

(Time: 3 hours)

Total marks: 80

**N.B: (1) Question no. 01 is compulsory.**

**(2) Attempt any 3 questions out of the remaining 5 questions.**

**(3) Assume data wherever necessary and clearly mention the assumption made.**

**(4) Draw neat figures as required.**

**Q1:- Attempt Any Four**

**(20)**

- Define irrigation and discuss in brief the benefits and ill effects of irrigation.
- Write a note on sub surface irrigation , stating clearly the conditions under which this method is suitable.
- What are the factors affecting duty?
- Explain hydrologic cycle with neat sketch .
- State and discuss assumptions and limitations of Dupuit's theory.
- Write short note on reservoir sedimentation.

**Q2:-**

- Describe the salient features of National Water Policy 1987. **(05)**
  - What are the advantages and disadvantages of Bandhara irrigation **(05)**
- Discuss in brief various methods of surface irrigation. **(10)**

**Q3:-**

- Define the term duty and derive the relationship between duty delta and base period . **(05)**
  - What do you understand by crop rotation ? What are its advantages . **(05)**
- The base period , intensity of irrigation and duty of water for various crops under the canal system are given . Determine the reservoir capacity , if the culturable command area is 40000 hectares , canal losses are 25% and reservoir losses are 15% . **(10)**

Crop	Base period(days)	Duty at field (Ha/cumec)	Intensity of irrigation
Wheat	120	1800	25%
Sugarcane	360	1700	20%
Cotton	180	1400	10%
Rice	120	800	15%
Vegetables	120	700	15%

**Q4:-**

- Describe various methods of computing average rainfall over a basin . **(10)**
- Find out the ordinates of a storm hydrographs resulting from a 3 hour storm with rainfall 3, 4.5 and 1.5 cm during subsequent 3 hour intervals. The ordinates of unit hydrograph are given in the table below. **(10)**

Hours	0	3	6	9	12	15	18	21	24	27	30	33	36
Ordinates of unit hydrograph (cumecs)	0	90	200	350	450	350	260	190	130	80	45	20	0

Assume an initial loss of 5mm , infiltration index of 5mm / hour and base flow of 20 cumecs

**Q5:-**

- a) i) Derive an expression for discharge from a well fully penetrating a confined aquifer. (05)  
 ii) Define aquifer, aquiclude, specific yield, specific retention and perched aquifer. (05)
- b) A 30 cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping at the rate of 5400 liters/minutes, the water level in a test well at 90 m is lowered by 0.53 m, and in a well 30 m away the drawdown is 1.11 m. (10)  
 i) What is the transmissibility of the aquifer?  
 ii) Also determine the drawdown in main well.

**Q6:-**

- a) i) State the factors affecting selection of site of a reservoir. (05)  
 ii) Discuss various zones of storages with neat sketch. (05)
- b) Fix the control levels of a medium size reservoir from the following data. (10)  
 i) Effective storage required for crops = 32 Mm<sup>3</sup>  
 ii) Tank losses = 20% of effective storage  
 iii) Carry over allowance = 10% of effective storage.  
 iv) Dead storage = 10% of gross storage.  
 v) Length of waste weir = 100m  
 vi) Maximum flood discharge = 500 cumec.  
 vii) Francis formula  $Q = 1.84 LH^{3/2}$ .  
 viii) Wind velocity  $V = 70$  KMPH.  
 ix) Fetch length  $F = 30$  KM.

Contour RL(m)	250	253	256	-	278	281	284
Storage (Mm <sup>3</sup> )	3.3	4.1	5.25	-	42.65	47.3	55.12

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