b. Guwahati city water supply project envisages expansion of the storage system from the existing capacity of 100 units to 200 units in the next 20 years. The additional capacity required at the end of each of the 5 years and the discounted present worth for additional capacities are as given below:

Time	Required Additional Capacity
End of 5th year	20
End of 10th Year	40
End of 15th Year	60
End of 20th Year	100

Additional Capacity:		*Discounted present worth of cost*					
		0	**20**	**40**	**60**	**80**	**100**
t	**Period (Years)**						
1	**1-5**	0	120	150	200	250	280
2	**6-10**	0	80	110	130	150	-
3	**11-15**	0	60	80	100	-	
4	**15-20**	0	40	50	-	-	-

Obtain the optimum present worth of the investment.

c. Calculate the required capacity of a reservoir whose inflows and demands over a 6-period sequence are as given below (release, R_t = demand, D_t). Use sequent peak method. Neglect evaporation losses.

Period, t	1	2	3	4	5	6
Inflow, Q_t	4	6	7	3	2	0
Demand, Dt (= R_t)	5	0	5	4	2	6

5. Attempt ***any two*** of the following: **7 x 2**

a. Develop a linear programming model for reservoir capacity determination when the reservoir is used for irrigation release taking into account the evaporation losses.

b. Illustrate the following methods of multi-objective optimization.

i. Goal Programming method; *ii.* Lexicographic method

c. Explain Utility Function Method and Global Criteria Method for multi-objective optimization