Total number of printed pages: 02

UG/8th Semester/UFET801

2024

PLANT DESIGN AND PROJECT ENGINEERING

Full Marks: 100

Time: Three hours

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

*Answer **any five** questions.*

<table>
<tr><td rowspan="3">1.</td><td>a)</td><td>(a) Following is a break-even chart for two potential locations for a business venture.

<table><tr><td>Location</td><td>Fixed cost (Rs.)</td><td>Variable cost per tonne (Rs.)</td><td>Price of product per tonne (Rs.)</td></tr><tr><td>Bongaigaon (S1)</td><td>50,00,000</td><td>40,000</td><td>65,000</td></tr><tr><td>Kokrajhar (S2)</td><td>57,00,000</td><td>35,000</td><td>65,000</td></tr></table>
What are the break-even product sales volumes (in tonnes) for the two sites? Also, if the expected sales volume for the proposed manufacturing line is 100 tonnes in 6 months, what will be profit / loss for the manufacturing line at the two locations after 1 year?</td><td>8</td></tr>
<tr><td>b)</td><td>Elaborate on “product description” and “description of the market” necessary for feasibility study.</td><td>2+4</td></tr>
<tr><td>c)</td><td>Describe the five major flow patterns to draw / represent a process flow.</td><td>6</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="3">2.</td><td>a)</td><td>During decision making for a location analysis, a company gives weightage of 4 to human resource (F1), weightage of 2.5 to community attitude (F2), weightage of 2 to availability of power (F3), and weightage of 2 to availability of portable water. The ratings (on a 0 – 10 scale) for the three potential locations on these factors are given in the following table. Prepare a decision matrix / table, and give your decision on choice of location.

<table><tr><td rowspan="2">Factor</td><td colspan="3">Potential locations</td></tr><tr><td>S1</td><td>S2</td><td>S3</td></tr><tr><td>F1</td><td>4</td><td>7</td><td>5</td></tr><tr><td>F2</td><td>4</td><td>6</td><td>8</td></tr><tr><td>F3</td><td>6</td><td>2</td><td>4</td></tr><tr><td>F3</td><td>5</td><td>3</td><td>7</td></tr></table></td><td>8</td></tr>
<tr><td>b)</td><td>After technical analyses of a potential business venture, briefly describe any six (6) major points that need to be included in the technical analysis report.</td><td>6</td></tr>
<tr><td>c)</td><td>Enlist six (6) major objectives of plant layout.</td><td>6</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="2">3.</td><td>a)</td><td>In the feasibility study of a business idea, briefly mention five major areas of study to effectively identify of customers’ / consumers’ needs. Enlist the five questions, on the basis of which preliminary screening / elimination of potential business ideas can be carried out</td><td>5+5</td></tr>
<tr><td>b)</td><td>Define the term – Depreciation. Explain the methods for the calculation of</td><td>10</td></tr>
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<table>
<tr><td></td><td></td><td>depreciation with suitable example (take the rate of depreciation @ 10 percent).</td><td></td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="2">4.</td><td>a)</td><td>Discuss about the various properties of materials which must be considered during the manufacturing process of food process equipments.</td><td>10</td></tr>
<tr><td>b)</td><td>Explain in detail about the working principle of any one of the following conveyors with proper schematic diagram.
(i). Belt conveyor
(ii). Pneumatic conveyor
(iii). Chain conveyor</td><td>10</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="3">5.</td><td>a)</td><td>Give brief notes on the product life cycle with suitable diagram.</td><td>8</td></tr>
<tr><td>b)</td><td>Mention few objectives on the development of a successful process.</td><td>2</td></tr>
<tr><td>c)</td><td>How return on investment (ROI) is calculated. Explain the calculation with a suitable example. Give cash flow diagram also.</td><td>8+2</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>6.</td><td>a)</td><td>Define Cash flow. Write the important features of cash flow diagram. A machine will cost ₹ 30000 to purchase. Annual operating and maintenance cost will be ₹ 2000. The machine will save ₹ 10,000 per year in labour costs. The salvage value of the machine after 5 years be ₹ 7000. Draw the cash flow diagram.</td><td>2+3+5</td></tr>
<tr><td></td><td>b)</td><td>What is NPV? Calculate NPV for the following given projects and comments on the results. Assume project cost = ₹ 200, discount rate @ 12% for both the project.

<u>Cash Inflows</u>
<table><tr><td>Year</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Project A</td><td>35</td><td>80</td><td>90</td><td>75</td><td>20</td></tr><tr><td>Project B</td><td>18</td><td>10</td><td>10</td><td>40</td><td>35</td></tr></table>
<u>PV factor @ 12% discount</u>
<table><tr><td>Year</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>PV factor @ 12%</td><td>0.893</td><td>0.797</td><td>0.712</td><td>0.636</td><td>0.567</td></tr></table></td><td>2+8</td></tr>
<tr><td>7.</td><td>a)</td><td>Define the following terms:
i) Annuity cash flow ii) Time value of money
iii) Salvage value iv) Effective rate of interest</td><td>2.5x4</td></tr>
<tr><td></td><td>b)</td><td>Explain in brief the steps of capital budgeting. The cost of a project is ₹ 50,000 which has an expected life of 5 years. The cash inflows for the next 5 years are ₹ 24000, ₹ 26000, ₹20000, ₹ 17000, and ₹ 16000 respectively. Determine the payback period.</td><td>3+7</td></tr>
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