

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M. E. - SEMESTER – II • EXAMINATION – WINTER 2012**

**Subject code: 1721202****Date: 31-12-2012****Subject Name: Water Resources Planning****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 physical life (ii) Cash flow diagram  
 (iii) Compound amount factor (iv) Sinking fund factor.  
 (v) Joint cost (vi) Alternative cost and (vii) Benefits.
- (b) 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. $20 \times 10^6$ | Rs. $20 \times 10^6$ |
| Year-15                      | 0                    | Rs. $10 \times 10^6$ |
| Year-30                      | 0                    | Rs. $05 \times 10^6$ |
| Operation & Maintenance cost | Project-A            | Project-B            |
| Year 1-15                    | Rs. 70000            | Rs. 60000            |
| Year 16-30                   | Rs. 80000            | Rs. 70000            |
| Year 31-45                   | Rs. 90000            | Rs. 80000            |

Using a 5% discount rate, compare the projects by:

- (i) The present-worth method (ii) The benefit-cost ratio method.

- Q.2** (a) Explain the following discounting techniques: **07**  
 (i) The rate of return method. (ii) The annual cost method.
- (b) Briefly discuss the critique of benefit cost analysis. **07**

**OR**

- (b) The total cost of a multipurpose project is Rs. 200 crores. Allocate the costs to different project purposes using the following information by alternate justifiable method. **07**

| Project Purpose                                 | Flood Mitigation | Hydro-Power | Irrigation | Navigation |
|---|------------------|-------------|------------|------------|
| 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       |

- Q.3** (a) Briefly discuss the steps involved in planning of water reservoir project. **07**  
 (b) Write the various water requirements of a multipurpose project. **07**  
 Discuss their compatibility.

**OR**

- Q.3** (a) State and explain the various feasibility tests carried out in the project evaluation. **07**  
 (b) What are the stages of project life? Discuss in brief. **07**

- Q.4** (a) Discuss the reservoir operation for optimum benefits. **07**

- (b) The average annual discharge of a river for 11 years is as follows: **07**

|                       |      |      |      |      |      |      |
|-----------------------|------|------|------|------|------|------|
| Year                  | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
| Discharge<br>(cumecs) | 1750 | 2050 | 3010 | 2240 | 2630 | 3200 |
| Year                  | 1986 | 1887 | 1988 | 1989 | 1990 | -    |
| Discharge<br>(cumecs) | 1080 | 950  | 1200 | 4150 | 3500 | -    |

Determine the storage capacity required to meet a demand of 2000 cumecs throughout the year.

**OR**

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

- Q.4 (b)** What is trap efficiency? How would you estimate the useful life of reservoir? **07**

- Q.5 (a)** Write water laws and policies. **07**

Discuss interstate water problems with examples

- (b)** Discuss risk and uncertainty considerations in water resources planning **07**

**OR**

- Q.5 (a)** Discuss social, economical and environmental impacts of water resources projects. **07**

- (b)** Discuss in detail financing of water resources development projects. **07**

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