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. Write the situations that arise to design a plant. 3+3=6

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

   (c) Write short notes on the hierarchy of chemical process design. 4

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

   (b) What are the factors that influence the plant layout ? 3

(c) Differentiate between the process layout and product layout. What is the significance of group layout ? 5+2=7

(d) Explain about the use of Travel-Chart in the development of plant layout. 5

3. (a) When does a plant location decision arise ? Discuss the different factors that influence the location of a plant. 4+10=14

(b) What do you understand by systematic layout planning (SLP) ? 6

4. (a) A company 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, 400 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

(b) What do you mean by Total Capital Investment ? Define the term "Fixed Capital Investment" and "Working Capital". 2+2=4

(c) Distinguish between the "profit before taxes" and "profit after taxes". Explain the term 'cash flow'. 3+3=6

5. (a) How will you define "Return on Investment" and "Internal Rate of Return" of a project ? 5

(b) Calculate the net present value for the following cash flow of a cold storage project. Consider cost of capital as 25%

Year	0	1	2	3	4
Cash flow (in Rupees)	1,00,00,000	30,00,000	30,00,000	3,50,000	40,00,000

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(c) Calculate the internal rate of return for the following cash flow of a project using trial and error method. (Hints : start the value of '*k*' from 8% to 11%). 10

Investment	*Rs.* (1,000,000)
Saving in year	*Cash flow*
1	200,000
2	200,000
3	300,000
4	300,000
5	350,000

6. *(a)* What is 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 —

(a) To break-even

(b) To earn Rs. 400 as profit

(c) Calculate margin of safety and profit if the company sells 750 articles. 8

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

(a) Batch versus continuous processes

(b) Time value of money

(c) Depreciation

(d) Manufacturing Fixed Capital and Non-Manufacturing Fixed Capital Investments.

(e) Prevention of contamination for Food Plant Design.
