

**SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2009**

CE 04 606 – HYDROLOGY AND IRRIGATION ENGINEERING

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

Assume any missing data suitably.

Part A

- I. 1. Discuss the role of various components of hydrologic cycle and explain it with a neat sketch.
2. Explain the various factors affecting runoff.
3. Explain how you will determine the maximum flood by using (i) Rational Method and (ii) Dicken's Method.
4. Distinguish between permeable and impermeable spurs, marginal bunds and guide banks.
5. Suggest suitable location of head works on a river considering its different stages.
6. State the functions of the following in a head works illustrative sketches.
(i) Silt extruder ; (ii) Divide wall ; and (iii) Sheet piles.
7. How do you classify canals? Explain them in detail.
8. What is meant by canal lining? What advantages and disadvantages of canal lining?

(8 × 5 = 40 marks)

Part B

- II. (a) (i) Explain the different methods of determining the mean areal depth of precipitation over a basin covered by several rain gauge stations. Indicate the most accurate method of determination giving reasons.
(ii) Explain step by step procedure you would adopt to prepare the Depth-Area-Duration curves for a particular storm, for a basin having a number of rain gauges most of which are recording.

(8 + 7 = 15 marks)

Or

- (b) (i) A 3 h unit hydrograph for basin has the following ordinates. Using the S curve method, determine the 9 h unit hydrograph ordinates.

Turn over

Time (h)	0	3	6	9	12	15	18	21	24
Discharge (m ³ /s)	0	12	75	132	180	210	183	156	135

Time (h)	27	30	33	36	39	42	45	48	51	54	57	60
Discharge (m ³ /s)	144	96	87	66	54	42	33	24	18	12	6	0

(15 marks)

- III. (a) (i) Write a brief note on Flood control and Flood warning.
(ii) Design a guide bank for a bridge site on a river with design discharge as 8500 m³/s. Assume silt factor as 1.5, Draw suitable sketches indicating various dimensions in plan and typical sectional views. Assume suitable data required.

(8 + 7 = 15 marks)

Or

- (b) (i) What do you understand by storage zones by reservoir? Discuss live and dead storage.
(ii) Define river training. Describe various types of river training and protection works.

(7 + 8 = 15 marks)

- IV. (a) (i) Draw neat sketches to illustrate the methods of irrigation (1) Border Irrigation ; (2) Basin Irrigation ; and (3) Furrow Irrigation. State under what circumstances you will recommend their use.
(ii) Explain Khosla's method of independent variable. How do you apply corrections for floor thickness, sloping floor and interference of piles?

(7 + 8 = 15 marks)

Or

- (b) (i) State the fundamental difference between Khosla's theory and Bligh's creep theory for seepage flow below a weir.
(ii) A water course has a culturable commanded area of 1200 hectares. The intensity of irrigation for wheat crop is 45% and for rice 20%. Wheat has a kor period of 20 days and rice has a kor period of 35 days. Calculate the head discharge of water course, if kor depths for wheat and rice are 10 cm and 16 cm respectively and losses in the conveyance system are 5% of outlet discharge.

(7 + 8 = 15 marks)

- V. (a) (i) Compare the relative efficiency of sub surface drains and surface drains. Describe the situations in which sub surface drains would be preferred over surface drains.
(ii) Design an irrigation canal in alluvial soil for full supply discharge = 35 cumecs, coefficient of roughness = 0.025, canal side slope = 1:1, longitudinal slope = 1 in 50000. Also check for critical velocity ratio, allowable critical velocity ratio is 0.9 to 1.1.

(7 + 8 = 15 marks)

Or

- (b) (i) Briefly describe the procedure for the construction of unlined canal. ✓
(ii) What are the effects of water logging? What measures are adopted to reclaim the waterlogged areas?

(8 + 7 = 15 marks)

[4 × 15 = 60 marks]