OR

Using Lacey's silt theory, design an irrigation canal in alluvial soil with a discharge of 14 cumecs flows through the channel in the soil of 0.33 mm diameter and side slope ½ H: 1V.

Unit - V

5. a) What is flood routing? Explain the basic flood routing equation and outline its method of solution.

   b) Differentiate between :

      i) Hydraulic routing and hydrologic routing

      ii) Channel routing and reservoir routing.

   c) Define 'flood frequency' and 'return period'. Explain any one method of flood frequency analysis.

   d) For a river valley project, the following results were obtained from flood frequency analysis using Gumbel's method:

Return period T (years)	Peak flood (m^3/s)
40	27000
80	31000

Estimate the flood magnitude with a return period of 240 years.

OR

A coffer dam is designed for a 25 year flood and constructed. If it takes 5 years to complete the construction of main dam, what is the risk that the coffer dam may fail before the end of the construction period? What return period in the design of coffer dam would have reduced the risk to 10%?

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Total No. of Questions : 5] *[Total No. of Printed Pages : 4*

Roll No .....

CE - 602

B.E. VI Semester

Examination, June 2016

Water Resources and Irrigation Engineering

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

v) Any missing data may be suitably assumed, if any.

Unit - I

1. a) Describe different methods of the surface irrigation with the sketches, where necessary.

   b) Write a note on the sprinkler irrigation stating its types, advantages and limitations.

   c) Compare surface irrigation with sub-surface irrigation.

   d) A field channel has culturable commanded area of 2000 hectare. The intensity of irrigation for gram is 30% and for wheat is 50%. Gram has a crop period of 18 days and kor depth of 12 cm, while wheat has a kor period of 15 days and kor depth of 15 cm. Calculate discharge of the field channel.

OR

What do you understand by irrigation efficiencies? What is the significance of following irrigation efficiencies and how are they determined?

i) Water conveyance efficiency

ii) Water application efficiency
iii) Water use efficiency
iv) Water storage efficiency
v) Water distribution efficiency
vi) Consumptive use efficiency

Unit - II

2. a) What are the advantages of groundwater compared to surface water?
   b) Distinguish clearly between a shallow well and a deep well. How does a deep well differ from a tube well in confined aquifer?
   c) What do you understand by recuperation test? Derive the equations used in the test.
   d) Derive an expression for the steady state discharge of fully penetrating into a confined aquifer.

OR

An unconfined aquifer has a thickness of 30 m. A fully penetrating 20 cm diameter well in this aquifer is pumped at a rate of 35 lit/sec. The drawdown measured in two observation wells located at distances of 10 m and 100 m from the well are 7.5 m and 0.5 m respectively. Determine the average hydraulic conductivity of the aquifer. At what distance from the well the drawdown is insignificant.

Unit - III

3. a) Describe Recording and Non-Recording type of rain gauge stations.
   b) What is a rainfall hyetograph? How is it derived from a rainfall mass curve?
   c) Define Unit Hydrograph. What are the assumptions underlying the unit hydrograph theory? Explain uses of unit hydrograph.

   d) A catchment area of 30 Sq.km. has one recording gauge. During a storm, the following mass curve of rainfall was recorded.

Time from start of storm (hr.)	0	2	4	6	8	10	12	14
Accumulated rainfall (mm)	0	6	17	57	70	81	87	90

If the volume of runoff due to the storm measured is 1.2×10^6 m^3, estimate the φ index of the catchment.

OR

A catchment area of 40 km^2 has one recording gauge. During a storm, the following mass curve of rainfall was recorded.

Time from start of rainfall (h)	0	2	4	6	8	10	12	14
Accumulated rainfall (min.)	0	8	22	74	92	105	114	120

If the volume of runoff due to the storm measured is 2.0×10^6 m^3, estimate the φ - index of the catchment.

Unit - IV

4. a) How irrigation canals are classified? Explain and describe their functions.
   b) Enumerate the different types of canal lining. What are the causes of failure of lining?
   c) Compare Kennedy's and Lacey's theories for the design of irrigation channel in alluvium.
   d) Design an irrigation canal by Kennedy's theory which is to carry a discharge of 15 cumecs. Assume N=0.0225, m = 1.0, B/D = 7, side slope = ½ H: 1V. Find also the bed slope of canal.