53 (FPT 801) PDPE

2014

PLANT DESIGN AND PROJECT ENGINEERING

Paper : FPT 801

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Mention the various stages involved in designing a plant. 3

(b) What are the importance of a flow-chart in a Food Processing Plant ? 4

(c) Explain with example the commonly used flow-charts in Food Processing Plants. 10

(d) Write short notes on the hierarchy of chemical process design. 3

2. *(a)* Explain why plant location decisions are important to the organisation. 4

(b) Discuss the different factors that influence the location of a plant. 10

(c) Explain the advantages and dis-advantages of urban area and rural area plant locations. 6

3. *(a)* Define plant layout. What are the objectives of a good plant layout ? 2+3=5

(b) What do you mean by process layout and product layout ? Write their advantages. 4+4=8

(c) What are the various material flow patterns ? Explain with a diagram for each. 5

(d) Mention the advantages of good plant layout. 2

4. *(a)* Arrange the work-centres of the following Relationship chart into a suitable (2×3) grid. 5

(b) Balagaon Food Processing Ltd. manufactures three products P, Q and R using the same manufacturing facilities arranged in six

departments A, B, C, D, E and F. The material handling is done by a forklift. The containers can carry 300, 500 and 600 pieces of the products P, Q, and 'R' respectively. The annual demand for each product is 1200 units. Sequence of operations of product movement is given below :

Product	Movement
P	$A \rightarrow F \rightarrow B \rightarrow D \rightarrow C \rightarrow F$
Q	$A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$
R	$C \rightarrow B \rightarrow A \rightarrow E \rightarrow D \rightarrow F$

Construct the travel chart. 10

(c) Define the following terms :

(i) Fixed Capital Investment

(ii) Working Capital Investment

(iii) Cash flow. 5

5. (a) Define 'Simple Payback Period' and 'Return on Investment'. 2+2=4

(b) The NPV of a Food Processing Equipment is Rs. 2,00,000 and interest on discount rate is 10%. Calculate the future value of the cash flow at the end of 2·5 years. 2

(c) The initial investment and net cash flows for two project proposals A and B are given in the table below :

Proposals	End of years				
	0	1	2	3	4
A	10,000	3,000	3,000	7,000	7,000
B	10,000	6,000	6,000	3,000	3,000

Select the project based on NPV assuming the discount factor of 15%. 8

(d) What are the Benefit Cost Ratio (BCR) and Net Benefit Cost Ratio (NBCR) ? 2

(e) Determine the BCR and NBCR of the following project investment : 4

Initial investment Rs. 1,00,000, cost of capital is 12%

Year	1	2	3	4
Benefits	25,000	40,000	40,000	50,000

6. (a) What are the cost of production ? Distinguish between the fixed cost and variable cost. 3+4=7

(b) Explain Break-Even-point with chart. 5

(c) ABC company plans to sell an article at a local market. The articles are purchased at Rs. 5 on the condition that all unsold articles shall be returned. The rent for the space is Rs. 2000. The articles will be sold at Rs. 9. Determine the number of articles which must be sold —

(i) to break-even

(ii) to earn Rs. 400 as profit

(iii) calculate margin of safety and profit if the company sells 750 articles. 8

7. Write short note on ***any four*** of the following : 4×5=20

(a) Relationship chart (REL)

(b) Depreciation

(c) Time value of money

(d) Systematic Layout Planning (SLP)

(e) Batch *versus* continuous processes.

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