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Reg. No. : | | | | | | | | | | | | |

Question Paper Code: R4904

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Fourth Semester

Chemical Engineering

R21UCH404 CHEMICAL PROCESS INDUSTRIES

(Regulations R2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which process is used to treat all types of woods for pulping process? CO1-U

   a) Mechanical pulping b) Neutral-sulfite semi chemical

   c) Kraft process d) Chemical mechanical pulping

2. _____ reduces the strength of pulp yield and is not ideal for the dissolving pulp CO1- U

   a) Terpne b) Hemicellulose c) Lignin d) Microfibrils

3. Which industrial process is widely used for large-scale sulfuric acid production? CO1-U

   a) Haber Process b) Contact Process c) Ostwald Process d) Solvay Process

4. In the Contact Process, which catalyst is used for the oxidation of sulfur dioxide (SO_2) to sulfur trioxide (SO_3)? CO1-U

   a) Iron (Fe) b) Platinum(Pt)

   c) Vanadium oxide(V2 O5) d) Copper oxide (CuO)

5. What is the main purpose of adding gypsum to cement? CO1-U

   a) Compressive strength b) Durability

   c) Water absorption d) Freezing point

6. White cement is most commonly used for: CO1-U

a) Expeller pressing b) Solvent extraction

c) Steam distillation d) Cold pressing

7. Which process is commonly used for the manufacture of white lead? CO1-U

a) Chamber process b) Carter process c) Dutch process d) Haber process

8. In the Dutch process for white lead manufacture, which two gases react with lead to form the pigment? CO1-U

a) CO_2 and O_2 b) CO_2 and H_2S c) NH_2 and SO_2 d) N_2 and O_2

9. What is the main use of liquefied petroleum gas (LPG)? CO1-U

a) Lubrication b) Cooking and heating c) Road construction d) Aviation fuel

10. Which catalyst is commonly used in catalytic cracking? CO1-U

a) Platinum b) Zeolites c) Nickel d) Iron oxide

PART – B (5 x 2= 10 Marks)

11. Difference between mechanical and chemical pulping processes. CO2-App

12. State two uses of sulfur. CO1-U

13. In which type of construction is High Alumina Cement most appropriate? CO3-Ann

14. How does the addition of rare earth elements improve optical glass quality? CO5-Ann

15. How does Nylon-6 differ from Nylon-66 in terms of properties? CO5-Ann

PART – C (5 x 16= 80 Marks)

16. (a) Explain the manufacturing process of wood pulp by Kraft process with a suitable diagram. CO1- U (16)

Or

(b) Explain in detail how raw sugar is produced from sugarcane with a neat process flow diagram. CO1- U (16)

17. (a) Demonstrate the importance of sulfur production and draw a process flow diagram for producing sulfur using the Claus process. CO3-Ann (16)

Or

(b) Compare the solar evaporation method and rock salt mining for sodium chloride production. Discuss their applications. CO3-Ann (16)

18.	(a)	Illustrate the process involved in the production of Portland cement with a neat diagram.	CO2-App	(16)
		Or		
	(b)	Discuss in detail the manufacturing process of soaps and detergents. How do their compositions differ?	CO2-App	(16)
19.	(a)	Explain the various constituents of paints and varnishes and describe their functions in detail.	CO1- U	(16)
		Or		
	(b)	Describe the Direct Process for the production of Zinc Oxide, along with chemical reactions.	CO1- U	(16)
20.	(a)	Discuss the process of catalytic cracking in petroleum refining. How does it help in increasing the yield of gasoline?	CO6-App	(16)
		Or		
	(b)	Discuss the advantages and limitations of using natural fibers in the textile industry. How do they compare to synthetic alternatives?	CO6-App	(16)