

G 1452

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Sixth Semester

Branch : Civil Engineering

CE 010 605—WATER RESOURCES ENGINEERING (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

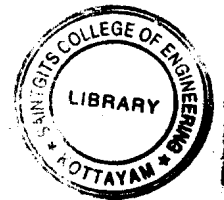
Assume any data not mentioned suitably.

Part A

Answer all questions.

Each question carries 3 marks.

1. List the various systems of irrigation practiced.
2. The presentation of rainfall data at a rain gauge station is to be made. Discuss any two procedures used.
3. Differentiate between a confined and unconfined aquifer.
4. State the requirements of a good canal outlet.
5. List down the structural and non-structural measures used in flood control.



(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Comment on the variation of duty from the head of a main canal to field water course with justification.
7. State the influence of the following parameters on the run-off hydrograph :
 - (i) shape of basin ;
 - (ii) drainage density.
8. Sketch the strainer type of tube well. Indicate the salient features of it and its suitability in field.
9. Illustrate the classification of canals based on alignment.
10. Differentiate between hydraulic and hydrologic routing.

(5 × 5 = 25 marks)

Turn over

**Part C**

Answer all questions.

Each question carries 12 marks.

11. (a) Compute the depth and frequency of irrigation required for a certain crop with the data given below. Root zone depth = 100 cm, Field capacity of soil = 22 %, wilting point of soil = 12 %, Apparent specific gravity of soil = 1.5 gram/cm³. Consumptive use = 30 mm/day, irrigation efficiency = 60 %. Assume 50 % depletion of soil moisture before application of water.

(8 marks)

- (b) Give the typical layout of an irrigation scheme indicating the components. (4 marks)

Or

12. (a) For a branch canal the Gross command area is 10 km², and the cultivable command area is 80 % of gross command area. The intensity of irrigation is 40 % for wheat and 20 % for rice. If the kor period for wheat and rice are 22 days and 18 days respectively, determine the discharge required, neglecting the losses. Assume depth of kor watering for wheat and rice are 10 cm and 20 cm respectively.

(7 marks)

- (b) Briefly discuss a method for the estimation of consumptive use of a crop grown in an irrigated area of a canal.

(5 marks)

13. The ordinates of the 2 hour unit hydrograph (In 2 hour intervals from zero to 22 hours) of a basin are as follows : 0, 25, 100, 160, 190, 170, 110, 70, 30, 20, 6, 0. Determine the ordinates of 5 curve hydrograph. Using the S curve, determine the ordinates of a 3 hour flood hydrograph. Assume a constant base flow of 5 cumecs.

(12 marks)

Or

14. (a) The isohyets due to a storm in a catchment were drawn and the area of the catchment bounded by the isohyets were tabulated as follows :

Isohyets (mm) ...	Station - 120	120 - 100	100 - 80	80 - 60	60 - 40	40 - 20
Area (km ²) ...	40	150	70	170	50	20

Estimate the mean precipitation due to the storm.

(6 marks)

- (b) The mass curve of rainfall of duration 100 minutes is given below. If the catchment had an initial loss of 0.6 cm and a ϕ -index value of 0.6 cm/hour, calculate the total surface run-off from the catchment.

Time from start of rainfall (minutes) ...	0	20	40	60	80	100
Cumulative rainfall (cm) ...	0	0.5	1.2	2.6	3.3	3.5

(6 marks)

15. During the recuperation test of a 3.5 m diameter open well a recuperation of the depression head from 2.4 m to 1.2 m was found to take place in 80 minutes. Determine the :
- specific capacity per unit well area and ;
 - yield of the well for a safe draw down of 2.4 m ;
 - What would be the yield from a well of 4.5 m diameter for a drawdown of 2,2 m ?

Or

16. A 30 cm diameter well completely penetrates an unconfined aquifer of saturated depth 25 m. When a discharge of 2100 litres/minute was being pumped for a long time, observation wells at radial distances of 30 and 90 m indicated a drawdown of 5 m and 4 m respectively. Estimate the co-efficient of permeability and transmissibility of the aquifer. What is the drawdown at the pumping well ? State the Equation used for solving the problem, indicating the assumptions.
17. Design an irrigation canal in alluvial soil (cross sectional parameters and bed slope) using Kennedy's theory to carry a discharge of 15 cumecs. Assume Kutter's $n = 0.023$, critical velocity ratio = 1.05. Use bottom width to depth ratio for the channel section as 5.8,

Or

18. Explain the permanent regime concept put forward by Lacey's theory. A channel section is to be designed for the following data : Discharge = 30 cumecs, silt factor = 1.1, side slope = 0,5 : 1. Determine the cross sectional parameters and the longitudinal slope of canal using Lacey's theory.
19. (a) List the methods for controlling reservoir sedimentation. (4 marks)
- (b) The average monthly inflows in m^3/s units, for a water year (June to May), into a reservoir is given below: 20, 60, 200, 300, 200, 150, 100, 80, 60, 40, 30, 25. If a uniform discharge of $90 m^3/s$ is desired from the reservoir, what is the minimum storage capacity required.

(8 marks)

Or

20. (a) A flood of 5000 cumecs in a certain river has a return period of 40 years :
- What is its probability of exceedance ?
 - What is the probability that a flood of 5000 cumecs or greater magnitude may occur in the next 20 years ?
 - What is the probability occurrence of a flood of magnitude 5000 cumecs ?
- (6 marks)
- (b) Briefly explain with sketches the use of guide banks and groynes for river training works.

(6 marks)

[5 × 12 = 60 marks]

