ABB(II)-Business Admin.-H-11A

2019

BUSINESS ADMINISTRATION — HONOURS

Paper : XI

Group - A

(Operation Research, MIS and Modern Office Mgmt.)

(Operation Research)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer *question no.* **1** and *any four* from the rest.

1. Write short notes on *any two* :   5×2

   (a) Limitations of Linear Programming

   (b) Monte-Carlo Simulation

   (c) Distinguish between PERT and CPM as networking techniques

   (d) Principles of Dominance.

2. A dealer wishes to purchase a number of fans and sewing machines. He has only ₹ 5,760 to invest and has space utmost for 20 items. A fan costs him ₹ 360 and a sewing machine ₹ 240. His expectation is that he can sell a fan at a profit of ₹ 22 and a sewing machine at a profit of ₹ 18. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit? Formulate this problem as a Linear Programming Problem and then use graphical method to solve it.
                                                                             10

3. Solve the following by Simplex method :   10

   Maximize $Z = 2x_1 + 5x_2$

   Subject to $\quad x_1 + 4x_2 \le 24$

   $\qquad\qquad 3x_1 + x_2 \le 21$

   $\qquad\qquad x_1 + x_2 \le 9$

   $\qquad\qquad x_1, x_2 \ge 0$

Please Turn Over

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4. Following is the profit matrix based on the four factories and three sales depots of the company :

Sales Depots

		S_1	S_2	S_3	Availability
Factories	F_1	6	6	1	10
	F_2	–2	–2	–4	150
	F_3	3	2	2	50
	F_4	8	5	3	100
Requirement		80	120	150	

Determine the most profitable distribution schedule and the corresponding profit.   10

5. A foreign bank is considering opening a drive-in window for customer service. Management estimates that customers will arrive for service at 12 per hour. The teller which the Bank is considering to staff can serve customers at the rate of one every three minutes. Assuming Poisson arrivals and exponential service, find   2×5

    (i) Utilization of teller

    (ii) Average number in the system

    (iii) Average waiting time in the line

    (iv) Average waiting time in the system

    (v) What is the average length of the queue?

6. A gambler at a horse race is considering placing a bet on a specific horse. There are four possible alternatives and four states of nature with the following pay-offs :

States of nature

Strategies	A wins	B wins	C Wins	All lose
Bet A	7	–2	–2	–2
Bet B	3	3	–2	–2
Bet C	2	2	2	–2
Do not bet	0	0	0.	0

    (a) What is the maximin strategy?

    (b) What strategy should be selected as per Hurwicz criterion with $\alpha = 0.6$?

    (c) What is the best criterion by Laplace criterion?

    (d) What is the best strategy by savage criterion?   2+3+2+3

7. Find the optimal assignment and the corresponding maximum profit from the following profit matrix.

Profits in units

Machine

		M_1	M_2	M_3	M_4	M_5
Job	J_1	2	4	3	5	4
	J_2	7	4	6	8	4
	J_3	2	9	8	10	4
	J_4	8	6	12	7	4
	J_5	2	8	5	8	8

10

8. A project has the following activities

Activity	Immediate Predecessors	Duration (weeks)
A	——	3
B	——	2
C	——	2
D	A	4
E	B	4
F	B	7
G	C	4
H	D	2
I	E	5
J	F, G	6
K	H, I	3

Find : (i) Critical Path and total Project duration.

(ii) Compute earliest event time and latest event time for all the activities.

(iii) Total, free and Independent Float for each activity.   4+2+4