Subject : Decision Technologies

Day : Saturday   **S.D.E.** 30400   Time : 10.00 A.M. TO 1.00 P.M.
Date : 11/06/2016   Max Marks : 80   Total Pages : 2

N.B.:
1) Attempt **ANY FIVE** questions from Section – I and attempt **ANY TWO** questions from Section – II.
2) Answers to both the sections should be written in the **SAME** answer book.
3) Figures to the right indicate **FULL** marks.

SECTION – I

Q.1 Evaluate $\int_0^4 e^x dx$ by Simpson's (1\3)rd and (3\8)th rule, h = 1. **[10]**

Q.2 The transportation cost matrix for a given situation for supply of the commodity **[10]** from sources A, B, C to the points P, Q, R is given below. Work out the optimal solution for the problem.

	P	Q	R	Supply
A	4	8	8	76
B	16	24	16	82
C	8	16	24	77
Demand	72	102	41	

Q.3 Solve the following assignment problem. Assign workers 1, 2, 3, 4 to jobs A, B, **[10]** C, D. Times taken by workers for different jobs are given in the matrix.

	Jobs			
Workers	A	B	C	D
1	45	40	51	67
2	55	40	61	53
3	49	52	48	64
4	41	45	60	53

Q.4 A and B are two products to be manufactured. Unit profits are Rs. 40 and Rs. **[10]** 35 respectively. Maximum material available is 60 kgs and labour 96 hours. Each unit of A needs 2 kg of material and 3 man hours, whereas each unit of B needs 4 kg of material and 3 man hours. Find optimal level of A and B to be manufactured.

Q.5 The annual demand of a product is 1,00,000 units. The rate of production is **[10]** 2,00,000 units per year. The set up cost per production run is Rs. 500 and the variable production cost of each item is Rs. 10. The annual holding cost per unit is 20% of its value. Find the optimal production lot size and the length of the production run.

Q.6 Find the Standard Deviation and coefficient variation from the following table **[10]** giving the marks of the students.

Marks	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80	81 – 90	91 – 100
Students	5	12	20	25	40	22	15	6	4	1

Q.7 Write short notes on: **[10]**
a) Type I and Type II error
b) Inventory

P.T.O.

SECTION – II

Q.8 A departmental store has a single cashier. During the run hours, customers **[15]** arrive at the rate of 20 customers per hour. The average number of customers that can be processed by the cashier is 24 per hour. Assume that the conditions for the use of single channel queuing model apply. What is the

a) Probability that the cashier is idle.

b) Average number of customers in the queuing system.

c) Average time a customer spends in the system.

d) Average number of customers in the queue.

e) Average time a customer spends in the queue waiting for service.

Q.9 A hotel management is planning to add another 700 room hotel to their chain. **[15]** Existing occupancy has been found to be an average of 70% on annual basis. It has been estimated that the cost per room per annum is Rs. 20,000. Following data based on demand at similar hotel of the chain has been tabulated.

Season	No. of days	Daily demand	Average cost per occupied room per day
Peak Season	210	700	100
Normal Season	130	600	85
Slack Season	90	500	65

a) Prepare a pay-off table for a complex with 500, 600, and 700 rooms.

b) Advise management as to the number of rooms it should construct under new proposal.

c) How to utilize spare capacity due to poor occupancy rate?

Q.10 Use the simplex method to solve the following LP problem. **[15]**

Maximize : $Z = 3x_1 + 5x_2 + 4x_3$

Subject to : $2x_1 + 3x_2 \le 8$

$2x_2 + 5x_3 \le 10$

$3x_1 + 2x_2 + 4x_3 \le 15$

$x_1, x_2, x_3 \ge 0$

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