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CE 1318E032 JINA CHOWDHURY CENTRAL LIBRARY
(GIMT & GIPS)

Azara, Hatkhowapara,

Guwahati - 781017

Roll No. of candidate

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2019

B.Tech. 8th Semester End-Term Examination

WATER RESOURCES ENGINEERING

Elective - III (Departmental)

Full Marks - 100

Time - Three hours

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

Answer Question No. 1 and any *six* from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- Trap efficiency is usually expressed as _____ of sediment yield of the catchment retained in the reservoir.
 - The _____ indicates the number of rupees one must invest at $r\%$ interest in order to have Rs. 1/- after n years.
 - _____ is the number of years required for the reservoir capacity to be fully depleted by sedimentation.
 - _____ dam carries most of the water load horizontally to the abutment.
 - The sediment originating from the land surface of the watershed and is transported to the stream channel is called _____.

[Turn over

- (vi) The benefits that are accrued of the economic consequences brought about by technological changes of a project is called _____
- (vii) A fairly impervious barrier formed at the center of the base of an earth dam by extending the core up to the depth where impervious strata are reached is called _____
- (viii) The storage requirement for _____ in a reservoir is least compatible of all the uses.
- (ix) For the upstream slope of an earth dam, the most critical condition is _____ condition.
- (x) The most rational method of sediment distribution is _____.
2. (a) Discuss the various steps involved in making economic study of an water resources project. (9)
- (b) Discuss (i) present worth method and (ii) benefit cost method of discounting. (3 + 3 = 6)
3. (a) Differentiate with examples (2 + 2 = 4)
- (i) Direct and indirect benefit
- (ii) Tangible and intangible benefits
- (b) A community can provide for its water storage needs either with a high elevated steel tank A or low elevated steel tank B on a nearby hill. Tank A will cost Rs. 1,50,000 and tank B, Rs. 1,20,000. Annual operating and maintenance cost will be Rs 6000/- for tank A and Rs. 10,000/- for tank B. Using the annual cost method and with 6% interest, determine which tank should be chosen if either of them 50 years of life and (i) are without any salvage (ii) have salvage of 5% when replaced. (8)
- (c) Discuss the requirement of uses in multipurpose projects. (3)

4. (a) What are the basic steps involved in planning of water resources projects? (4)
- (b) State the purpose of collecting field data for water resources project planning. Discuss their types and importance. (8)
- (c) What is sunk cost? Explain with example. (3)
5. (a) Discuss different levels of planning objectives. (4)
- (b) State briefly the environmental considerations to be made in planning multipurpose project. (6)
- (c) What do you mean by Trap efficiency? Discuss the process of deposition of sediment in a reservoir. (2 + 3 = 5)
6. (a) What is cost allocation? (2)
- (b) Differentiate joint cost and separable cost. (3)
- (c) Discuss briefly the water resources potential of North Eastern Region. (5)
- (d) Discuss the site investigations to be made before taking up design and construction of dam. (5)
7. (a) Discuss the stability criteria of gravity dam. What are the requirements for stability of the gravity dam? (3 + 6 = 9)
- (b) Describe the factors to be considered for selecting the type of a dam. (6)

8. (a) Discuss the compatibility of multipurpose users. (5)
- (b) There are two alternatives for, purchasing a concrete mixer. Both the alternatives have same useful life of 5 years. The cash flows are as under. (10)

Alternative - I

Alternative - II

Initial purchase cost = Rs. 3,00,000

Initial purchase cost = Rs. 2,00,000

Annual O & M cost = Rs. 20,000

Annual O & M cost = Rs. 35,000

Expected salvage value = Rs. 1,25,000

Expected salvage value = Rs. 70,000

Draw the cash flow diagrams and using present worth method find out which alternative will be selected if the rate of interest is 10%.

9. (a) A reservoir has a capacity of 8 mm³ at full reservoir level. The catchment area is 500 sq km. The average annual runoff of the catchment is 300mm and sediment yield is 12.5 MN/km². The sediment can be assumed to have an average in situ specific weight of 12.5 KN/m² after deposition. Estimate the time required for reservoir capacity to be reduced to 25% of its initial volume. Use uniform steps of capacity interval of 1 Mm³. The variation of the trap efficiency is given by the relation: (10)

$$\eta_c = 100 \times \left[1 - \frac{1}{\left(1 + 100 \left(\frac{C}{1} \right) \right)} \right]^{1.5}$$

- (b) Discuss the drawbacks in water resources planning. (5)