

BCE Third year Second Semester Supplementary Examination, 2023

CONSTRUCTION MANAGEMENT

Time: 3 hours

Full Marks: 100

Use separate answer-scripts for each part
Part I: (Carries 50 marks. Attempt all questions.)

1. A company has 3 plants that sells welding electrodes through 4 outlets distributed in different parts of the country. The production cost varies from factory to factory and the selling price varies from market to market. The shipping cost per unit of the product from each plant to each outlet is known and stable. The relevant data are given:

(a) Production Cost	Weekly production Capacity (Units)	Unit Production Costs (Rs)
Plant 1	500	19
Plant 2	300	24
Plant 3	800	20

(b) Shipping Cost (Rs/units)	To outlet 1	To outlet 2	To outlet 3	To outlet 4
From Plant 1	3	5	7	3
From Plant 2	7	4	6	7
From Plant 3	3	6	4	6

(c) Demand of outlets and selling price of each outlet are		
Outlets	Demand (Units)	Selling Price (Rs)
1	400	32
2	600	35
3	300	31
4	400	36

Determine the **optimal plan to maximize profit** of the company using VAM and MODI. Note that net unit profit = unit selling price – unit production cost – unit cost of shipping.
25 (CO3)

- 2 (a) Deduce the formulae for uniform-series present-worth factor, sinking fund deposit factor and capital recovery factor.

Now, find the **present worth** of this proposal: To construct Tank 1 with pump on the 1st year at a capital cost of ₹50,00,000 and annual operating charges of ₹1,20,000. Then, on the 14th year construct Tank 2 with pump at a cost of ₹12,00,000 and an added operating cost of ₹55,000 per annum. Rate of interest = 10% 6+6=12 (CO4)

(b) Deduce the expression for Economic Ordering Quantity with shortage. The demand for an item is deterministic and constant over time and is equal to 600 units/year. The per unit cost of the item is Rs.50, while the cost of placing an order is Rs. 5. The inventory carrying cost is 20% of the inventory per annum and the cost of shortage is Re. 1 per unit per month. Find the optimal ordering quantity when stock-outs are permitted. If stock outs are not permitted, what would be the loss to the company?
8+5 = 13(CO4)

[Turn over

B. E. CIVIL ENGINEERING THIRD YEAR 2ND SEM. SUPPLEMENTARY EXAM. -2023**Sub: CONSTRUCTION MANAGEMENT Time: Three Hours Full Marks 100****PART-II**

(50 marks for this part)

Use a separate Answer-Script for each part

No. of questions	Answer question No.1 and question No. 2	Marks 40+10=50																												
1.	<p>a) What are the advantages and limitations of bar chart and what do you mean by PERT and CPM?</p> <p>b) The three time estimates as optimistic time (t_o), most likely time (t_m) and pessimistic time (t_p) of each activity of a project are given below.</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>t_o(days)</th> <th>t_m(days)</th> <th>t_p(days)</th> </tr> </thead> <tbody> <tr> <td>1-2</td> <td>2</td> <td>5</td> <td>14</td> </tr> <tr> <td>1-3</td> <td>3</td> <td>12</td> <td>21</td> </tr> <tr> <td>2-4</td> <td>5</td> <td>14</td> <td>17</td> </tr> <tr> <td>3-4</td> <td>2</td> <td>5</td> <td>8</td> </tr> <tr> <td>4-5</td> <td>1</td> <td>4</td> <td>7</td> </tr> <tr> <td>3-5</td> <td>6</td> <td>15</td> <td>30</td> </tr> </tbody> </table> <p>1) Draw the network diagram. 2) Find the expected duration and variance of each activity 3) Determine the expected duration of the project 4) Find the variance and the standard deviation of the entire project.</p>	Activity	t_o (days)	t_m (days)	t_p (days)	1-2	2	5	14	1-3	3	12	21	2-4	5	14	17	3-4	2	5	8	4-5	1	4	7	3-5	6	15	30	<p>CO1 10+20+10=40</p> <p>10</p> <p>20</p>
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<p>c)</p>	<p>A project is expected to take 15 months along the critical path, having a standard deviation of 3 months. What is the probability of completing the project within a) 18 months and c) 12 months?</p> <table border="1"> <thead> <tr> <th>Z(+)</th> <th>Probability(%)</th> <th>Z(-)</th> <th>Probability(%)</th> </tr> </thead> <tbody> <tr> <td>+0.9</td> <td>81.59</td> <td>0</td> <td>50</td> </tr> <tr> <td>+1.0</td> <td>84.13</td> <td>-1</td> <td>15.87</td> </tr> <tr> <td>+1.1</td> <td>86.43</td> <td>-1.1</td> <td>13.57</td> </tr> </tbody> </table>	Z(+)	Probability(%)	Z(-)	Probability(%)	+0.9	81.59	0	50	+1.0	84.13	-1	15.87	+1.1	86.43	-1.1	13.57	<p>10</p>
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<p>2.</p>	<p>Write short note</p> <ul style="list-style-type: none"> a) Earliest start time (EST) , b) Earliest finish time (EFT), c) Latest start time (LST), d) Latest finish time (LFT), e) Float and Critical path 	<p>CO2 5x2 =10</p>																