

Total No. of Questions : 12]

SEAT No. :

P1684

[Total No. of Pages : 3

[5460]-501

T.E. (Civil)

**HYDROLOGY AND WATER RESOURCE ENGINEERING  
(2015 Pattern)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q.1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8, Q.No.9 or 10, Q.No.11 or 12.
- 2) Assume suitable data if necessary.
- 3) Draw a neat sketch wherever necessary.
- 4) Figures to the right indicate full marks.

- Q1)** a) Estimate the total volume of rainfall water received in m<sup>3</sup> over a basin of 4444 hectare for following data : [4]

Station	1	2	3	4	5
Polygon area (ha)	518	777	906	1495	748
Observed rainfall (mm)	267	198	142	114	81

- b) Explain Area-velocity method of discharge measurement. [3]

OR

- Q2)** a) Explain construction and application of DAD curves with sketch. [3]

- b) The rates of rainfall for successive 20 minutes period of a 140 minutes duration storms are 2.5, 2.5, 10.0, 7.5, 1.25 and 5.0 cm/hr. Taking the value of 'φ' index as 3.2 cm/hr, estimate the net Run-off (surface). Also determine 'W' - index. [4]

- Q3)** a) Explain various methods of assessment of canal revenue. State constraints of each. [3]

- b) Determine reservoir capacity for command area of 40,000 hectares, canal losses = 10%, and reservoir losses = 10%. [4]

P.T.O.

Crop	Base period (days)	Duty ha/cumecs	Intensity of irrigation (%)
Sugar cane	360	1700	20
Cotton	180	1500	10
Wheat	120	1800	20
Rice	120	700	15
Vegetables	120	700	15

OR

- Q4)** a) After how many days you will supply water to soil in order to ensure sufficient irrigation of given crop, if field capacity of the soil = 30% permanent wilting point = 12%, density of soil = 1.25 gm/cc, effective depth of root zone = 60 cm and daily consumptive use of water for crop = 12.5 cm. Assume that readily available moisture is 80% of the available water. [3]
- b) State principal Indian crops and explain importance of crop rotation. [4]

- Q5)** a) A 20 cm well penetrates 30m below static water level (GWT). After long period of pumping at a rate 1800 rpm, the drawdown in the observation wells are 12m and 36m from the pumped well are 1.2m and 0.5m respectively. [4]
- Determine :
- transmissibility of the aquifer.
  - drawdown in the pumped well assuming  $R = 300$  m.
- b) Explain the perched water table. [2]

OR

- Q6)** a) Write explanatory note - Validity of Darcy's law. [2]
- b) Derive the Dupit's equation for unconfined aquifers. State assumptions. [4]

- Q7)** a) The ordinate of 4-hour unit hydrograph in particular basin are given below. Determine the ordinate of the S-hydrograph and also the ordinate of 6-hour unit hydrograph. [8]

Time (Hrs)	0	2	4	6	8	10	12	14	16	18	20	22	24
4-hour unit Hydrograph ordinate (cumecs)	0	25	100	160	190	170	110	70	30	20	6	1.5	0

- b) What are different methods of estimation of flood. Explain any one. [8]

OR

- Q8)** a) Define 'Recurrence interval' and 'frequency' as applied to annual floods. Explain Gumbel's method. [8]

- b) What is "S" curve hydrograph? Explain its component and construction with a sketch. [8]

- Q9)** a) Explain flow mass curve and explain the step by step procedure to determine the reservoir capacity and surplus water. [8]

- b) What are different losses which take place from reservoir. Also write methods to control it. [8]

OR

- Q10)** a) Explain Fixation of reservoir capacity using elevation capacity curve and dependable yield. [8]

- b) What is Flood routing? State different methods. Explain any one in detail. [8]

- Q11)** a) Explain rotational water supply system. [6]

- b) Describe the role of auto weather station in water management. [6]

- c) What are causes of becoming land alkaline and saline. Suggest remedies. [6]

OR

- Q12)** a) Explain water logging - process, causes and curative measures. [6]

- b) What is PIM? Why is it needed in India. [6]

- c) Compare 'Warabandi' with cooperative water distribution system. [6]

