VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.: 22BCM0087

NAME OF THE SCHOOL
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT:C1+TC1+TCC1

Programme Name & Branch : B.Tech Chemical Engineering
Course Code and Course Name : BCHE304L Chemical Process Technology and Economics
Faculty Name(s) : Dr. M. Aslam Abdullah
Class Number(s) : VL2024250103259
Date of Examination : 15th Oct, 2024
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- Use Graph sheet wherever necessary
- Data Book/ Data Sheets are allowed
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- **Course Outcomes**
    1. **CO5:** Understand the economic evaluation concepts as applied in the Chemical Process Industries.

<table>
<tr><th>Q. No</th><th>Question</th><th>M</th><th>CO</th><th>BL</th></tr>
<tr><td>1.</td><td>The purchased price of glass–lined vessels with agitator, baffle, and thermwell is as follows:
<table>
<tr><th>Capacity, gal</th><th>Purchased price FOB factory, $</th></tr>
<tr><td>500</td><td>55,300</td></tr>
<tr><td>750</td><td>60,400</td></tr>
<tr><td>1000</td><td>66,900</td></tr>
<tr><td>1500</td><td>76,800</td></tr>
<tr><td>2000</td><td>85,300</td></tr>
<tr><td>3000</td><td>109,500</td></tr>
</table>
a. Construct a graph of the purchased price as a function of capacity on a logarithmic plot.
b. Determine whether the six-tenths rule applies.
c. Derive an equation of purchased price as a function of vessel size.</td><td>10</td><td>5</td><td>3</td></tr>
<tr><td>2.</td><td>A small fluids-processing unit is to be constructed adjacent to a large operating unit in a multiproduct chemical plant. The current purchased equipment costs, FOB the vendor's factory, are:
<table>
<tr><th>Equipment</th><th>Number required</th><th>Total Purchased price, $</th></tr>
<tr><td>Tower and internals</td><td>1</td><td>375,000</td></tr>
<tr><td>Accumulators</td><td>2</td><td>182,000</td></tr>
</table></td><td>10</td><td>5</td><td>3</td></tr>
</table>

Accumulated depreciation of intangible assets	950		Accumulated depreciation of tangible fixed assets	1,000
Customers advances	100		Computers	2,000
Furniture	5,200		Short-term deposits and guarantees given	500
Receivable (income tax refund)	50		Salary payable	20
Short-term debt	2,000		Capital stock	21,000
Cash	1,335		Adjustments in value of cost of sale	50
Long-term debt with credit institutions	2,000		Accounts receivable	200
Constructions	5,000		Constructions in progress	300
Impairment of inventories	100			

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Receivers	3	450,000
Heat exchangers	6	726,000
Pumps and motors	5	200,000
Miscellaneous		160,000

If the delivery charges are 5% of the purchased price, estimate the fixed capital investment, using the Wroth methods.

3. A couple takes out a $75,000 mortgage on a house at 8% interest compounded monthly and agrees to pay it off in 20 years with monthly payments. How much are the monthly payments? How much will be left to pay off after the 100th payment? 10 5 3

4. A refinery is planning the addition of a small dewaxing unit. It is estimated that the fixed capital investment is $63MM. Prepare a depreciation schedule using the MACRS method with half-year convention. What is the book value at the end of the fourth year? 10 5 3

5. Prepare a Balance Sheet for the XYZ Co., for the year ending 31st December 2017 for the following details. All values are in $(000s) 10 5 3

Long-term holdings in equity	2,500	capital receivable	5,000
Prior years' negative income	300	Accounts payable for goods	50
Income for the year	1,925	Legal reserve	1,600
Vehicles	4,000	Payable to public authorities	220
Other owners' contributions	200	Intellectual property	4,000
Interest receivable	50	Expenses paid in advance	270
Inventories	1,000	Short-term credit from tangible fixed assets	500
Shares in the entity	1,000	Capital grants	1,500
Interest payable	10	Provisions for environmental actions	500