

I.M.C.A. SEM-VI (2014 COURSE) CBCS : SUMMER - 2018

SUBJECT : OPERATION RESEARCH

Day : Friday

Time : 10.00 AM TO 01.00 PM

Date : 04/05/2018

S-2018-1771

Max. Marks : 100

N. B. ;

- 1) Attempt ANY FOUR questions from Section – I and ANY TWO questions from Section – II.
- 2) Figures to the right indicate FULL marks.
- 3) Answers to both the sections should be written in SEPERATE answer books.
- 4) Use of non – programmable CALCULATOR is allowed.

SECTION - I

Q. 1 Explain steps involves in Operation Research. (15)

Q. 2 Solve the following Problem: (15)

$$\text{Maximise } Z = 28x_1 + 30x_2$$

$$\text{Subject to } 6x_1 + 3x_2 \leq 18$$

$$3x_1 + x_2 \leq 8$$

$$4x_1 + 5x_2 \leq 30$$

$$\text{and } x_1, x_2 \geq 0$$

Q. 3 The distribution of commodity from warehouses A, B, C, D is planned to three sources P, Q and R. The level of surpluses and requirements at various sources are given in the following matrix with related cost of transportation as cell of the matrix. (15)

	P	Q	R	Surpluses
A	2	7	4	5
B	3	3	1	8
C	5	4	7	7
D	1	6	2	14
Requirement	7	9	18	

Work out the optimal cost of distribution.

Q. 4 Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do a job is known and is given in the following matrix: (15)

Men \ Jobs	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

P. T. O.

Find the assignment of men to jobs that will minimize the total time taken.

- Q. 5** Using various criteria for decision making, find the optimal strategy for the marketing manager of an automobile company. The conditional pay-off in crores of rupees for the two models of a car the various likely sales figure are as follows: **(15)**

Sales (Units)			
Model	1 lakh	2 Lakh	3 Lakh
X	30	10	10
Y	35	20	3

- Q. 6** Draw the network diagram of activities for the project **(15)**

Activity	A	B	C	D	E	F	G	H
Predecessor Activity	-	A	A	B	B, C	E	D, F	G

- Q. 7** Write short notes on the following: **(15)**
- Optimality check
  - Application of LPP
  - Queuing Application

### SECTION - II

- Q. 8** A departmental store has a single cashier. During the rush hours, customers arrive at the rate of 20 customer 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 **(20)**
- Probability that the cashier is idle.
  - Average number of customers in the queuing system.
  - Average time a customer spends in the system.
  - Average number of customers in the queue.
  - Average time a customer spends in the queue waiting for service.

- Q. 9** Solve the following problems using simplex method: **(20)**

$$\begin{aligned} &\text{Maximize } Z = 3x_1 + 2x_2 \\ &\text{Subject to } x_1 + x_2 \leq 4 \\ &\quad \quad \quad x_1 - x_2 \geq 2 \\ &\quad \quad \quad \text{and } x_1, x_2 \geq 0 \end{aligned}$$

- Q.10** Give the following information: **(20)**

- Draw the network
- Determine the different types of floats
- Find the critical path

Activity	A	B	C	D	E	F	G	H	I	J
Predecessor	-	-	A, B	B	A	C	E, F	D, F	G, H	I
Duration (Days)	2	3	4	1	5	3	2	7	6	3