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**BICEE-015**

# B.Tech. IN CIVIL ENGINEERING (BTCLEVI)

## Term-End Examination

00345

**December, 2014**

## BICEE-015 : WATER RESOURCES SYSTEM PLANNING AND DESIGN

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Answer any* ***seven*** *questions. All questions carry equal marks. Assume any missing data. Non-programmable scientific calculator is allowed.*

**1.** Using Simplex algorithm, solve the following linear programming problem :

Maximize $z = 1x_1 + 2x_2 + 3x_3$

subject to

$1x_1 + 1x_2 + 1x_3 \leq 5$

$2x_1 + 3x_2 + 4x_3 \leq 24$ *10*

**2.** What is multi-objective planning ? Discuss its importance in water resource system with suitable example. *10*

**3.** (a) Discuss the importance of conjunctive use of water with suitable example. *5*

(b) Describe Dynamic Programming and its application in water resources. *5*

**4.** (a) Explain the economic life and physical life of Water Resource Project. *5*

(b) Discuss the various data required to be collected for planning of Water Resource Project. *5*

**5.** Area of a farming field is 200 hectare and the farmer wants to grow wheat and pulses on this land. It costs ₹ 3/ha to raise wheat crop while for pulses, the cost is ₹ 1/ha. The benefit from wheat crop is ₹ 5/ha and from pulses crop, it is ₹ 2/ha. A sum of ₹ 300 is available for raising both crops. Formulate a linear programming problem to find optimal cropping plan. How much area is to be allotted for wheat crop and how much for pulses, so as to maximize the total net benefit ? *10*

**6.** (a) What are the economic and financial aspects of water resource planning and management ? *5*

(b) What are the institutional aspects of water resource planning and management ? *5*

7. (a) Discuss the mass diagram method for estimating the reservoir capacity. *5*

(b) Write the scope of Water System Engineering in the Indian context. *5*

8. (a) The following table gives the mean monthly flow in a river during a particular calendar year. Calculate the minimum storage demand rate if 40 $m^3/s$, is the overflow rate. *5*

| Month | Mean flow (cumec) |
|---|---|
| January | 60 |
| February | 45 |
| March | 35 |
| April | 25 |
| May | 15 |
| June | 22 |
| July | 50 |
| August | 80 |
| September | 105 |
| October | 90 |
| November | 80 |
| December | 70 |

(b) Discuss non-structural method of flood control. *5*

**9.** Enumerate the procedural steps for planning ground water system. *10*

**10.** Among the following plans, identify the more economical plan at 6% interest rate. Adopt the present worth (Pw) comparison method. *10*

| | Plan A | Plan B |
|---|---|---|
| Cost of equipment | 50,000 | 35,000 |
| Annual O & M cost | 2,000 | 2,500 |
| Salvage value | 7,000 | 6,000 |
| Service life | 30 years | 15 years |