

B.E.FULL TIME DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011

INDUSTRIAL ENGINEERING

FOURTH SEMESTER- (REGULATION-2004)

**IE281 DETERMINISTIC OPERATION RESEARCH**

Time: 3 hr

Max. Mark: 100

Answer ALL Questions

Part-A (10 X 2 = 20 Mark)

1. What are the various models used in OR?
2. What are the applications of duality principles?
3. What are the conditions for maintaining dual feasibility in solving unbalanced transportation problem?
4. Define k-median problem.
5. Define flow augmenting path.
6. What are the applications of minimum spanning tree?
7. What is VED analysis?
8. What is Production Consumption Model?
9. Define the following: (i) Stage (ii) State
10. Define the following: (i) Decision Variable (ii) Criterion of Effectiveness

Part-B (5 X 16 = 80 Marks)

11. Solve using dynamic programming:

(16)

$$\text{Maximize } 8X_1^2 + 5X_1 + 6X_2^2$$

Subject to

$$X_1 + 2X_2 \leq 9$$

$$X_1 + 3X_2 \leq 10$$

$$X_1, X_2 \geq 0$$

12. (a) Solve the following problem using simplex method:

$$\text{Maximize } Z = 8X_1 + 6X_2$$

Subject to

$$X_1 + X_2 + X_3 = 10$$

$$2X_1 + 3X_2 + X_4 = 25$$

$$X_1 + 5X_2 + X_5 = 35$$

$$X_1, X_2, X_3, X_4, X_5 \geq 0$$

OR

12. (b) Consider the following LPP Solve the primal using simple and the dual by dual simplex algorithm: Maximize  $Z = 8X_1 + 6X_2 - X_3$

Subject to

$$8X_1 + 6X_2 - 2X_3 \leq 13$$

$$X_1 + X_2 - X_3 \leq 4$$

$$X_1, X_2, X_3, \geq 0$$

13 (a) Explain the procedure in solving Transportation problem and Travelling salesman problem?

OR

13 (b) Describe the steps involved in solving Assignment Problem and Goal Programming?

14 (a) The hostel management of a college is considering quotations from three vendors to whom it has to place orders for rice. Nellore provision stores quotes Rs 120/bag irrespective of the quantity ordered. Green and Company will accept orders only for 800 or more bags but quotes a price of Rs 108/bag. Ponni Trading Company will accept orders only for 1000 or more bags at Rs.100/bag. Chamba and company will accept orders only for 400 bags or more for a cost of Rs112/bag. The total requirement of the 12 hostels for which the management buys is 3000 bags per semester (six months). Inventory carrying costs are 20% of the unit cost and the ordering cost is Rs.400/order. Which vendor would you recommend for placing the orders and for what quantity per order? (16)

OR

14 (b) Consider the production inventory model with backorders. The data are  $D=10000/\text{year}$ ,  $P=16000/\text{year}$ ,  $C_o=\text{Rs.}350/\text{Setup}$ ,  $C_c=\text{Rs.}3.6/\text{unit}/\text{year}$  and  $C_s=\text{Rs.}100/\text{unit}/\text{year}$ . Find the batch quantity  $Q$  and the total cost. Find the time in a cycle, where there is production and consumption, consumption of existing inventory, and build up of backorder. (16)

15 (a) Describe the procedure involved in solving Maximal flow and minimal spanning tree? (16)

OR

15 (b) Explain the steps involved in solving PERT/CPM and Resource Levelling? (16)