

Total No. of printed pages = 4

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32/1/18, Hatik, Wapara,
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B.Tech. 7th Semester End-Term Examination

(All)

FLOOD MANAGEMENT AND RIVER ENGINEERING (Elective - I)

(New Regulation)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Choose the correct answer : (10 × 1 = 10)
- (i) The time required for the surface runoff from the remotest part of the catchment to reach the outlet is called
- (a) Time of concentration (b) Time factor
(c) Time lag (d) Time of arrival
- (ii) A catchment consists of 30% area with runoff coefficient of 0.60 while the remaining 70% area with runoff coefficient 0.40. The equivalent runoff coefficient of the catchment is
- (a) 0.46 (b) 0.54
(c) 0.76 (d) 0.48
- (iii) The most commonly used probability distribution to fit the flood data is
- (a) Gumbel's Distribution (b) Log Pearson Type-III
(c) Log normal Distribution (d) (a) and (b) above
- (iv) As a result of high flows in river, flooding extends over large areas called
- (a) Valley area (b) Flood plains
(c) Submergence area (d) All the above

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- (v) The longitudinal dams constructed along the rivers parallel to river flow to prevent overflow is called
- (a) Guide bank (b) Embankment
(c) Spurs (d) Bank revetment
- (vi) Which of the following is not a flood control measure?
- (a) Floodways (b) Channel improvement
(c) Flood proofing (d) Floodwalls
- (vii) The rational formula is suitable for design of areas generally up to
- (a) 500 sq km (b) 5000 ha
(c) 50000 ha (d) 5000 sq km
- (viii) For a return period of 1000 years, the Gumbel's reduced variate, Y_T is-
- (a) 6.907 (b) 4.001
(c) 5.386 (d) 6.632
- (ix) The reduced mean is a function of sample size N , if the value of N is too large its value is
- (a) 1.2825 (b) 1.5572
(c) 0.577 (d) 1.2528
- (x) The empirical formula of peak flow discharge can be used
- (a) In small areas in India
(b) In particular regions where they have developed
(c) In coastal areas
(d) In northern and central parts of India

2. (a) Define design flood and probable maximum flood. (2 + 2 = 4)
(b) What is the use of RCC porcupines? (2)
(c) A 100 ha watershed has the following characteristics-
- (i) Maximum length of travel of water 3500 m
(ii) Difference in elevation between the most remote point on the catchment and the outlet = 65 m

(iii) Land use details:

Land use	Area ha	Runoff coefficient
Forest	30	0.25
Pasture	10	0.16
Cultivated land	60	0.40

The maximum intensity-duration-frequency relationship for the catchment is given by $I = (3.97T^{0.165}) / (t + 0.15)^{0.733}$

where I = intensity in cm/h, T= Return period in years and t= Duration in minutes. Estimate the peak rate of discharge for the watershed for a 25 years frequency. (9)

3. (a) Describe the method of estimating a T-year flood using Gumbel's distribution. (7)

(b) Distinguish between annual series and partial duration series. (4)

(c) What is incipient motion? (4)

4. (a) What do you understand by Flood plain zoning, Flood proofing and flood insurance? (2 + 2 + 2 = 6)

(b) For a river the estimated flood peaks for two return periods by the use of Gumbel's method are as follows : (9)

Return Period (years)	Peak flood (m ³ /sec)
100	46300
50	40809

What flood discharge in this river will have a return period of 500 years?

5. (a) The mean annual flood of a river is 600 m³/s and the standard deviation of the annual flood series is 150 m³/s. What is the probability of flood of magnitude 1000 m³/s occurring in the river ? What is the probability of a flood of magnitude 1000 m³/s occurring in the river in next 5 years? Use Gumbel's method and the sample size is very large. (6 + 2 + 1 = 9)

(b) What is meandering? What are its causes? (2 + 4 = 6)

6. (a) Explain the differences between peninsular rivers and the Himalayan rivers. (5)
- (b) What is river training? Discuss its objectives. (1 + 4 = 5)
- (c) Discuss the characteristic bed features of mobile bed channels. (5)
7. (a) Differentiate between : (2 + 2 = 4)
- (i) Aggrading and degrading rivers
- (ii) Attracting and repelling spurs
- (b) What are the three stages of a river course? Discuss the characteristics of each stage. (2 + 5 = 7)
- (c) What is a flood embankment? Draw a typical section of an embankment. (1 + 3 = 4)

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