

UNIVERSITY OF PUNE
[4363]-106
T. E. (Civil) May 2013
Hydrology and Water Resource
Engineering
(2008 Pattern)

Total No. of Questions : 12 **[Total No. of Printed Pages :4]**
[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

- (1) Answer any 3 question Section-I and 3 question Section-II
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Figures to the right indicate full marks.
- (4) Draw neat diagram wherever necessary.
- (5) Use of calculator is allowed.
- (6) Assume suitable data, if necessary.

SECTION-I

Q1.

- a) Define precipitation and State different forms and types of precipitation.
Explain cyclonic and frontal type of precipitation. [10]
- b) Describe the working of a float type recording rain gauge with neat sketch.
Mention its advantages over non-recording type [08]

OR

Q2.

- a) State various methods to measure evaporation. Discuss the factors affecting infiltration. Explain flooding type infiltrometer. [10]
- b) What is stream gauging? Explain area velocity method with sketch and explain its application in water resources engineering. [08]

Q3.

- a) Explain with a neat sketch geographic divide and geologic divide of catchment area and distinguish clearly between perennial flow and intermittent flow streams. [08]
- b) State various formulae to estimate flood and explain any two methods. [08]

OR

Q4.

- a) Explain with neat sketch Synthetic Unit Hydrograph (Snyder method). [08]
- b) Given below are the observed flows (cumecs) from a storm of 6-hours duration on a stream with a drainage area of 316 sq.km. Assume a constant base flow of 17 cumecs. Derive and plot a 6-hour duration unit hydrograph.

| | | | | | | | | | | | | | |
|-----------|----|-------|-------|-----|-----|-------|------|------|------|------|------|-------|----|
| Time (hr) | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| Flow | 17 | 113.2 | 254.5 | 198 | 150 | 113.2 | 87.7 | 67.9 | 53.8 | 42.5 | 31.1 | 22.64 | 17 |

[08]

Q5.

- a) State types of reservoirs and explain how topography and geology will affect for selecting the site for a reservoir and state the investigation required for construction of a reservoir. [08]
- b) What is design life period of storage reservoir? How do you account for sediment deposition in the reservoir while fixing its storage capacity? [08]

OR

Q6.

- a) Define trap efficiency of reservoir. Describe how the time required to the reservoir to fill up with the sediments is calculated. [08]
- b) Write a note on various storage zones of a reservoir with neat sketch [08]

SECTION-II

Q7.

- a) Explain crop area and volumetric methods of assessing canal revenue. And state their merits and demerits. [08]
- b) Following data pertains to a off taking canal and it's C.C.A

| Sr.no | Crop | Crop period (Days) | Area (ha) | Duty (ha/cumec) |
|-------|-------------------|--------------------|-----------|-----------------|
| 1 | Sugarcane | 280 | 300 | 620 |
| 2 | Sugarcane Overlap | 100 | 90 | 620 |
| 3 | Jawar (r) | 120 | 4500 | 1500 |
| 4 | Bajari (k) | 120 | 5000 | 2700 |
| 5 | Vegetables | 120 | 300 | 600 |

Find [10]

- a) Q required at the head of the main canal.
 Take time factor=0.7 and capacity factor=0.8
 b) Gross storage capacity of the reservoir

OR

Q8.

- a) Explain the relation between duty, delta and base period. Derive the relation between them and states the methods to improve duty of water. [08]
 b) Find the reservoir capacity for the following data. Consider canal losses=20% and reservoir losses=15% [10]

| Crop | Base period (Days) | Duty (ha/cumec) | Area (ha) | Intensity of Irrigation (%) |
|------------|--------------------|-----------------|-----------|-----------------------------|
| Rice | 120 | 1000 | 3000 | 90 |
| Cotton | 200 | 1500 | 2000 | 80 |
| Wheat | 120 | 2000 | 4500 | 60 |
| Sugarcane | 360 | 1000 | 5200 | 60 |
| Vegetables | 120 | 800 | 1000 | 75 |

Q9.

- a) Explain Dupits and Thiems theory and state the assumptions made [8]
 b) Enlist different types of tube wells and dug wells and explain strainer type with a neat sketch [8]

OR

Q10.

- a) Explain pumping and recuperation test. What should be the diameter of an open well to give safe yield of 5 lit/sec? Assume the working head at 3.75 m

and the subsoil consists of fine sand. (For fine sand specific yield =0.5/hour) [08]

- b) In an artesian aquifer of 10m thick, a 10 cm diameter well is pumped at a constant rate of 100 lit/minute. The steady state drawdown observed in two wells located at 10 m and 50 m distances from the centre of the well are 3 m and 0.05 m respectively, compute the transmissivity and the hydraulic conductivity of the aquifer. [08]

Q11.

- a) What is lift irrigation scheme. Explain the investigations necessary and approvals required for its implementation. State the design considerations for the components of lift irrigation scheme. [12]
- b) Write a note on ancient system of water distribution. [04]

OR

Q12.

- a) What are co-operative water distribution society's. State the rules and regulation laid down by the societies for equitable distribution of water to famers. [08]
- b) What is water logging? What are the ill effects of water logging? Explain any one method to improve the sub-surface drainage. [08]