

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (S), FEBRUARY 2023**CIVIL ENGINEERING****(2020 SCHEME)****Course Code : 20CET307****Course Name: Hydrology and Water Resources Engineering****Max. Marks : 100****Duration: 3 Hours***Assume any data if necessary***PART A***(Answer all questions. Each question carries 3 marks)*

1. What are the different types of precipitation?
2. Differentiate mass curve and hyetograph.
3. Define infiltration indices.
4. With neat sketches discuss any two methods of base flow separation.
5. List the environmental effects of irrigation.
6. Define Duty and Delta. Obtain the relation between the two.
7. What are the methods for the control of river sedimentation?
8. Define stage discharge curve.
9. Describe the vertical distribution of ground water.
10. Explain Darcy's law.

PART B*(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. a) Explain the method of determination of optimum number of rain gauges in a catchment. (4)
- b) Describe the Non recording rain gauge with a neat sketch. (10)

OR

12. a) A station 'A' was inoperative while stations B, C, D and E registered 80mm, 70mm, 83mm and 79mm of precipitation. Coordinates of B, C, D and E are (7, 6), (10,-8), (-11,-5) and (-5, 5) respectively with coordinates of A as (0, 0). Estimate storm precipitation by Inverse Distance Method. (7)
- b) Explain the use of double ring infiltrometer for measurement of infiltration. How will you fit Horton's model. (7)

MODULE II

13. a) The rate of rainfall for successive one hour periods of a 10hr storm were recorded as 4.0, 6.3, 5.2, 7.5, 8.4, 2.3, 5.4, 4.5, 8.5, and 3.6 cm/hr. Taking value of ϕ -index as 6.0 cm/hr, compute (i) Total Rainfall Excess (ii) w-index. (4)
- b) What is S-Hydrograph? How is it used to construct a longer or shorter period unit hydrograph from a longer period unit hydrograph? (10)

OR

14. a) What is Runoff? What are the factors affecting Runoff? (7)
- b) Ordinates of 2 hour unit hydrograph are given below. Using this, derive the ordinates of a 6 hour unit hydrograph using S-hydrograph method. (7)

Time (hrs)	0	2	4	6	8	10	12	14	16	18	20	22
Ordinates of 2 hour UH (cumecs)	0	25	100	160	200	170	110	70	30	20	8	0

MODULE III

15. a) After how many days will you supply water to soil (clay loam) in order to ensure efficient irrigation of the given crop, if
 (i) Field capacity of soil = 27 %
 (ii) Permanent wilting point = 14 %
 (iii) Dry density of soil = 15 kN/m³
 (iv) Effective depth of root zone = 75 cm
 (v) Daily consumptive use of water for the given crop = 11 mm (7)
- b) A water course has a culturable commanded area of 1200 hectare. The intensity of irrigation for crop A is 40 % and for B is 35%, both the crops being Rabi crops. Crop A has a kor period of 20 days and crop B has kor period of 15 days. Calculate the discharge of the water course if the kor depth for crop A is 10 cm and for B it is 16 cm. (7)

OR

16. a) Define saturation capacity, field capacity, permanent wilting point and available moisture. (4)
- b) Explain the various methods of surface irrigation. (10)

MODULE IV

17. a) List the objectives of river training. Discuss repelling, attracting and deflecting groynes. (4)
- b) The following information is available regarding the relationship between trap efficiency and capacity-inflow ratio for a reservoir. Find the probable life of the reservoir with an initial reservoir (10)

capacity of 30 million cubic meters, if the annual flood inflow is 60 million cubic metres and the average annual sediment inflow is 36,00,000 kN. Assume a specific weight of sediment equal to 12 kN/m³. The useful life of reservoir will terminate when 80% of initial capacity is filled with sediment.

Capacity/Inflow ratio	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Trap efficiency (η %)	87	93	95	95.5	96	96.5	97	97.2	97.3	97.5

OR

18. a) What is Flow - Duration curve? What are its practical applications? (4)
 b) Explain the procedure for determining reservoir capacity from mass inflow curve. (10)

MODULE V

19. a) Define (i) Storativity (ii) Transmissibility (4)
 b) Explain and derive steady state flow to wells in a confined aquifer. (10)

OR

20. a) Explain with sketch strainer type tube well (7)
 b) A tube well penetrates fully an unconfined aquifer. Calculate the discharge from the tube well under the following conditions:
 Diameter of well = 30 cm
 Drawdown = 2 m (7)
 Effective length of strainer under the above drawdown = 10 m
 Coefficient of permeability of aquifer = 0.05 cm/sec
 Radius of zero drawdown = 300 m
