Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem. – IInd - Examination – June/July- 2011

Subject code:1721202

Subject Name: Water Resources Planning

Date:24/06/2011 **Time: 10:30 am – 01:00 pm**

Total Marks: 70

Instructions:

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

Q.1 **(a)** Define the following terms: **07**
(i) The economic life (ii) Cash flow diagram
(iii) Capital-recovery factor and (iv) Sinking fund factor
(v) Justifiable cost (vi) Remaining benefit and (vii) Cost-center

(b) Explain the following discounting techniques: **07**
(i)The rate of return method. (ii) The annual cost method.

Q.2 **(a)** The two alternatives described below are available for irrigation project for the next 45 years when all economic lives as well as the periods of analysis terminate. **07**

Construction cost	Project-**A**	Project-**B**
Year-1	Rs. 20 x 10^6	Rs. 20 x 10^6
Year-15	0	Rs. 10 x 10^6
Year-30	0	Rs. 05 x 10^6
Operation & Maintenance cost	Project-**A**	Project-**B**
Year 1-15	Rs. 80000	Rs. 60000
Year 16-30	Rs. 90000	Rs. 85000
Year 31-45	Rs. 98000	Rs. 93000
Annual benefits	Rs. 4 x 10^6	Rs. 5 x 10^6

Using a 4% discount rate, compare the projects by:
i) The present-worth method (ii) The benefit-cost ratio method.

(b) Discuss the basic guiding rules for allocation of cost **07**

OR

(b) The following data pertain to a multipurpose project: **07**
Allocate the cost using the alternative justifiable cost method. Assume total cost of project is Rs. 3.00 crores

Sr. No.	Item	Flood control	Irrigation	Hydro-power
		(Cost in thousands of rupees)		
1	Separable cost	2400 x 2	6500 x 2	2600 x 2
2	Benefits	4000 x 2	8200 x 2	3400 x 2
3	Alternative single purpose cost	3000 x 2	7200 x 2	3200 x 2

Q.3 **(a)** Differentiate between: **07**
(i) Direct benefits and indirect benefits
(ii) Tangible benefits and intangible benefits
(iii) Engineering feasibility test and financial feasibility test
(iv) Political feasibility test and social feasibility test

(b) Write the various water requirements of a multipurpose project. **07**
Discuss their compatibility.

OR

Q.3 **(a)** Explain the optimum construction date in detail. **07**

(b) Present worth of benefits and costs of two mutually exclusive 'Base' proposals are shown below, along with the data for the supplementary projects which can be combined with either base to yield additional benefits. The supplementary projects are not mutually exclusive. Which combination of projects is preferred, when resources are limited to Rs. 5.5 crores? **07**

Basic projects				Supplementary Projects		
Project	Benefit Rs.	Cost Rs.	B/C	Project	Benefit Rs.	Cost Rs.
P_1	40×10^6	20×10^6	2.00	S_1	08×10^6	06×10^6
P_2	50×10^6	30×10^6	1.67	S_2	15×10^6	12×10^6
-	-	-	-	S_3	32×10^6	16×10^6

Q.4 **(a)** How will you carry out social evaluation studies for water resources projects? **07**

(b) Write strategies which are available to planners to reduce uncertainty in WRP **07**

OR

Q.4 **(a)** How would you estimate the available storage capacity of reservoir? Draw typical storage elevation curve. **07**

(b) The following table gives the average monthly flow in a river for a particular year. **07**

Month	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.
Discharge (m^3/sec)	1000	975	700	632	390	280
Month	Dec.	Jan.	Feb.	Mar.	Apr.	May.
Discharge (m^3/sec)	250	180	170	165	160	150

(i) Compute and draw monthly flow-duration curve
(ii) Determine the total quantity of water available for power.
(iii) Determine the flow available for firm power
(iv) Estimate the storage required for the maximum power.

Q.5 **(a)** Discuss planning for water resources development projects.. Also explain the environmental consideration in planning **07**

(b) Discuss interstate and international water problems **07**

OR

Q.5 **(a)** Briefly discuss the steps involved in planning of water reservoir project. **07**

(b) Discuss water law and policies **07**

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