**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examinations – June 2016**

**Subject Title: SYSTEMS ANALYSIS Time : 3 hours**

**Subject Code: 14CE3029 Maximum Marks: 100**

**Answer ALL questions (5 x 20 = 100 Marks)**

1. a. Define Systems and types of systems. (10)

b. What do you mean by design and analysis of a system? Explain with an example. (5)

c. Discuss the problems in systems analysis in relation to water resources. (5)

**(OR)**

2. a. Explain the procedures for optimization of functions with single variable and multi- variables. (10)

b. Explain Sensitivity Analysis with reference to optimality and feasibility. (10)

3. a. For all LP problems, the optimum solution will always fall on the boundary of the feasible space. Explain this with a graphical approach. (4)

b. A fruit grower has 150 acres of land available to raise two crops, A and B. It takes one day to trim an acre of crop A and two days to trim an acre of crop B, and there are 240 days per year available for trimming. It takes 0.3 day to pick an acre of crop A and 0.1 day to pick an acre of crop B, and there are 30 days per year available for picking. Find the number of acres of each fruit that should be planted to maximize profit, assuming that the profit is Rs 7000 per acre for crop A and Rs11750 per acre for crop B. (16)

**(OR)**

4. a. An irrigation project is to be developed. There is 20 Mm3 of water available annually. Two high-value specialty crops, A and B, are considered for which water consumption requirements are 9000 m3 and 6000 m3, respectively. It has also been determined that the planting of more than 1600 hectares to crop A or 2400 hectares to crop B would cause an adverse effect on the market for these special crops. It has been estimated that each acre devoted to crop A will result in Rs. 28800 profit, while an acre of crop B will net Rs. 48,000. Structure the LP model for this problem stating the logics involved. (12)

b. Explain the process of Inflow as a stochastic process. (8)

5. a. Explain the procedure involved in Reservoir capacity expansion by means of simulation. (15)

b. Discuss Bellman’s principle of optimality. (5)

**(OR)**

6. Consider that funds are allocated to three water resources development project namely, A, B and C in order to maximize the total expected revenue. Each water resources development project consists of different alternative configurations that require different funding levels and yield different revenues. Due to budget limitations, the total available funds for the entire development are fixed. Describe the general philosophy of the dynamic programming technique in deriving the optimal allocation of funds to the three projects with the objective of maximizing the total revenues. (20)

7. a. Explain reservoir operation using standard operating policy for irrigation. (10)

b. Determine the required capacity of a reservoir whose inflows and demands over a 6- period sequence are as given below: (release = demand) (10)

Period (t): 1 2 3 4 5 6

Inflow (Qt): 4 8 7 3 2 0

Demand (Dt): 5 0 5 6 2 6

**(OR)**

8. a. Explain the objective function and constraints to be involved in the operation of a multi- reservoir for irrigation planning. (15)

b. Discuss about role of mass diagram for determining reservoir capacity. (5)

9. **Compulsory**:

a. Explain simulation and its importance in Water resources systems. (8)

b. Explain the components of a simulation model. (5)

c. Explain the usefulness of simulation runs and the combination of simulation and optimization. (7)