

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April 2018

Course: CHEG452 – Chemical Project Economics
Program: B. Tech Chemical Engineering (RPC)
Time: 03 hrs.

Semester: VIII
Max. Marks: 100

Instructions: 1. Kindly attempt the paper section wise. 2. Assume suitable data wherever necessary.
3. The notations used here have the usual meanings.

SECTION A (4 x 5 = 20)
Attempt *all* the questions.

S. No.		Marks	CO
Q 1	Discuss in brief about the activity ratio.	05	CO3
Q 2	A company wants to set up a reserve which will help it to have an annual equivalent amount of Rs. 10,00,000 for the next 20 years towards its employees welfare measures. The reserve is assumed to grow at the rate of 15% annually. Find the single-payment that must be made now as the reserve amount.	05	CO1
Q 3	Explain about the payback period method of profitability evaluation.	05	CO4
Q 4	Estimate the fixed capital investment for a 1500 ton/day ammonia plant using the turnover ratio of 0.65. The current gross selling price of ammonia is \$150/ton. The plant will operate at a 95% stream time.	05	CO2

SECTION B (4 x 15 = 60)
Attempt *all* the questions.

Q 5	<p>A pharmaceutical company is planning to purchase a batch mixer. There are two alternatives available. The cash flow details of alternatives are as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Description</th> <th>Mixer - 1</th> <th>Mixer - 2</th> </tr> </thead> <tbody> <tr> <td>Initial purchase cost (Rs.)</td> <td>3,00,000</td> <td>2,00,000</td> </tr> <tr> <td>Annual operating maintenance cost (Rs.)</td> <td>20,000</td> <td>35,000</td> </tr> <tr> <td>Salvage value (Rs.)</td> <td>1,25,000</td> <td>70,000</td> </tr> <tr> <td>Useful life (Years)</td> <td>5</td> <td>5</td> </tr> </tbody> </table> <p>Using present worth method, find out which alternative should be selected, if the rate of interest is 10% per year.</p>	Description	Mixer - 1	Mixer - 2	Initial purchase cost (Rs.)	3,00,000	2,00,000	Annual operating maintenance cost (Rs.)	20,000	35,000	Salvage value (Rs.)	1,25,000	70,000	Useful life (Years)	5	5	15	CO1
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Useful life (Years)	5	5																
Q 6	Explain in detail about the cost factors considered in the estimation of total product cost.	15	CO2															
Q 7	Prepare a balance sheet for KDP Pvt. Ltd. from the following ledger balances as on 31 st March 2018. Find out the current ratio and cash ratio.	15	CO3															

	Particulars	Rs.	Particulars	Rs.
	Cash	1,20,000	Accounts receivable	6,00,000
	Inventory	8,00,000	Prepaid expenses	30,000
	8% Debentures in APCO Ltd,	4,50,000	Mortgage loan	3,00,000
	Accounts payable	6,70,000	Preferred stock	2,00,000
	Notes payable	30,000	Common stock	6,00,000
	Retained earnings	8,00,000	Additional paid-in capital	1,00,000
	Plant & machinery	12,00,000	Land	4,00,000

Q 8	Discuss in detail about the process flow diagram and piping and instrumentation diagram. How these diagrams are useful in the preparation of bill of materials.	15	CO5
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SECTION-C (1 x 20 = 20)
Attempt any one question.

Q 9	<p>i) A materials-testing machine was purchased for \$20,000 and was to be used for 5 years with an expected residual salvage value of \$5000. Plot a graph between life period in use and year-end book values obtained by using: (a) Straight-line depreciation and (b) Sum-of-digits depreciation.</p> <p>ii) Explain in brief about the following: (a) Rate of return on investment (b) Capitalized cost profitability</p>	10	CO2
		10	CO4

Q 10	<p>A heat exchanger has been designed and insulation is being considered for the unit. The insulation can be obtained in thicknesses of 0.025, 0.051, 0.076, or 0.102 m. The following data have been determined for the different insulation thicknesses.</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Details</th> <th>0.025 m</th> <th>0.051 m</th> <th>0.076 m</th> <th>0.102 m</th> </tr> </thead> <tbody> <tr> <td>kJ/s energy saved</td> <td>88</td> <td>102</td> <td>108</td> <td>111</td> </tr> <tr> <td>Cost for installed insulation (Rs.)</td> <td>5,60,000</td> <td>7,07,000</td> <td>7,77,000</td> <td>8,05,000</td> </tr> <tr> <td>Annual fixed charges, % of installed cost</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> </tr> </tbody> </table> <p>What thickness of insulation should be used? The value of heat is Rs. 105/GJ. An annual after-tax return of 15 percent on the fixed-capital investment is required for</p>	Details	0.025 m	0.051 m	0.076 m	0.102 m	kJ/s energy saved	88	102	108	111	Cost for installed insulation (Rs.)	5,60,000	7,07,000	7,77,000	8,05,000	Annual fixed charges, % of installed cost	10	10	10	10	20	CO4
Details	0.025 m	0.051 m	0.076 m	0.102 m																			
kJ/s energy saved	88	102	108	111																			
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Annual fixed charges, % of installed cost	10	10	10	10																			

	any capital utilized in this type of investment. The exchanger operates for 300 days/yr.		