UPES
UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination May, 2022

Course	: **Process Technology and Economics**	**Semester**	: **VI**
Program	: **B. Tech.: CE+RP**	**Time**	: **03 hrs.**
Course Code: CHCE 3032		**Max. Marks : 100**	

Instructions:
- All Questions are Compulsory
- Assume Suitable and necessary data if required and Justify

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
1.	Neatly sketch the symbol for cyclone and write down about the data to be included for this equipment on the process flowsheets	4	CO1
2.	Write the properties and uses of Ammonia	4	CO2
3.	What are the different types of estimates?	4	CO3
4.	In 10 years, it is estimated that ₹ 144,860 will be required to purchase several cooling towers. Interest available at the bank is 8% compounded annually. Calculate the annual annuity payment that will amount to the given fund after 10 years of deposit	4	CO4
5.	Name the methods used for evaluating the Profitability.	4	CO4

SECTION B
(4Qx10M= 40 Marks)

6.	Explain general principles applied in studying a process industry	10	CO1
7.	Describe the manufacturing process of methanol with neat flow scheme	10	CO2
8.	The annual variable production costs for a plant operating at 75 percent capacity are ₹250,000. The sum of the annual fixed charges, overhead costs, and general expenses is ₹180,000, and may be considered not to change with production rate. The total annual sales are ₹540,000, and the product sells for ₹5/kg. What is the breakeven point in kilograms of product per year? What are the gross annual profit (depreciation included) and net annual profit for this plant at 100 percent capacity if the income tax rate is 30 percent of gross profit?	10	CO3
9.	An existing plant has been operating in such a way that a large amount of heat is being lost in waste gases. It has been proposed to save money by recovering heat	10	CO4

now being lost. Four different heat exchangers have been designed to recover the heat and all prices. Saving has been calculated for each of the design is given in the following table. The plant manager wants at least 16% annual return on initial investment. Which one of the four designs should recommend to the plant manager?

Item	Design I	Design II	Design III	Design IV
Initial Installed cost (₹)	2,50,000	4,00,000	5,00,000	6,50,000
Operating Cost, (₹)	7,500	7,500	7,500	7,500
Fixed Charges, % of initial cost per year	10%	10%	10%	10%
Value of heat saved (₹/Year)	1,00,000	1,40,000	1,60,000	2,00,000

SECTION-C
(2Qx20M=40 Marks)

10.	The total capital investment for a proposed petro chemical plant which will produce ₹ 1,500,000 worth of goods per year is estimated to be ₹ 1 million. It will be necessary to do a considerable amount of research and development work on the project before the final plant can be constructed, and management wishes to estimate the permissible research and development costs. It has been decided that the net profits from the plant should be sufficient to pay off the total capital investment plus all research and development costs in 7 years. A return after taxes of at least 12 percent of sales must be obtained, and 34 percent of the research and development cost is tax-free (i.e., income tax rate for the company is 35 percent of the gross earnings and only 65 percent of the funds spent on R&D must be recovered after taxes are paid). Under these conditions, what is the total amount the company can afford to pay for research and development?	20	CO3
11.	a. Explain in detail the uses and limitations of Financial Ratios.	10+10	CO4

b. The following information applies to a company on given date. Determine current ratio, cash ratio and working capital for the company at the given date

Long Term debts	₹1,600
Debts due within 1 year	₹1,000
Accounts payable	₹2,300
Machinery and equipment (at cost)	₹10,000
Cash in Bank	₹3,100
Prepaid rent	₹300
Government Bonds	₹3,000
Social Security taxes payable	₹240
Reserve for depreciation	₹600
Reserve for expansion	₹1,200
Inventory	₹1,600
Accounts Receivable	₹1,700

END