

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER 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. Solve the following **linear programming problem by Simplex (Big-M) method**:

Maximize: $Z = 5p + 4q + 3r$

Subject to: $2p + q - 6r = 20$, $6p + 5q + 10r \leq 76$, and $8p - 3q + 6r \leq 3$,
where p, q & r are non-negative quantities. 25 (CO3)

- 2 (a) Deduce the expressions for $uspwf(i, n)$, $sfd(i, n)$ and $crf(i, n)$ where the terms have their usual meaning.

Now, find the **present worth** of this proposal: To construct Tank 1 with pump on the 1st year at a capital cost of ₹4,00,00,000 and annual operating charges of ₹12,00,000. Then, on the 15th year construct Tank 2 with pump at a cost of ₹1,20,00,000 and an **added** operating cost of ₹5,50,000 per annum for infinite time. Rate of interest = 10%
6+6 =12 (CO4)

- (b) Deduce the expression for Economic Ordering Quantity with shortage with detail explanation of each term. 8 (CO4)

(C) A commodity is to be supplied at the constant rate of 200 units per day. Supplies of any amount may be obtained at any required point of time, but each ordering process costs ₹50. Cost of holding the commodity in inventory costs ₹2 per unit per day, while a delay in timely supply induces a penalty of ₹10 per item short per day. Find the optimum policy (Q, t) for maximum benefit, where t is the reorder cycle time, and Q is the amount ordered per cycle. 5 (CO4)

[Turn over

B. E. CIVIL ENGINEERING THIRD YEAR SECOND SEM. 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 30+20=50
1.	<p>a) What do you know about parallel activity, predecessor activity, successor activity, dummy activity, Slack and critical path?</p> <p>b) A project consists of six activities designated from A to F, With the following relationships:</p> <ol style="list-style-type: none"> 1) A is the first job to be performed. 2) B and C can be done concurrently, and must follow A. 3) B must precede D 4) E must succeed C, but it cannot start until B is complete. 5) The last operation F is dependent on the completion of both <p>Draw the network diagram.</p>	<p>CO1 10+8+12=30</p> <p>10</p> <p>8</p>

<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 b) 15 months and c) 12 months?</p> <table border="1" data-bbox="367 504 1053 649"> <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>12</p>
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<p>2.</p> <p>a)</p> <p>b)</p>	<p>What are the difference between PERT and CPM ?</p> <p>The network diagram of a project is given below. The Durations (t^i_j) of each activity are given in following table. Calculate only Earliest Event time (T_E), Latest Event occurrence time (T_L), Earliest start time (EST), Earliest finish time (EFT), Latest start time (LST), Latest finish time (LFT) and total float (F_T) for each activity. Assume T_E and T_L of last event (event 8) is same. Also assume T_E and T_L of start event (event 1) is Zero.</p>	<p>CO2 5+15=20</p> <p>5</p> <p>15</p>																

Activity (i-j)	Duration (t ^d)
1-2	10
1-3	12
2-5	8
2-7	12
3-4	6
3-6	5
4-5	8
5-6	8
5-7	10
6-7	6
7-8	12

