MCA.III/11.15.1040 Reg. No. | | | | | | | | |

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MCA DEGREE III SEMESTER EXAMINATION NOVEMBER 2015

CAS 2305/2304 OPERATIONS RESEARCH

(Regular)

Time: 3 Hours Maximum Marks: 50

PART A

(Answer ***ALL*** questions)

(15 × 2 = 30)

I. (a) Write the mathematical formulation of an LPP.
(b) Explain the graphical method of solving an LPP.
(c) What do you mean by sensitivity analysis?

II. (a) Distinguish between assignment problem and transportation problem.
(b) What do you mean by degeneracy in transportation problem?
(c) Explain the stepping stone method of solving a transportation problem.

III. (a) Distinguish between pure Integer Programming Problem and Mixed Integer Programming Problem.
(b) Write a note on travelling salesman problem.
(c) Explain the branch and bound method of solving an Integer Programming Problem.

IV. (a) State Bellman's principle of optimality.
(b) Explain the characteristics of Dynamic Programming Problem (DPP).
(c) Distinguish between deterministic and probabilistic dynamic programming problem.

V. (a) What do you mean by pure birth and death process?
(b) Define Jockeying and Reneging in queueing theory.
(c) Define Markov Chain with an example.

PART B

(5 × 4 = 20)

VI. Solve by simplex method:
Maximise $Z = 3x_1 + 2x_2$ subject to

$$x_1 + x_2 \leq 4$$
$$x_1 - x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

OR

VII. Use two phase method to solve
Minimize $Z = x_1 - 2x_2 - 3x_3$ subject to

$$-2x_1 + x_2 + 3x_3 = 2$$
$$2x_1 + 3x_2 + 4x_3 = 1$$
$$x_1, x_2, x_3 \geq 0$$

(P.T.O.)

VIII. Five men are available to do five different jobs from past records, time (in hours) that each man takes to do each job is known and given in the table.

		Job				
		I	II	III	IV	V
Man	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

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

OR

IX. Solve the following transportation problem.

	A	B	C	Availability
I	50	30	220	1
II	90	45	170	3
III	250	200	50	4
Requirement	4	2	2	

X. Solve the travelling salesman problem

	A_1	A_2	A_3	A_4	A_5
A_1	∞	2	5	7	1
A_2	6	∞	3	8	2
A_3	8	7	∞	4	7
A_4	12	4	6	∞	5
A_5	1	3	2	8	∞

OR

XI. Use Branch and Bound technique to solve

Maximise $Z = 3x_1 + 3x_2 + 13x_3$ subject to

$$-3x_1 + 6x_2 + 7x_3 \le 8$$

$$6x_1 - 3x_2 + 7x_3 \le 8$$

$$0 \le xj \le 5$$

x_j are integers, j = 1, 2, 3.

XII. Divide a given quantity b into n parts so as to maximize their product. Show that $f_n(b) = \max_{0 \le z \le b} \{z f_{n-1}(b-z)\}$.

OR

XIII. Use DPP to show that $-\sum_{i=1}^{2} p_i \log p_i$ subject to $\sum_{i=1}^{2} p_i = 1$ is maximum when $p_1 = p_2 = \ldots = p_n = 1/2$.

XIV. Explain the characteristics of a queueing system.

OR

XV. A TV repairman finds that the time spent on his jobs that has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hour day, what is the repairman's idle time each day? How many jobs are ahead of the average set just brought in?

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