

FACULTY OF ENGINEERING

B. E. 4/4 (Civil) I Semester (Suppl.) Examination, July 2012

Subject: **Surface and Ground Water Management**

Time: 3 Hours

(*Elective-I*)

Max. Marks: 75

Note: Answer all questions from Part-A. Answer any *Five* questions from Part-B.

PART – A (25 Marks)

1. Define the term system and explain the concept of system. 3
2. Distinguish between convex function and concave function. 3
3. What is lagrangian multiplier? How it is useful in system problem. 2
4. What do you understand by recursive equation in D.P. problem? Under what conditions D.P. problem method is useful in water resources. 3
5. What do you understand by conjunctive use? State its suitability. 2
6. Compare two popularly adopted resistivity arrangement viz. Wenner and Schlumberger methods in ground water resistivity test. 2
7. At an interface of Land and Sea the following data has been obtained. Permeability 42.0 m/day. Thickness of aquifer 25.0 m, difference in specific gravity is 0.03. Salt water intrusion discharge per metre width 2.60 m³/day. Compute the length of Sea water intrusion.
8. State atleast three conditions favourable for natural or artificial recharge of ground water. 3
9. Write the general water balance equation and list out all variables. 2
10. Explain how do you apply a D.P. Model for reservoir operation. 2

PART – B (50 Marks)

- 11.(a) Explain various steps of Systems Engineering. 5
- (b) Compare and contrast the following with relevance of systems engineering 5
 - (i) Simple and complex system
 - (ii) Lumped parameter and distributed parameter systems.
- 12.(a) Solve the following L.P. problem either graphically (or) analatically. 5
$$\text{Min. } Z = 20x_1 + 10x_2$$
$$\text{Sub to } 0x_1 + 2x_2 \leq 40$$
$$3x_1 + x_2 \geq 30$$
$$4x_1 + 3x_2 \geq 60$$
$$x_1, x_2 \geq 0$$
- (b) What do you understand by dynamic programming? Explain the general procedure and recursive equations for solving a D.P. Model for reservoir operation problem. 5
- 13.(a) Write a note on safe yield from ground water. Also explain any two methods of computation of safe yield from ground with relevant suitability conditions of these methods. 5
- (b) What do you understand by conjunctive use? Explain briefly the advantages of it. 5
- 14.(a) With the help of neat sketches explain recharge through pits and shafts and recharge through wells. 5
- (b) Explain various irrigation methods of recharge of ground water. 5
- 15.(a) With the help of neat sketch explain Sank tank model and explain its relevance in ground water. 5
- (b) Two crops are grown on a land of 500 Hact. The cost of rising crop 1 is 4 units / Hact and for crop 2 is 3 units / Hact. The gross benefit from crop 1 is 6 units/Hact and that of crop 2 is 7 units/Hact. The total available money to grow the crops is 400 units. Compute the pattern of cropping to be followed to maximize net benefits. 5
- 16.(a) What do you understand by basin management of ground water? Explain all the features of it. 6
- (b) Distinguish between optimization and simulation modelling. 4
17. Write note on the following: 10