

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2016

00730

ET-534(C) : WATER RESOURCES PLANNING

Time : 3 hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. (a) Describe the features of the following : 7
 - (i) The Continental Shelf of Indian seas and Indian islands
 - (ii) A Lake and a Swamp
- (b) What do you understand by land-use pattern ? Describe its importance and application. 7
2. (a) Explain about hydrological cycle and its processes with a neat sketch. 7
- (b) A Mexican wheat crop is grown in soil made up of fine sandy loam (14 cm top layer), light sandy clay (26 cm middle layer) and sandy clay loam (60 cm bottom layer) and moisture holding capacity as 0.13 cm/cm, 0.14 cm/cm and 0.15 cm/cm, respectively. If the effective root zone is 91 cm thick, find out the net irrigation water application and rotation period for irrigation. Take peak moisture use rate at 5.08 mm/day. Assume that 80% of peak moisture consumption is met from root zone. Take field water application efficiency as 85%. 7

3. (a) List different methods of population forecasting. Explain it in detail. 8
- (b) Derive the relation between duty and delta. If $1.5 \text{ m}^3/\text{sec}$ flow is allowed to the field for a base period of 14 weeks to mature a wheat crop with total irrigation requirement of 40 cm, determine the duty of water. 6
4. (a) List the methods of surface irrigation and subsurface irrigation. Explain in detail surface irrigation methods with neat sketches. 7
- (b) Explain briefly : $2 \times 3 \frac{1}{2} = 7$
- (i) Most common method used for disinfecting public water supply
- (ii) Reverse Osmosis
5. (a) Differentiate between simulation and optimization modes. 5
- (b) The estimated cost of installing a hydro power plant is 50 crore rupees. Assume that 10 crore rupees have been spent on the hydro power installation. A steam plant costing an estimated 30 crore rupees is subsequently found to be capable of supplying the same energy. Which facility should be selected assuming all other future costs and all benefits from the plant to be the same ? Explain your answer. What is sunk cost ? 4
- (c) Describe the role of environmental impact indices. 5

6. Up to 1000 ha of land is available for growth of alfalfa and sugar beet near the boundary of States A and B. Irrigation water is pumped up from the river at a cost of ₹ 5,000 per cubic metre. During the irrigation season, the available river water discharge is 20 million cubic metres with a salinity of 1500 mg per litre. By a treaty between the states, the river must have an available discharge of water at the border, of at least 10 million cubic metres and a salinity of not more than 2500 mg per litre. Develop an optimal management plan for 1000 ha of land. Additional data is as given below :

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<i>Parameter</i>	<i>Alfalfa</i>	<i>Sugar beet</i>
Evapotranspiration (m)	1.0	0.7
Maximum yield	10	40
Salinity level (mg/l) at maximum yield	1300	4500
Salinity level (mg/l) at which yield is zero	10391	15611
Factor for yield (tonnes/ha)	0.00011	0.00009
Fixed cost (₹/ha)	200	500
Product price (₹/tonne)	100	30
Delivery efficiency	0.70	0.70
Leaching factor	same for both the crops	

7. Write short notes on any **four** of the following : $4 \times 3 \frac{1}{2} = 14$

- (a) Irrigation Efficiency
 - (b) Crop Water Requirement
 - (c) Delta and Duty
 - (d) Chemical Characteristics of Water
 - (e) Evaporation and Transpiration
 - (f) Coagulation and Sand Filters
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