

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: BTECH
BRANCH: CHEMICAL ENGINEERING

SEMESTER: V
SESSION: MO/2024

SUBJECT: CL327 PROJECT ENGINEERING AND ECONOMICS

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates.

		CO	BL
Q.1(a)	Explain TURNOVER RATIOS with respect to quick estimation of fixed-capital investment. [2]	1	2
Q.1(b)	The purchased cost of a shell-and-tube heat exchanger (floating-head and carbon-steel tubes) with 10 m ² of heating surface was \$4200 in 1990. What will be the cost of a similar heat exchanger with 100 m ² of heating surface in 2000 if the capacity exponent is 0.60 for surface areas ranging from 10 to 40 m ² and 0.81 for surface areas ranging from 40 to 200 m ² ? Use the annual Marshall and Swift equipment-cost index (all industry) to update the cost of the heat exchanger. Index in 1990: 929 and index in 2000: 1097. [3]	1	3
Q.2(a)	An original loan of \$2000 was made at 6 percent simple interest per year for 4 years. At the end of 4 years, no interest had been paid and the loan was extended for another 6 more years at a new compound-interest rate of 8 percent per year. What is the total amount owed at the end of the 10 years if no intermediate payments are made? [2]	2	3
Q.2(b)	For the case of a nominal annual interest rate 20 percent, determine: (a) The total amount to which one dollar of initial principal would accumulate after 365-days with daily compounding. (b) The total amount to which one dollar of initial principal would accumulate after one year with continuous compounding. (c) The effective annual interest rate if compounding is continuous. [3]	2	3
Q.3(a)	Explain the following terms: (1) Present worth, and (2) Perpetuities. [2]	2	2
Q.3(b)	A new piece of completely installed equipment costs \$12000 and will have a scrap value of \$2000 at the end of the useful life. If the useful life period is 10 years and the interest compounded is 6 percent per year, what is the capitalized cost of the equipment? [3]	2	3
Q.4(a)	The annual direct production costs for a plant operating at 70 percent capacity are \$2,80,000 while the sum of the annual fixed charges, overhead costs and general expenses is \$2,00,000. What is the breakeven point in units of production per year if total annual sales are \$5,60,000 and the product sells at \$40 per unit? [2]	2	3
Q.4(b)	A plant produces phenol. The variable cost in Rs./ton of the phenol is 45000+5P where P is the plant capacity in ton/day. The fixed charges are Rs. 1,00,000 per day. The selling price of phenol is Rs. 50,000 per ton. Estimate the break-even capacity in ton/day. [3]	2	3
Q.5(a)	Define the following terms: (1) Salvage value, (2) Book value [2]	3	2
Q.5(b)	The original value of a piece of equipment is \$22,000, completely installed and ready for use. Its salvage value is estimated to be \$2000 at the end of service life, estimated to be 10 years. Determine the asset (or book) value at the end of 5 years using: (a) straight line method, and (b) Textbook declining balance method. [3]	3	3

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