

Code No: R1622355

R16
SET -1
II B. Tech II Semester Regular Examinations, April-2018
SURFACE WATER HYDROLOGY

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **FOUR** Questions from **Part-B**
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PART -A

- 1 a) Define mass curve. (2M)
- b) Define overland flow and interflow. (2M)
- c) Explain rational formula for determining runoff. (3M)
- d) Explain the straight line methods of separation of base flow (3M)
- e) Define Synthetic Unit hydrograph. (2M)
- f) Define Hydrologic routing. (2M)

PART -B

- 2 a) Discuss the various types of precipitation with neat sketches. (7M)
- b) In a watershed, four rain gauges I, II, III, IV are installed. The depths of normal annual rainfall recorded at these stations are 80.0, 65.0, 75.5 and 92.0 cm respectively. The rain gauge at station I went out of order during one of the years. The annual precipitation for that year, recorded at the other three stations was 90.0, 72.5 and 80.0 cm at II, III and IV stations respectively. Estimate the rainfall at station I in that year. (7M)
- 3 a) Explain the Intensity –Duration –Frequency curves with neat necessary sketches. (7M)
- b) A storm of 10 cm precipitation produced a direct runoff of 5.8cm. The duration of the rainfall is 16 hrs. Estimate the ϕ – index. (7M)

Time from start	0	2	4	6	8	10	12	14	16
Cumul-ative rainfall	0	0.4	1.3	2.8	5.1	6.9	8.5	9.5	10

- 4 a) Discuss the different methods for measurement of stage. (7M)
- b) Explain about the Curve Number Technique and rational method for estimating peak runoff. (7M)

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- 5 a) Mention the basic assumptions of the Unit hydrograph and explain the step wise procedure for constructing a unit hydrograph from a storm hydrograph. (7M)
- b) The ordinates of 6 hr UH are given. A storm of 3 successive intervals of rainfall with magnitude 3cm, 5cm, 4cm, respectively. Assume a ϕ index of 0.2cm/hr and a base-flow of $30\text{m}^3/\text{sec}$. Determine the resulting flood hydrograph. (7M)

Time from start	Ordinates of 6h UH
0	0
6	250
12	600
18	800
24	700
30	600
36	450
42	320
48	200
54	100
60	50
66	0

- 6 a) A drainage basin, having an area of 520 km^2 , has a basin length L of 50 km, the L_{ca} as 22km and a peak discharge of $60\text{ m}^3/\text{s}$ for its unit hydrograph of 4-h effective rainfall period. The hydrograph peak occurred at 12-h from the beginning of rainfall excess. Just adjacent to this drainage basin, with similar geographic and agro-climatic conditions, is another drainage basin of area 250 km^2 of which the L and L_{ca} are 30 km and 1.5 km respectively. Develop a Synthetic unit hydrograph for the other basin by using the Snyder's method? (7M)
- b) Explain the different methods for flood control. (7M)
- 7 a) What is watershed management? Explain the objectives of Watershed Management. (7M)
- b) Differentiate between the following: (i) Hydraulic routing and hydrologic routing (7M)
 (ii) Channel routing and reservoir routing