Roll No. .....

OLE-24292

B. Tech. 5th Semester (Civil) Examination – April, 2021

HYDROLOGY

Paper : CE-311-F

Time : Three Hours] ***[Maximum Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is ***compulsory.*** Attempt ***one*** question from each Section. All questions carry equal marks. Attempt ***five*** questions in all. Assume missing data, if any, suitably.

1. Briefly describe the following : 20

(a) Sources of hydrological data in India

(b) Application of hydrology

(c) Hypsometric curves

(d) Distinguish between infiltration capacity and infiltration rate

(e) Interception losses

(f) Methods to measure velocity of runoff

(g) Stage hydrograph and stage recorder

(h) Factors affecting shape of hydrograph

(i) Compressibility of aquifer

(j) Darcy's law

SECTION – A

2. (a) What is hydrologic cycle ? Describe the hydrologic cycle with a neat sketch. 10

(b) What is meant by Probable Maximum Precipitation ? Describe the methods of estimating PMP. What are its design applications ? 10

3. (a) What are design applications of the depth-area-duration relations ? Explain the procedure of developing these relations. 10

(b) The co-ordinate distances in km of 5 rain gauge station X, A, B, C and D are (0.0), (4, 5), (–6, 8), (–9, –6) and (5, –7) respectively. During July 2005 station X was inoperative and the other four stations A, B, C and D recorded rainfalls of 8.3, 10.1, 7.7 and 12.4 cm respectively. Calculate the missing July rainfall at X. 10

SECTION – B

4. (a) What is evapotranpiration ? List the various data needed to use Penman's equation for estimating the potential evapotranpiration from a given area. 10

(b) During a daily routine observation, 10.8 litres of water was added to bring the water surface in the evaporation pan to the stipulated level and the nearby rain gauge measured 3.6 mm of rainfall. What was the evaporation recorded for the day if the diameter of the pan is 122 cm ? 10

5. (a) Define Φ-index and W-index and bring out the difference between them. How is Φ-index determined from the rainfall hyetograph ? 10

(b) Define infiltration. What are the factors affecting infiltration ? Describe in detail. 10

SECTION – C

6. (a) Explain the principle involved in the measurement of streamflow by the dilution method. What are the fundamentals of a good tracer used in the dilution method ? 10

(b) What are the factors should be considered in selecting a site for a stream gauging station ? Also describe with neat sketches how the stage can be measured with the help of a vertical staff gauge. 10

7. (a) From the topographical map of a drainage basin the following quantities are measured : A = 3480 km^2, L = 148 km and L_c = 74 km. the 12h unit hydrograph derived for the basin has a peak ordinate of 155m^3/s occurring at 40 h. determine the coefficients C_t and C_p for the synthetic unit hydrograph of the basin. 10

(b) Distinguish between unit hydrograph and distribution graph. What are the uses of distribution graph ? 10

SECTION – D

8. (a) An unconfined aquifer has an areal extent of 15 km^2. When 9.5 million m^3 of water was pumped out, the water table was observed to go down by 2.4 m. What is the specific yield of the aquifer ? If the water table of the same aquifer rises by 12.5 m during a monsoon season, what is the volume of recharge ? 10

(b) A 30 cm well fully penetrates an unconfined aquifer of 25 m saturated depth. When a discharge of 2100 lpm was being pumped for a long time, observation wells at radial distances of 30 and 90 m indicated drawdown of 5 and 4 m respectively. Estimate the coefficient of permeability and transmissibility of the aquifer. What is the drawdown at the pumping well ? 10

9. Differentiate between : 20

(i) Water table and piezometric surface

(ii) Influent and effluent streams

(iii) Aquiclude and aquitard

(iv) Hydraulic conductivity and intrinsic permeability

(v) Specific yield and specific retention