

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2019

Programme Name: B.Tech: CE+RP

Semester : VII

Course Name : Chemical Project Economics

Time : 03 hrs

Course Code : CHEG 452

Max. Marks : 100

Nos. of page(s) : 03

Instructions: Assume Suitable and necessary data if required and Justify

SECTION A

Answer ***all*** the questions

S. No.		Marks	CO
Q 1	What are the various types of process flow sheets?	5	CO5
Q 2	How a Z-score for a firm is determined?	5	CO4
Q 3	Name the distinct parts of financial report	5	CO4
Q 4	Neatly sketch the symbol for the autoclave and write down about the data to be included for this equipment on the process flowsheets.	5	CO5

SECTION B

Answer ***all*** the questions

Q 5	Describe in detail the importance of PFD and P&ID in understanding economics of the plant	10	CO5												
Q 6	Explain the outline of accounting procedure for business transactions, and discuss the importance of double-entry book-keeping	10	CO4												
Q 7	A company has three proposals for expanding its business operations. The details are as follows: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Alternative</th> <th>Initial Cost (\$)</th> <th>Annual Revenue(\$)</th> <th>Life (years)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">25×10^5</td> <td style="text-align: center;">8×10^5</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">20×10^5</td> <td style="text-align: center;">6×10^5</td> <td style="text-align: center;">10</td> </tr> </tbody> </table>	Alternative	Initial Cost (\$)	Annual Revenue(\$)	Life (years)	1	25×10^5	8×10^5	10	2	20×10^5	6×10^5	10	10	CO1
Alternative	Initial Cost (\$)	Annual Revenue(\$)	Life (years)												
1	25×10^5	8×10^5	10												
2	20×10^5	6×10^5	10												

	3	30×10^5	10×10^5	10		
	<p>Each alternative has insignificant salvage value at the end of its life. Assuming an interest rate of 15%, compounded annually, find the best alternative for expanding the business operations of the company using the annual equivalent method.</p>					
Q 8	<p>A reactor of special design is the major item of equipment in a small chemical plant. The initial cost of the completely installed reactor is Rs. 60,000 and the salvage value at the end of the useful life is estimated to be Rs.10,000. Excluding depreciation costs the total annual expenses for the plant are Rs.100,000. How many years of useful life should be estimated for the reactor if 12 percent of the total annual expenses for the plant are due to the cost for reactor depreciation? The straight line method for determining depreciation should be used.</p> <p style="text-align: center;">OR</p> <p>A company has an initial worth of Rs. 50 lakh, and an estimated salvage value of Rs. 2 lakhs in a service life of 8 years.</p> <p>a. Given a choice between the straight line and declining-balance methods of depreciation. Which method would you recommend to save tax and why?</p> <p>b. Estimate the book value of the plant at the end of 4 years for each of the two methods of depreciation and also by sinking fund method by considering, $i = 12\%$</p>				10	CO2
<p>SECTION-C</p> <p>Note: <i>Q(9) Compulsory & Q(10) Internal Choice</i></p>						
Q 9	<p>The salt content of a middle-eastern crude oil (API gravity 24.2) was found to be 60 PTB(pounds per thousand barrels). In order to ship and market this oil, it is necessary to install a desalting unit in the field, which will reduce the salt content to 15 PTB. This upgrading in the quality of oil-in terms of an acceptable PTB-could realize a possible saving of 0.1 \$/bbl in the shipping cost of the oil. Assume the following: The crude oil desalter has a design capacity of 120,000 bbl/day. The current capital investment of the desalting unit is estimated to be \$ 3.0 million plus another \$2.0 million for storage tanks and other facilities. Service life of equipment is 10 years with negligible salvage value, while the operating factor = 0.95. The total operating expenses of the desalter are estimated to be \$10/1,000 bbl. The annual maintenance expenses are 10% of the total capital investment. Evaluate the economic merits of the desalter .</p>				20	CO4

Q 10	<p>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?</p> <p style="text-align: center;">OR</p> <p>The purchased equipment cost for a plant (Solid-fluid processing plant) which produces 'X' is \$ 300,000. The plant is to be an addition to an existing plant. The major part of the building cost will be for indoor construction. The contractor's fee will be 7 percent of the direct plant cost. All other costs are close to the average values found for typical chemical plants. On the basis of this information, estimate the total direct plant cost, the fixed-capital investment and the total capital investment.(Use attached data sheet)</p>	20	CO3

END

Data For Question (10)

Ratio factors for estimating capital-investment items based on delivered-equipment cost

Values presented are applicable for major process plant additions to an existing site where the necessary land is available through purchase or present ownership The values are based on FCI ranging from under \$ 1 million to over \$ 20 million

Item	% of Delivered Equipment cost
	Solid- Fluid Processing plant
<u>Direct Costs</u>	
Purchased Equipment-delivered(Including Fabricated equipment and process machinery)	100
Purchased equipment Installation	39
Instrumentation and controls(Installed)	26
Piping (installed)	31
Electrical (installed)	10
Yard Improvements	12
Service facilities (installed)	55
Land (If purchase is required)	6
<u>Indirect Costs</u>	
Engineering & Supervision	32
Construction Expenses	34
Legal Expenses	4
Contingency	37

***Buildings (Including services)** cost is considered as 18 % of FCI values for **Direct cost** segments for multipurpose plants or large additions to existing facilities