

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FIFTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022
CIVIL ENGINEERING****(2020 SCHEME)****Course Code: 20CET307****Course Name: Hydrology and Water Resources Engineering****Max. Marks: 100****Duration: 3 Hours***Graph sheet will be supplied on request***PART A*****(Answer all questions. Each question carries 3 marks)***

1. What are the different types of Infiltration indices?
2. Sketch an IMD pan and label its parts.
3. What are the assumptions of Unit hydrograph theory?
4. A six hour storm rainfall with following rainfall depths occurs over a basin. 2.2, 3.5, 5.4, 10.2, 4.8, 3.1 and 6.2 cm. Surface runoff is 10.7 cm. Determine the average infiltration index.
5. A stream of 119 litre/s was diverted from a canal and 99 litre/s were delivered in the field. An area of 4.94 acres was irrigated in 9.5 hours. The runoff loss in the field was 421m³. Determine water conveyance efficiency.
6. Give few examples of Kharif, Rabi and Perennial crops.
7. Explain the classification of River training.
8. What are the basic factors controlling the process of meandering?
9. Describe the various divisions of subsurface water.
10. Sketch a slotted type tube well and label its parts.

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

11. a) A rain gauge recorded the following accumulated rainfall during a storm. Plot a Hyetograph for the given data. (9)

Time (pm)	11.00	11.05	11.10	11.15	11.20	11.25	11.30
Accumulated rainfall (mm)	0	2	3	7	12	19	25

- b) Explain the working of a Symon's raingauge with a neat sketch. (5)

OR

12. a) Determine the mean precipitation for the rectangular area given below by Thiessen Polygon method. Precipitation recorded at rain gauge stations P, Q, R and S are 15 cm, 9 cm, 12 cm and 16 cm respectively. The distance between the rain gauge stations P and Q is 12 km and that between P and S is 7 km. (8)



- b) The normal annual rainfall at stations A, B, C, and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 2000, the station D was inoperative, and the stations A, B and C recorded annual precipitations of 91.11, 72.23 and 79.89 cm respectively. Estimate the rainfall at station D in the year 2000. (6)

MODULE II

13. a) A 6 hr UH ordinates for a basin are given below. Derive the 9 hr UH ordinates using S- curve method (11)

Time (hrs)	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42
6hr UHO m ³ /s	0	9	20	35	49	43	35	28	22	17	12	9	6	3	0

- b) Explain any three limitations of Unit hydrograph theory. (3)

OR

14. a) The rate of precipitation observed over a catchment of 2999 hectares for successive 30 min are 15, 19, 24, 36, 27, 11 and 3 mm/hr. If the ϕ index is 22mm/hr, find the runoff volume in m³ from the catchment. (8)
- b) Explain the following terms (6)
- Probable Maximum Flood
 - Standard Project Flood

MODULE III

15. a) A canal was designed to supply the irrigation needs of 1000 hectares of land growing rice of 120 days base period and having a delta of 1300 mm. Instead of rice if the canal water is used entirely to irrigate wheat of base period 118 days and having delta of 500 mm, determine the area that can be irrigated by the canal supplies. (11)
- b) Derive the relationship between Duty and Delta. (3)

OR

16. a) A certain crop is grown in a village in South India having an area of 3000 hectares and it is fed by a canal system. Field capacity of soil is 25%, Optimum moisture is 11% and permanent wilting point is 9%. Effective depth of root zone is 800 mm and relative density of soil is 1.39. If the frequency of irrigation is 9 days, find the daily consumptive use. (6)
- b) Explain the various factors affecting duty of water and suggest some methods to improve duty. (8)

MODULE IV

17. a) Explain Guide banks and Pitched island with neat sketches. (10)
- b) Explain the types of reservoirs. (4)

OR

18. a) The data pertaining to a stream gauging operation at a gauging station are given below. The rating equation of the current meter is $V=0.499N+0.029m/s$, where N is the number of revolutions per second. Calculate the discharge in the stream. (12)

Distance from left water edge (m)	0	1	3	5	7	9	11	12
Depth(m)	0	1.1	2	2.5	2	1.7	1	0
Revolutions of current meter kept at 0.6 depth	0	39	58	112	90	45	30	0
Durationofobservation(s)	0	100	100	150	150	100	100	0

- b) List few devices used for velocity measurement in streams. (2)

MODULE V

19. a) What are the assumptions of Dupit's theory? (7)
- b) A tube well is 0.46 m in diameter. The unconfined aquifer is of 18 m depth. After drawdown depth of water is 12 m in the well. Permeability of soil is 24.50 m/day. Radius of circle of influence is 27500 centimetres. Calculate discharge of the tube well in litres/sec. (7)

OR

20. a) A gravity well has a diameter of 60cm. The depth of water in the well is 40 meters before the pumping is started. When pumping is being done at the rate of 1900 litres per minute, the drawdown in a well 10 meters away is 4 meters and in another well 20 meters away is 2 meters. Determine the radius of zero drawdown. (8)
- b) Differentiate among aquifer, aquiclude, aquitard and aquifuge with suitable examples. (6)
