*Name* : .....

*Roll No.* : .....

*Invigilator's Signature* : .....

**CS/B.Tech(CE-OLD)/SEM-6/CE-605/2013**

**2013**

# WATER RESOURCES ENGINEERING – I

*Time Allotted* : 3 Hours *Full Marks* : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

## GROUP – A

## ( Multiple Choice Type Questions )

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) Which one of the following does not fit in with the rest ?

a) Rain b) Snow

c) Frost d) Silt.

ii) Run-off can be estimated by

a) infiltration method b) unit hydrograph

c) rational method d) any of these.

iii) C.V.R. is a short form of

a) current velocity ratio

b) Chezy's velocity ratio

c) constant volume ratio

d) critical velocity ratio.

iv) A plot of rainfall intensity versus time is known as

a) hyetograph b) mass flow curve

c) duration curve d) unit hydrograph.

v) Chezy's equation gives velocity of flow. Chezy's constant is given by

a) Manning's formula

b) Kutter's formula

c) Bazin's formula

d) Lacey's regime perimeter formula.

vi) The base period for a particular crop is 100 days. The duty of the canal is 1000 hectares/cumec. The depth of water will be

a) 0.864 cm b) 8.64 cm

c) 86.4 cm d) 864 cm.

vii) A canal section is called most economical when

a) depth of cutting is least

b) depth of filling is highest

c) depth of cutting is such that excavated soil is sufficient to construct banks

d) none of these.

viii) As per Lacey's theory, the silt factor is

a) directly proportional to average particle size

b) inversely proportional to average particle size

c) directly proportional to squre root of average particle size

d) not related to average particle size.

ix) Lacey's regime scour depth is given by

a) $1.35\,(q/f)^{1/3}$

b) $1.35\,(q/f)^{1/6}$

c) $1.35\,(q^2/f)^{1/3}$

d) none of these.

x) Isohyets are

a) contours of equal precipitation

b) elevation of areas mean sea level

c) depth of ground water level below ground surface

d) none of these.

xi) Delta of a crop means

a) areas under the crop

b) crop period

c) depth of water required by the crop

d) crop production.

**GROUP – B**
**( Short Answer Type Questions )**
Answer any *three* of the following. 3 × 5 = 15

2. What are the factors effecting evaporation losses ? Draw the mass curve of a rainfall.

3. Define Duty & Delta of a crop and express the relation between them.

4. Determine the discharge at the head of the distributory for fulfilling maximum crop requirement

   Assume : Kor period 4 weeks for Rabi ( wheat ) & 2.5 weeks for Kharif ( rice ).

   Kor depth 13.5 cm for Rabi ( wheat ) and 19 cm for Kharif ( rice ); [ Area to be irrigated in Rabi season 2400 hectares & Kharif season 1200 hectares ].

5. A 12 hour storm rainfall had the following depth in cm for each hour occurring over a basin :

   1.8, 2.6, 7.8, 3.9, 10.6, 5.4, 7.8, 9.2, 6.5, 4.4, 1.8, 1.6. The surface run-off resulting from the above storms is found to be 24.4 cm depth over the basin. Determine the average infiltration index for the basin.

6. Explain the objectives of canal lining and types of materials used for canal lining.

## GROUP – C
## ( Long Answer Type Questions )

Answer any *three* of the following. 3 × 15 = 45

7. a) The ordinates of a 3 hour unit hydrograph are given below :

| Time in hour | 0 | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ordinate $m^3/sec$ i.e. cumec | 0 | 10 | 25 | 20 | 16 | 12 | 09 | 07 | 08 | 03 | 00 |

Find the ordinates of a 6 hour unit hydrograph for the same.

b) How will you prepare a unit hydograph for an isolated storm ?

8. a) What are the precaution to be taken for controlling water-logging ?

b) What are the causes of water-logging ?

c) What are the differences between using Kennedy's theory and Lacey's theory ?

9. An irrigation channel is to carry full supply discharge of 30 $m^3/sec$ at a velocity of 1.75 m/sec. The side slopes are to be 1 horizontal : 1 vertical. The ratio of full supply depth to bed width is to be 1 : 6. Assuming Manning's $n$ is 0.018, calculate the full supply depth, bed width and bed slope of the channel.

10. a) What do you understand by Mass-inflow curve ?

b) How would you determine the safe-yield, if the mass-inflow curve and the reservoir capacity are given ?

c) Write short notes on the following :

i) Reservoir silting or reservoir sedimentation

ii) Useful life of a reservoir.