

Day : Wednesday

Date : 24/04/2019

S-2019-2136

Time : 10.00 AM TO 01.00 PM

Max. Marks :100

N.B.

- 1) Attempt any **FOUR** questions from Section – I. Each question carries 15 marks.
- 2) Attempt any **TWO** questions from Section – II . Each question carries 20 marks.
- 3) Answers to both the sections should be written in SAME answer book.

SECTION – I

Q.1 Define Operation Research. Also discuss their models in detail.

Q.2 A company can produce two product A and B. Each product has to be processed by three machines X, Y and Z.

Machine X can be operated for a total time of 2700 minutes, it takes 11 minutes of an item A and 5 minutes for an item B. Machine Y can be operated for 2000 minutes and its takes 5 minutes for an item A and 10 minutes for total time of 450 minutes and it takes 1 minutes for A and 2 minutes for B. The profit per item of A is 10 and per item of B is Rs. 15. Find the number of units of A and B to be produced so as to maximize the profit.

Q.3 Find the initial basic feasible solution of the following transportation problem by Vogel's approximate method.

Warehouse

Factory	W₁	W₂	W₃	W₄	Capacity
F₁	10	30	50	10	7
F₂	70	30	40	60	9
F₃	40	8	70	20	18
Requirement	5	8	7	15	

Q.4 Three jobs A, B, C are to be assigned to three machines X, Y, Z. The processing cost (Rs.) are as given in the matrix show below. Find the allocation which will minimize the overall processing cost.

	X	Y	Z
A	19	28	31
B	11	17	16
C	12	15	13

Q.5 Given the following pay off matrix choose the action using minimax regret criterion:

State the nature	Action			
	A₁	A₂	A₃	A₄
S₁	8	8	9	2
S₂	10	5	2	6
S₃	8	6	5	11

P.T.O.

Q.6 Draw a network diagram of activities for the project:

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:

- Application of Poisson distribution
- Expected opportunity loss
- Hungarian method

SECTION – II

Q.8 A fertilizer company distributes its products by trucks loaded at its only loading station. Both company trucks and contractors truck are used for this purpose. It was found out that on an average every 5 minutes on truck arrived every 5 minute one truck arrived and the average loading time was 3 minutes 40% of the truck belongs to the contractors.

Determine:

- The probability that a truck has to wait.
- The waiting time of a truck that waits.
- The expected waiting time of contractors trucks per day.

Q.9 Solve the LPP by simplex method

$$\text{Maximize } Z = 45x_1 + 55x_2$$

$$\text{Subject to constraints } 6x_1 + 4x_2 \leq 120$$

$$3x_1 + 10x_2 \leq 180$$

$$x_1, x_2 \geq 0$$

Q.10 A project has the following characteristics:

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Preceding Activity	-	A	A	B	D	D	D	B	C,E	G	F,I,J	K	H,G	M
Time in Weeks	5	2	6	12	10	9	5	9	1	2	3	9	7	8

- Draw a PERT network.
- Find the various paths and critical both as well as the project completion time.

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