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OLE-3201

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

HYDROLOGY AND WATER RESOURCE ENGINEERING

Paper : PCC-CE-301-G

Time : Three Hours] *[Maximum Marks : 75*

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 : Attempt ***five*** questions in all, selecting at least ***one*** question from each Section. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. Describe the following : 15

(a) Characteristics of precipitation on India

(b) Actual evapotranspiration

(c) Uses of Current meter

(d) Effect of urbanisation on runoff hydrograph

(e) Environment impact of multipurpose water resources projects

(f) Limitations of flood frequency studies

SECTION – A

2. (a) What is the hydrological cycle ? Give a brief description of different components of a hydrologic cycle. 7

(b) Explain briefly intensity duration frequency relationship. 8

3. (a) What is meant by Probable Maximum Precipitation ? Describe the methods of estimating PMP. 6

(b) A rain gauge 'D' was inoperative during a specific storm. The rainfall recorded at three surrounding stations A, B and C during that storm was 52, 85 and 70 mm respectively. If the average annual rainfall of stations A, B, C and D are 650, 900, 820 and 700 mm respectively, estimate the storm rainfall of station D. 9

SECTION – B

4. (a) What are the different analytical methods to estimate evaporation ? Explain in detail. 7

(b) What is transpiration ? What are the various factors that affect transpiration ? How would you measure transpiration ? What is transpiration ratio ? 8

5. (a) Differentiate between the infiltration capacity and the infiltration index. 5

(b) A catchment area of 30 sq.km. has one recording gauge. During a storm, the following mass curve of rainfall was recorded :

Time from start of storm (h)	0	2	4	6	8	10	12	14
Accumulated rainfall (mm)	0	6	17	57	70	81	87	90

If the volume of runoff due to the storm measured is 1.2×10^6 m^3. Estimate the φ index of the catchment. 10

SECTION – C

6. (a) Explain procedure to derive S-curve hydrograph from a given unit hydrograph. Also describe the uses of S-curve hydrograph. 7

(b) A flood of 4000 m^3/s in a river has a return period of 40 years. What is its probability of exceedance and probability of occurrence of a flood less than 4000 m^3/s ? Also determine the probability that a flood of 4000 m^3/s or greater magnitude may occur in next 20 years. 8

7. (a) Explain the flood hydrograph and its components. Briefly describe the factors affecting the hydrograph. 6

(b) The ordinates of 3 hour unit hydrograph are given below :

Time in hour	0	3	6	9	12	15	18	21	24	27	30
Ordinates cum/sec	0	10	25	20	16	12	9	7	5	3	0

Find the ordinates of a 6 hour unit hydrograph for the same basin analytically. Also sketch this unit

hydrograph. What is the peak value of discharge in this unit hydrograph ? 9

SECTION – D

8. (a) Explain functional requirements of water resources projects. 7

(b) What is the need for planning of water resources projects ? Discuss briefly the various steps involved in planning of water resources projects. 8

9. (a) Explain the procedure to determine the reservoir capacity using mass curve. 7

(b) Describe briefly :

(i) Reservoir sedimentation

(ii) Components of power house 8