Answer any five questions. All questions carry equal marks.

1. The following table gives the monthly inflow and contemplated demand for a proposed reservoir. Estimate the minimum storage necessary to meet the demand using i) arithmetic computation method ii) sequent peak algorithm.

Month	Jan	Feb	Mar	Apr	May	June	July	August	Sep	Oct	Nov	Dec
Monthly inflow (Mm^3)	50	40	30	25	20	30	200	225	150	90	70	60
Monthly demand (Mm^3)	70	75	80	85	130	120	25	25	40	45	50	60

2. The ordinates of an IUH are given as below:

Time(h)	0	1	2	3	4	5	6	7	8	9	10	11	12
IUH ordinates (m^3/s)	0	10	35	50	45	40	30	25	15	15	10	5	0

   Derive the direct runoff hydrograph due to a storm of duration 3hrs producing 4 cm of rainfall excess in the same catchment.

3. The IUH of a catchment is triangular in shape with a base of 36hrs and peak of 20m^3/s occurring at 8hrs from the start. Derive a two-hour unit hydrograph for this catchment.

4. Give a schematic sketch of Nash model and derive the equation for IUH.

5. A drainage basin has the following characteristics:
   Time of concentration = 18 hr, Storage constant = 12 hr and inter- isochrone area distribution as given below:

Travel time(hr)	0-3	3-6	6-9	9-12	12-15	15-18
Inter isochrone area (km^2)	4	10	20	25	15	10

   Derive the IUH using Clarke's method.

6. For a catchment, the cumulative rainfall and the direct runoff hydrograph are given below:

Time from start of rainfall (hr)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cumulative rainfall	0	4	7	10	10	10	10	10	10	10	10	10	10	10	10	10
DRH ordinates (m^3/s)	0	6	15	45	60	70	65	55	45	36	28	21	15	9	4	0

   Determine the coefficients n & K in Nash model.

7. For catchment of area 300 sq.km, the values of n and K are 4.6 and 4 hrs respectively. Determine 1 hr unit hydrograph. Γ (1.6) may be taken as 0.896.

8. Write short notes on any of the following:
   (a) Derivation of IUH from S curve
   (b) Flow duration curve