

**B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING FOURTH YEAR FIRST SEMESTER
SUPPLEMENTARY EXAM 2025**

Subject- PROJECT PLANNING, LAYOUT AND ECONOMICS

Time : Three hours

Full Marks : 100

(50 Marks for each Part)
Use separate answer scripts for each Part

PART I (50 Marks)

Answer Question no 4 and any two from the following

1. What is the most common application of a pilot plant? What are the different factors that influence the layout? Define any five important terms of engineering economy? $7+8+5=20$
2. How can you establish a mathematical structure or model to predict the result of various managerial choices explain with an example. If you want to set a dairy industry, where should you established it in West Bengal? -Explain. $12+8=20$
3. What are the objectives and advantage of plant layout? What are the different basic types of layout are there, give two example? Draw a symbol used for the following operation in food industry-
Rotary dryer, condenser, Rotary pump, Reboiler, Air cooler with finned tube. $7+8+5=20$
4. Draw a layout (not in scale) of a milk processing plant dealing with only liquid milk. Major Plant functions are cream separation, homogenizing, pasteurization and packaging etc. 10

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B. FTBE 4th YEAR 1st SEMESTER EXAMINATION 2025

PROJECT PLANNING LAYOUT & ECONOMICS

PART-II (50Marks)

Answer any Four (4) Questions. All questions carry equal marks (12.5 × 4 = 50)

1. Discuss the different methods of estimation for simple interest, compound interest, and continuous interest and show which interest method is more profitable for industries.
2. What are the different types of Depreciation commonly used in industrial investment process? Show in details the methods of calculations.
3. Discuss the terms Annuity and Perpetuity. How these are estimated to forecast the investment policy?
4. How does Break Even Point influence the criteria of a plant production system? Explain with a suitable example.
5. a) Following information relates to a fixed asset:

Original cost of the asset: Rs 8000000

Scrap value at the end of service life: Rs 80000

The asset value at the end of the third year: Rs 3580000

Calculate using the sum of the years digit method,

- I) the service life of the asset, and
- II) depreciation over the useful life of the asset.

- b) Determine the relation among the following terms:

K = Capitalized costs,

Cv = Original cost of the equipment,

CR = Replacement value after n = years of service life,

and i = Nominal interest rate compounding annually,

6. A biscuit manufacturing plant produces biscuit boxes at the rate of M units per day. The variable costs per box have been found to be $\text{Rs. } 98.56 + 0.1P^{1.2}$. The total daily fixed charges are Rs. 4750, and all other expenses are constant at Rs.9867 per day. If the selling price per box is Rs 237. Determine

- The daily profit at a production schedule giving the minimum cost per box,
- The daily profit at a production schedule giving the maximum daily profit,
- The production schedule at the break even point.

7. An existing plant has been operating in such a way that a large amount of heat is being lost in the waste gases. It has been proposed to save money by recovering the heat that is now being lost. Four different heat exchangers have been designed to recover the heat, and all prices, costs, and savings have been calculated for each of the designs. The results calculations are presented in the following :

Design	No1	No2	No3	No4
Total initial installed cost:	20000	32000	40000	52000
Operating cost:	200	200	200	200
Fixed charges % of initial cost per yr	30	30	30	30
Value of heat per year	8200	1200	1380	1770

The company in charge of the plant demands at least a 20% annual return based on the initial investment for any unnecessary investment. Only one of the four designs can be accepted. Neglecting effects of taxes and time value of money, which of the four designs should be recommended?

8. How would you apply the linear programming method for determining the optimum cost of a blended fruit juice product derived from three basic ingredients --- Apple juice of Rs98 per Kg, Guava juice of Rs 57 per kg, and water without any cost. The blended product should be the minimum quantity of 80% Apple juice and the water may be of any quantity. Assume any other data if it fits with your requirements for calculation.