

**COLLEGE OF ENGINEERING, PUNE**  
**END SEMESTER EXAMINATION**  
**(EW603) ECONOMICS, PLANNING AND MANAGEMENT OF SYSTEMS**

Program: S. Y. M.Tech Civil (EWRE)  
 Time: 3 Hrs.

Year: 2013-2014  
 Max. Marks: 60

**Instructions:**

1. All questions are compulsory.
2. Assume suitable data if necessary.
3. Use of scientific calculator is allowed.

**Q.1 a)** Which of the following plans is more economical at 6% interest rate? Compare the two plans by Equivalent annual cost and Present worth methods. **05**

	Plan A	Plan B
Cost of equipment	50000	35000
Annual O&M cost	2000	2500
Salvage value	7000	6000
Service life	30 years	15 years

**b)** A Water project is proposed to supply water for municipal and irrigation use. The demand curve for municipal use is given by  $P+2y = 10$ , and the demand curve for irrigation is given by  $2P+y = 20$ , where  $y$  is the demand and  $P$  is price in appropriate units. Determine the aggregate demand curve. **05**

**Q.2 a)** A multipurpose project is planned to include hydropower, irrigation, flood control and water supply. The estimated total project cost is Rs. 1765 million. The estimated benefits, separable costs and alternate single-purpose cost are as given in Table 1. Find the cost allocation to various purposes using separable cost- remaining benefits method. **05**

Description	All values are in Rs.10 <sup>6</sup>			
	Hydropower	Irrigation	flood control	water supply
estimated benefits	500	1500	350	100
separable costs	380	600	150	50
alternate single-purpose cost	400	1000	600	80

- b) In a flood plain, the cropland is planted with four crops. Hydrologic analysis reveals that 80% of the historical floods have occurred in season I, and 20% in season II. What is the expected damage per hectare to this cropland when it is flooded? 05  
Other data is as given below:

Crop	% area occupied	Income without flooding (Rs./Ha)	Income with flooding (Rs./Ha)	
			Season I	Season II
A	30	1560	910	1430
B	40	845	195	520
C	15	2600	130	2340
D	15	1100	800	950

- Q.3 a) The flow duration curve data at a run-of-river hydro plant site is given below: 05

**Table – Weekly flow duration curve data**

Stream discharge in cumecs	0.60	0.35	0.30	0.17	0.12
Period during which discharge is equalled or exceeded in %	8	21	28	80	100

If the constant head is 50 m and the power plant efficiency is 60%

- (i) Calculate total amount of firm energy available,
  - (ii) If the power plant capacity is 90 kW, calculate the amount of peak energy available
  - (i) Calculate the total energy potential available,
  - (ii) If at least 0.05 cumecs flow must be maintained in the stream for environmental considerations, calculate peak energy available.
- b) There are 3 alternate proposed sites for planning an irrigation project. The inflow data for the 75% annual dependable flow year for these sites and the irrigation water demands at the proposed command area are given below. Analyze the data and determine which type of water resources development project may be suited for irrigation at each of the three sites. 05

Month	The inflow for the 75% annual dependable flow year MCM			Irrigation water demand
	Site 1	Site 2	Site 3	
1	5	5	4	3
2	4	7	7	3
3	4	8	7	4
4	6	4	5	5
5	9	3	2	7
6	10	3	1	8
7	7	2	2	5
8	5	1	3	4
9	5	3	3	3
10	6	6	2	3
11	3	8	5	2
12	8	9	6	5



**Q.4 a)** Discuss various elements involved in water resources planning and its objective. **05**

**b)** A 25 hectare woodlot is to be harvested. The harvestable volume on the woodlot is  $200\text{m}^3/\text{hectare}$  which can be sold for a unit volume of  $15/\text{m}^3$ . The standard logging produces 2.8 metric tons/hectare of sediment, whereas the acceptable sediment load is 1.5 metric tons/hectare. The standard logging requires Rs. 500/hectare towards the cost charges. For sediment control either a buffer strip of 5 hectare or a filter strip of 8 hectare are proposed. For the filter strip an additional winched out cost of Rs. 10100 is required. Determine which alternative is suitable and estimate the cost of sediment discharge restriction. **05**

**Q.5 a)** The demand curve for recreation at a reservoir site is determined as  $4P+Y = 30$ , where Y is the annual demand and P is price in appropriate units. The annual demand was 10 without the reservoir and is expected to increase to 20 with the construction of the reservoir. Estimate the benefits of recreation arising from the construction of the reservoir. **05**

**b)** Regulate an irrigation reservoir from the following data given in Table. **05**

Sl.No.	Month	River flow in Units	Irrigation requirement in percent
1	Jan	4.856	7.92
2	Feb	4.503	6.13
3	Mar	2.914	10.82
4	Apr	0.883	5.18
5	May	0.265	6.33
6	Jun	2.119	10.22
7	Jul	52.889	3.77
8	Aug	173.942	3.03
9	Sept	119.022	8.85
10	Oct	54.390	16.44
11	Nov	12.185	15.70
12	Dec	4.062	5.61

The capacity of the reservoir is 330 units and the annual irrigation target is 340 units. Assume reservoir to be full in the beginning of January. Also give the behaviour of the reservoir. Take reservoir evaporation as 5 % from January to March, 10 % from April to June, and 2 percent from July to December, of the inflows.

**Q.6** Write short notes on

- a)** Skimmed price and penetrating price. **2.5**
- b)** Price elasticity of demand **2.5**
- c)** Indifference curves **2.5**
- d)** Environmental economics **2.5**

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