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16277(D) 10 DEC 2016

B. Tech 8th Semester Examination

Water Resources and System Engineering (NS)

CE-423

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each of the Sections A, B, C and D and all the subparts of the question in Section E.

SECTION - A

1. (a) Discuss the water resources potential of India. State and explain the reasons why India with a remarkable volume of rainfall and runoff has problems with usable water resources. (10)

   (b) The average monthly inflow to a reservoir in a dry year is as follows:

Month	Mean Monthly Flow (m^3/s)	Month	Mean Monthly Flow (m^3/s)
May	25	Nov.	70
June	60	Dec.	40
July	190	Jan.	145
Aug.	220	Feb.	45
Sept.	310	Mar.	30
Oct.	180	Apr.	20

Uniform discharge from the reservoir is 100 m^3/s. Determine live storage capacity of reservoir and dead storage capacity taking dead volume storage as 25 Mm^3. (10)

2. (a) What do you understand by water resources project planning? What are the steps involved and the pitfalls in planning of water resources projects? (10)

   (b) What are the functional requirements for a storage project for flood control and hydro-power generation? Explain how a multipurpose project can serve both the conflicting requirements and what are the compromises to be made? (10)

SECTION - B

3. (a) What is a flood? Enumerate the different methods of estimation of floods. Describe the rational method with its merits and limitations. (15)

   (b) A factory is proposed to be located on the edge of the 50 year flood plain of a river. If the design life of the factory is 25 years, what is the reliability that it will not be flooded during its design life. (5)

4 (a) What do you understand by flood frequency analysis? What are the different methods employed under this head for estimation of recurrence interval of a flood of given magnitude? (10)

   (b) What is a histogram and what are its applications? Explain with the help of a typical sketch. (10)

SECTION - C

5. (a) What are the different stages of rivers? Explain them with sketches where applicable. (10)

(b) What are the different types of sediments in an alluvial stream? Explain the critical tractive force approach for development of sediment transport equations in alluvial streams. (10)

6. (a) Draw and label a typical sketch showing meandering of a river. What are the factors controlling the process of meandering? (10)

(b) What do you understand by routing of floods? Enumerate the various methods of routing and explain any one of the methods in detail. (10)

SECTION - D

7. (a) What are the factors influencing erosion from a catchment? What are the methods normally employed for controlling erosion in a catchment? (10)

(b) Explain the non-structural measures employed for mitigation of floods. (10)

8. (a) What is rainwater harvesting? Describe the steps involved in conceptualizing and construction of a rainwater harvesting structure in urban area. (10)

(b) What are the strategies adopted for providing and regulating canal water for irrigation in any one state in India? (10)

SECTION - E

9. Explain/ Discuss the following:

(i) Geographical distribution of water in India.

(ii) Inter-Basin development of water.

(iii) Multipurpose versus single purpose water resources projects.

(iv) Feasibility studies in water resources projects.

(v) Element of risk in planning of water resources.

(vi) Characteristics of Himalayan and Non-Himalayan rivers.

(vii) Aggradation and degradation of rivers.

(viii) Strategies of delivering water for command area.

(ix) People's participation in sustainable water resources development.

(x) Assessment of canal revenue. (2×10=20)