of urea is minimized by decreasing the NH ₃ /CO ₂ ratio of the feedstock.	1.5	CO3							
Q 27	Epoxy resins are cured using amines.	1.5	CO4							
Q 28	Acrylic fiber is produced mainly from acrylonitrile along with co-monomer.	1.5	CO4							
Q 29	Dual process for the manufacture of soda ash uses limestone as the source of CO ₂ .	1.5	CO5							
Q 30	Nylon-6 is a third generation petrochemical derived from benzene.	1.5	CO5							
SECTION D 8 X 5 = 40 Marks Give Short answers										
Q 31	How are petrochemicals classified? Give an example each.	5	CO1							
Q 32	What is living polymerization? Give its important advantage.	5	CO2							
Q 33	Calculate the relative rate (r ₁ /r ₂) of the two following reactions at 800° C; R = 8.319 J/mol K.	5	CO2							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reaction</th> <th style="text-align: center;">A (s⁻¹)</th> <th style="text-align: center;">E (kJ/mole)</th> </tr> </thead> <tbody> <tr> <td>$1 - \dot{C}_3H_7 \rightarrow C_2H_4 + \dot{C}H_3$</td> <td style="text-align: center;">4.0×10^{13}</td> <td style="text-align: center;">136.5 (1)</td> </tr> <tr> <td>$1 - \dot{C}_3H_7 \rightarrow C_3H_6 + \dot{H}$</td> <td style="text-align: center;">2.0×10^{13}</td> <td style="text-align: center;">160.8 (2)</td> </tr> </tbody> </table>				Reaction	A (s ⁻¹)	E (kJ/mole)	$1 - \dot{C}_3H_7 \rightarrow C_2H_4 + \dot{C}H_3$	4.0×10^{13}	136.5 (1)	$1 - \dot{C}_3H_7 \rightarrow C_3H_6 + \dot{H}$
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Q 34	How is phthalic anhydride recovered from product stream using a single unit that combines the condenser and melter?	5	CO3							
Q 35	Name the two unit operations and principle involved that are employed to separate the reformat into aromatics and non-aromatics.	5	CO3							
Q 36	Name the monomers for the production of butyl rubber, its important property and use.	5	CO4							
Q 37	Trace the source of sulphuric acid to petroleum and natural gas.	5	CO5							
Q 38	Give the integration of naphtha to polyethylene terephthalate.	5	CO5							
SECTION E 1 X 15 = 15 Marks Give Detailed Answer										
Q 39	(a) Describe the steps involved in the steam cracking of desulphurized naphtha to olefins.	8	CO3							
	(b) Give the manufacturing steps of PET fiber.	7	CO4							
(Or)										
Q 39	(a) Give an account of manufacture of syngas production by autothermal reforming	8	CO3							
	(b) Describe the manufacturing of teflon.	7	CO4							