Name:	
Enrolment No:	<b>UPES</b>
	UNIVERSITY WITH A PURPOSE

## **UNIVERSITY OF PETROLEUM AND ENERGY STUDIES Online End Semester Examination, May 2021**

Course: Process Technology & Economics Semester: VI Program

B. Tech: CE+RP Time: 03 hrs.

Course Code: CHCE 3032

May Marks: 100

## **Course Code: CHCE 3032** Max. Marks: 100 **SECTION A** 1. All questions are compulsory 2. Each question carries 5 marks 3. Assume suitable and necessary data if required and Justify The Nitrogenous fertilizer with the highest percentage of nitrogen is Q 1 5 **CO1** a. Calcium Nitrate b. Ammonium Sulphate c. Urea d. Ammonium Nitrate The catalyst used in manufacture of sulfuric acid by contact process is 5 Q 2 **CO1** a. Vanadium Pentoxide b. Nickel c. Iron d. Platinum The operating temperature and pressure in Urea Autoclave is Q 3 5 CO<sub>2</sub> a. 550°C and 1000 atm b. 100°C and 1000 atm c. 185°C and 180 atm d. 25°C and 1 atm The feedstock for catalytic reforming unit is 5 Q 4 CO<sub>2</sub> a. Kerosene b. Diesel c. Fuel Oil d. Naptha

Q 5	For most chemical plants the ratio of working capital to total capital investment varies from	5	CO3			
	a. 1 % - 5%					
	b. 50%-60%					
	c. 90%-95%					
	d. 10%-20%					
Q 6	An infinitely lived stream is called a. Perpetuity	5	CO3			
	b. Annuity					
	c. Margin					
	d. Arbitrage					
	SECTION B					
	<ol> <li>All questions are compulsory</li> <li>Each question carries 10 marks</li> <li>Assume suitable and necessary data if required and justify</li> </ol>					
Q 7	Explain different methods for improving the productivity of a chemical plant	10	CO1			
Q 8	Describe the manufacturing process of ethylene oxide with neat flow scheme 10					
Q 9	A heat exchanger has been designed for use in chemical process. A standard type of heat exchanger					
	with a negligible scrap value costs \$4000 and will have a useful life of 6 years. Another proposed heat					
	exchanger of equivalent design capacity costs \$6800 but will have a useful life of 10 years and a scrap					
	value of \$800. Assuming an effective compound interest rate of 8% per annum, determine which heat exchanger is cheaper by comparing capitalized costs					
Q 10	Estimate by the turnover ratio method, the FCI required for a proposed sulfuric acid plant(battery-					
	limit) which has an annual capacity of 1.3 x 10 <sup>8</sup> kg/yr of 100 percent sulfuric acid (Contact I					
	using the given data, when the selling price for the sulfuric acid is \$ 86 per metric ton. The plant will					
	operate 325 days/year. Repeat the calculation, using the cost capacity exponent method by given data					
	Capital cost data for chemical processing:					
	Process/Product Process Size, 10 <sup>3</sup> kg/yr FCI, million \$ Power factor (10 <sup>3</sup> ton/yr)					
	Sulfuric Acid Contact 9 x 10 <sup>4</sup> 4 0.65					

Q 11	The manager in charge is considering the purchase and installation of a new pump that will deliver						
	crude oil at a faster rate than the existing one. The purchase and the installation of the new pump will						
	require an immediate layout of \$15,000. This pump however, will recover the costs by the end of one						
	year. The relevant cash flows is as follows.						
			Y	ear			
		0		1	2		CO
	New Pump	mp -15,000	19	,000	0		
	Old Pump	0	95.	,000	95,000		
	If the oil company requires 10% minimum annual rate of return on money invested, which alternative should be chosen?						
		S	SECTION C				
1.	Answer any one Que	stion					
2.	Each Question carrie	s 20 Marks.					
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3.	<b>Assume Suitable and</b>	necessary data if require	ed and Justify				
				factors that dete	rmine the profitability		
	What does Gross Re	necessary data if requirements finery Margin (GRM) mea		factors that dete	rmine the profitability	10	
				factors that dete	rmine the profitability		
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	What does Gross Re of a refinery.  A refinery will require	finery Margin (GRM) mea	an? Discuss the	. It is estimated th	hat the working capital	10	
	What does Gross Re of a refinery.  A refinery will require will amount to 25%	finery Margin (GRM) mea	an? Discuss the nt of \$10 million d annual depreci	. It is estimated thation costs are e	hat the working capital	10	
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Land & Premises	125,000,000
NPV of Production Plant	150,000,000
Furniture and fixtures(at Present value)	8,000,000
Government Bonds	300,000,000
Mortagage Payable	9,000,000
Pre-paid rent	10,000,000
Long Term Debts	50,000,000
Salary Accruals	50,000,000
Crude in Storage	20,000,000
Materials and Supplies	20,000,000
Reserves for contingencies	100,000,000
Surplus	4,000,000
Stock holders Equity	250,000,000
Earnings Employed in business	125,000,000
Accounts receivable	57,000,000
Gasoline in Storage	25,000,000