

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER – 2024
CONSTRUCTION MANAGEMENT

Time: 3 hours

(50 Marks for each Part)

Full Marks: 100

Use a separate answer-script for each part

Part I (50 Marks)

50 marks allotted for this part. Attempt all questions.

- Find the **present worth** of this proposal: It is proposed to construct a Tank with pumping facility on the first year at a capital cost of ₹40,00,000 and annual operating charges of ₹1,50,000. Then, on the 15th year, Tank 2 is to be constructed at a cost of ₹13,00,000 and an added operating cost of ₹55,000 per annum. Rate of interest = 10% 8 (CO4)
- Deduce the expression for **Economic Ordering Quantity with shortage, defining all variable names.** 8 (CO4)
- 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 (₹)
Plant 1	400	18
Plant 2	300	24
Plant 3	800	20

(b) Unit shipping cost	To outlet 1	To outlet 2	To outlet 3	To outlet 4
From Plant 1	₹2	₹5	₹7	₹3
From Plant 2	₹8	₹4	₹6	₹7
From Plant 3	₹3	₹4	₹4	₹5

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

Determine the **optimal plan to maximize profit** of the company using VAM and MODI.

17 (CO3)

- Solve the following LPP by Big-M linear programming: 17 (CO3)

Minimize: $Z = 4x + 2y$,subject to: $3x + y = 3$, $4x + 3y \geq 6$, and $x + 2y \leq 3$,where x and y are non-negative quantities. **Don't alter the variable names and order of inequations. Use S_i for slack and surplus variables while A_i for artificial variables.**

[Turn over

B. E. CIVIL ENGINEERING THIRD YEAR SECOND SEM. EXAM. -2024**Sub: CONSTRUCTION MANAGEMENT Time: Three Hours****Full Marks 100****PART-II (50 Marks)****(50 marks for this part)**

Use a separate Answer-Script for each part

No. of questions	Answer all questions	Marks (20x2+10)=50																
1.	<p>a. Define optimistic time, pessimistic time, most probable time and expected time of completion of project and write down their relationship.</p> <p>b. Draw a network of a project having seven activities. Activity A, B, C runs concurrently. Activity predecessor relationships are as follows</p> <table border="1" data-bbox="459 1151 997 1294"> <thead> <tr> <th><u>Activity</u></th> <th><u>Immediate predecessor</u></th> </tr> </thead> <tbody> <tr> <td>D</td> <td>A</td> </tr> <tr> <td>E</td> <td>B</td> </tr> <tr> <td>F</td> <td>C</td> </tr> </tbody> </table> <p>Activity G is the last operation of the project and immediate successor of D, E and F.</p>	<u>Activity</u>	<u>Immediate predecessor</u>	D	A	E	B	F	C	CO1 10+10=20								
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2.	<p>a. 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="435 1787 1114 1926"> <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	CO1 14+6=20
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b.	What do you mean by PERT and CPM. Write down the difference between PERT and CPM.	
3.	What do you mean by Earliest Start Time (EST), Earliest Finis Time (EFT), Latest Start Time (LST) and Latest Finish Time (LFT)? Describe briefly.	CO2 10