GUJARAT TECHNOLOGICAL UNIVERSITY

Subject code: 721202
Subject Name: Water Resources Planning

Date: 06 /07 /2010   **Time: 11.00am – 1.30pm**
                                                       Total Marks: 60

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the following discounting techniques: **06**
          (i) The annual cost method (ii) The benefit-cost ratio Method.
     (b) The two alternatives water resources projects described in table given below   **06**
          are available for irrigation and flood control. Compare the projects by the
          present worth method. Which project will you select?

Cost	Project-A Rs.	Project-B Rs.
Construction cost	80×10^6	50×10^6 1st stage 20 years 60×10^6 2nd stage 20 years
Operation & Maintenance cost	0.32×10^6 per year for 40 years	0.20×10^6 for 1st 20 years 0.40×10^6 for 2nd 20 years
Economic life	40 years	40 years for each stage
Period of analysis	40 years	40 years
Annual benefits	4×10^6	5×10^6
Discount rate	4 %	4 %

Q.2 **(a)** Define the following terms: **06**
          (i) The economic life (ii) Cash flow diagram
          (iii) Capital-recovery factor and (iv) Sinking fund factor.
          (v) Justifiable cost (vi Remaining benefit.
     (b) The total cost of a multipurpose project is Rs. 200 crores. Allocate the costs to   **06**
          different project purposes using the following information by remaining
          benefits method.

Project Purpose	Flood Mitiga-tion	Hydro-Power	Irrigation	Naviga-tion
Separable cost (Rs. in crores)	43.00	68.00	17.00	5.50
Estimated Benefits (Rs. in crores)	57.00	170.00	40.00	11.00
Alternative single purpose cost (Rs. in crores)	45.00	113.00	68.00	9.00

OR

     (b) Discuss the basic principles of cost allocation.   **06**

| Q.3 | (a) | State and explain the various feasibility tests carried out in the project evaluation. | 06 |
| | (b) | Explain with neat sketch, the stages of project life. | 06 |

OR

| Q.3 | (a) | Briefly discuss the steps involved in planning of water reservoir project. | 06 |
| | (b) | Write the various water requirements of a multipurpose project. Discuss their compatibility. | 06 |

| Q.4 | (a) | Explain the method for the determination of the required storage capacity of a reservoir when the demand is (i) Uniform and (ii) Average. | 06 |
| | (b) | The average monthly adjusted runoff of a river during a critical year is as follows | 06 |

Month	JAN.	FEB.	MAR.	APR.	MAY	JUN.
Run-off (ha-m)	540	460	680	670	315	700

Month	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Run-off (ha-m)	7500	6000	3500	2500	600	700

If there is a uniform demand of 7 cumecs. Determination the reservoir capacity.

OR

| Q.4 | (a) | How would you estimate the available storage capacity of a reservoir? Draw typical storage –elevation curve. | 06 |
| | (b) | Discuss in detail the reservoir operation of a multipurpose project and working table | 06 |

| Q.5 | (a) | Explain the environmental impacts of multipurpose project. | 06 |
| | (b) | How will you carry out social evaluation studies for water resources projects? | 06 |

OR

| Q.5 | (a) | Discuss water law and policies | 06 |
| | (b) | Discuss risk and uncertainty considerations in water resources planning | 06 |

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