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IB

Reg. No. : | | | | | | | | | | | | |

**Question Paper Code : 45889**

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fifth/Seventh Semester

Software Engineering

XCS 351/10677 SW 501 — OPERATIONS RESEARCH

(Common to 5 Year M.Sc. Information Technology and M.Sc. Computer Technology)

(Regulation 2003/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the uses of operations research.

2. Define : Objective function.

3. What do you mean by feasible solution?

4. List the difference between Transportation problem and assignment problem.

5. State down the rules for constructing a project network.

6. Define : Crashing.

7. What do you mean by Holding Cost?

8. List the types of Deterministic inventory models.

9. State the uses of Kendal's notation.

10. Define: Transition Probability.

PART B — (5 × 16 = 80 marks)

11. (a) Use two phase method to

$$\text{Max } Z = 5x_1 + 3x_2$$

Subject to
$$2x_1 + x_2 \leq 1$$
$$x_1 + 4x_2 \geq 6$$

and $x1, x2 \geq 0$.

Or

(b) Use Dual simplex method to solve the LPP.

$$\text{Max } Z = -3x_1 - 2x_2$$

Subject to
$$x_1 + x_2 \geq 1$$
$$x_1 + x_2 \leq 7$$
$$x_1 + 2x_2 \geq 10$$
$$x_2 \leq 3$$

and $x1, x2 \geq 0$.

12. (a) Obtain an optimum basic feasible solution to the following transportation problem :

| | | To | | Available |
|---|---|---|---|---|
| From | 7 | 3 | 2 | 2 |
| | 2 | 1 | 3 | 3 |
| | 3 | 4 | 6 | 5 |
| Demand | 4 | 1 | 5 | 10 |

Or

(b) The assignment cost of assigning anyone operator to anyone machine is given in the following table.

| | | Operators | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| | A | 10 | 5 | 13 | 15 |
| Machine | B | 3 | 9 | 18 | 3 |
| | C | 10 | 7 | 3 | 2 |
| | D | 5 | 11 | 9 | 7 |

Find the optimal assignment by Hungarian method.

13. (a) Compute the earliest start, earliest finish, latest start and latest finish of each activity of the project given below.

| Activity | 1-2 | 1-3 | 2-4 | 2-5 | 3-4 | 4-5 |
|---|---|---|---|---|---|---|
| Duration (in days) | 8 | 4 | 10 | 2 | 5 | 3 |

Or

(b) A project consists of the following activities and time estimates :

| Activity | Least time (days) | Greatest time (days) | Most likely time (days) |
|---|---|---|---|
| 1-2 | 3 | 15 | 6 |
| 2-3 | 2 | 14 | 5 |
| 1-4 | 6 | 30 | 12 |
| 2-5 | 2 | 8 | 5 |
| 2-6 | 5 | 17 | 11 |
| 3-6 | 3 | 15 | 6 |
| 4-7 | 3 | 27 | 9 |
| 5-7 | 1 | 7 | 4 |
| 6-7 | 2 | 8 | 5 |

(i) Draw the network

(ii) What is the probability that the project will be completed in 27 days?

14. (a) Find the Optimal quantity for a product where the annual demand for the product is 500 units. The cost of storage per unit per year is 10% of the unit cost and the ordering cost per order is Rs.180.00. The unit costs are given below :

| Quantity | Unit cost |
|---|---|
| $0 \leq Q1 < 500$ | Rs. 25 |
| $500 \leq Q2 < 1500$ | Rs. 24.80 |
| $1500 < Q3 < 3000$ | Rs. 24.60 |
| $3000 < Q4$ | Rs. 24.40 |

Or

(b) For the following inventory problem, find out

(i) EOQ

(ii) When should the order be placed?

(iii) What should be inventory level(ideally) immediately before material order is received?

15. (a) People arrive at a Theatre ticket booth in Poisson distributed arrival rate of 25 per hour. Service time is constant at 2 minutes. Calculate

(i) The mean number in the waiting line

(ii) The mean waiting time

(iii) The utilisation factor.

Or

(b) A car park contains 5 cars. The arrival of cars is Poisson at a mean rate of 10 per hour. The length of time each car spends in the car park is negative exponential distribution with mean of 2 hours. How many cars are in the car park on average?

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