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**UNIVERSITY OF PETROLEUM  
AND ENERGY STUDIES**



**End Semester Examination – April 2017**

**Program/course: B. Tech CE + RPC**  
**Subject: Chemical Project Economics**  
**Code : CHEG452**  
**No. of page/s: 04**

**Semester – VIII**  
**Max. Marks : 100**  
**Duration : 3 Hrs**

\*The question paper consists of three sections. Answer the questions section wise in the answer booklet.

**Note: Assume suitable data wherever necessary. The notations used here have the usual meanings.**

**SECTION – A (Total Marks: 4 x 5 = 20)**

➤ Attempt ***all*** the questions. All questions carry equal marks.

- Q.1** What is the cost index? State its significance. [05]  
**Q.2** Explain in short about the process flow diagram. [05]  
**Q.3** Write in brief about the liquidity ratio and leverage ratio. [05]  
**Q.4** Distinguish between the preferred and common stockholders. [05]

**SECTION – B (Total Marks: 5 x 12 = 60)**

- Q.5** You have accumulated Rs. 50,000 in credit card debt. The credit card company charges 3.25% interest rate compounded monthly. You can only afford to pay Rs. 5000 per month. How many months will it take you to pay off the debt and how much money will you have paid in interest? If you want to clear the debt in 4 months at a levied interest rate, what will be the amount of money paid monthly? [12]
- Q.6** Explain in detail about the sources of funding for the capital investment. [12]

**Q.7** The initial cost of a piece of construction equipment is Rs.3500000. It has useful life of 10 years. The estimated salvage value of the equipment at the end of useful life is Rs.500000. Calculate the annual depreciation and book value of the construction equipment using sinking fund method. The interest rate is 8% per year.

[12]

**Q.8** A food company is planning to invest for the purchase of a packaging equipment, which will be used for packaging the food items. There are four feasible alternatives and the detailed cash flows of all the alternatives are presented in Table 1. Each alternative has the useful life of 8 years. If the company's MARR is 12% per year, select the best alternative using the incremental investment rate of return analysis. [12]

Table 1: Cash flow of alternatives

Alternative	P1	P2	P3	P4
Cash Flow				
Initial investment (Rs.)	2400000	3400000	2700000	3200000
Annual Profit (after deducting expenditures) (Rs.)	415000	680000	525000	640000
Salvage value (Rs.)	590000	990000	710000	860000

**OR**

**Q.8** There are two alternatives for a water supply project in a city. The details of cash flow of the alternatives are shown in Table 2.

Table 2: Cash flow of alternatives

Alternative	W1	W2
Cash Flow		
Initial cost (Rs.)	20000000	26000000
Annual operating cost (Rs.)	1600000	1200000
Cost of renovation (Rs.)	2500000 at the end of every 17 years	3500000 at the end of every 20 years
One time upgrading cost (Rs.)	3200000 at the end of 22 year	--

Compare the alternatives based on capitalized cost and find out the economical alternative if the rate of interest is 9% per year [12]

**Q.9** Prepare a balance sheet for KDP Foods Ltd. from the following ledger balances as on 31<sup>st</sup> March 2017. Find out the current ratio and cash ratio. **[12]**

Particulars	Rs.	Particulars	Rs.
Office Equipment	4,80,600	Cash Credit	75,000
General Reserve	4,15,000	Computer Software	83,250
9% Debentures in APCO Ltd,	2,45,000	Mortgage loan	3,10,000
Payable for Goods	1,68,500	Receivables for goods	1,90,000
Payable for expenses	36,000	8% Preference share capital	5,20,000
Loose Tools	1,63,000	Cash at Bank	23,000
Plant & machinery	18,00,000	Equity Share Capital	15,00,000
Stores & Spares	1,00,200	Staff Welfare Fund	85,000
Interest accrued on investment	51,000	Provision for Taxation	26,550

**SECTION – C (Total Marks: 1 x 20 = 20)**

**Q.10 a)** Draw the neat symbols of the following equipment and write down about the data included for the equipment on the process flowsheets.

**[10]**

- i) Centrifugal Pump
- ii) Kettle reboiler
- iii) Distillation column
- iv) Internal floating roof tank

**b)** Explain in detail about the types of capital cost estimates. **[10]**

**OR**

**Q.10** 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. Based on the information, estimate the cost of every item of direct and indirect plant cost, the fixed-capital investment and the total capital investment based on WCI/TCI = 20%. **[20]**

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
<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

