Time: 3 hours   Use separate answer-scripts for each part   Full Marks: 100
                          Part I: (Carries 40 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	400	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	500	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.
                                                              20 (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 ₹40,00,000 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.   8 (CO4)

B. E. CIVIL ENGINEERING THIRD YEAR SECOND SEM. EXAM. -2022

Sub: CONSTRUCTION MANAGEMENT   Time: Three Hours   Full Marks 100

PART-II (MARKS: 60)

Use a separate Answer-Script for each part

No. of questions	Answer all questions	Marks 12+8+20+20=60
1.	Write short note on: a) Turnkey contract b) Percentage contract c) Item rate contract d) Lump sum contract	3x4=12
2.	What are the advantages and limitations of bar chart and what do you mean by PERT and CPM?	8
3.	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.	20

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

a) Draw the network diagram.
b) Find the expected duration and variance of each activity
c) Determine the expected duration of the project
d) Find the variance and the standard deviation of the entire project.

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4. The network diagram of a project is given below. The Durations (t^{ij}) 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.

20

Activity (i-j)	Duration (t^{ij})
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