MCA.I/12.15.1100 Reg.No. | | | | | | | | |

C

MCA DEGREE I SEMESTER EXAMINATION DECEMBER 2015

CAS 2105 COMPUTER BASED OPTIMIZATION

(*Supplementary*)

Time : 3 Hours Maximum Marks : 50

PART A

(Answer ***ALL*** questions)

(15 × 2 = 30)

I. (a) What is duality principle in LPP?

(b) Briefly explain artificial variable.

(c) Describe the mathematical formation of a LPP.

II. (a) Distinguish between transportation problem and assignment problem.

(b) What is meant by degeneracy in transportation problem?

(c) What is unbalanced assignment problem?

III. (a) Explain branch and bound techniques for solving LPP.

(b) Explain pure and mixed integer programming.

(c) What is the importance of integer programming problem?

IV. (a) What are the limitations of dynamic programming?

(b) State Bellman's principle of optimality.

(c) Distinguish between forward and backward recursion.

V. (a) Define balking, jockeying, reneging.

(b) Define transient and recurrent state.

(c) Explain the characteristics of queuing system.

(P.T.O.)

PART B

(5 × 4 = 20)

VI. Solve graphically :

Maximize $z = -X_1 + 2x_2$

Subject to $-x_1 + 3x_2 <= 10$

$x_1 + x_2 <= 6 \quad x_1 + x_2 >= 0$

$x_1 + x_2 <= 2$

OR

VII. Using two phase method; solve the LPP:

Minimize $z = x_1 + x_2$

Subject to $2x_1 + x_2 >= 4$

$x_1 + 7x_2 >= 7$

$x_1 , x_2 >= 0$

VIII. Solve the following transportation problem.

	D_1	D_2	D_3	Available
S_1	4	5	2	30
S_2	4	1	3	40
S_3	3	6	2	20
S_4	2	3	7	60
Required	40	50	60	

OR

IX. Solve the following assignment problem.

	J_1	J_2	J_3	J_4	J_5
M_1	5	11	10	12	4
M_2	2	4	6	3	5
M_3	3	1	5	14	6
M_4	6	14	4	11	7
M_5	7	9	8	12	5

This matrix shows the profit per machine for each job.
Find an allocation which will maximize profit.

X. Solve the following LPP

Maximize $z = 3x_1 - 2x_2 + 5x_3$

Subject to $5x_1 + 2x_2 + 7x_3 <= 28$

$4x_1 + 5x_2 + 5x_3 <= 30$

$x_1 , x_2, x_3 >= 0$, are integers

OR

(Contd....3)

XI. Solve the following transportation problem.

From city \ To city	A	B	C	D	E	
A	-	12	24	25	15	
B	6	-	16	18	7	
C	10	11	-	18	12	
D	14	17	22	-	16	
E	12	13	23	25	-	

XII. Use dynamic programming to solve the problem

Maximize $z = Y_1^2 - Y_2^2 + Y_3^2$

Subject to the constants $Y_1 + Y_2 + Y_3 >= 15$

$Y_1 + Y_2 + Y_3 >= 0$

OR

XIII. Use dynamic programming to solve the LPP.

Maximize $z = 3x_1 + 7x_2$

Subject to $x_1 + 4x_2 <= 8$

$x_2 <= 2$

$x_1 >= 0, x_2 >= 0.$

XIV. A sales tax office has only one typist, since number of pages to type is random, typing rate is randomly distributed according to a poisson distribution with mean service rate of 9 letter per hour. The letters arrive at the rate of 6 per hour during the 8 hour working day. If the typewriter is valued as ₹ 1.75/- per hour. Find (i) Utilization of equipment (ii) average cost due to waiting on the part of typewriter.

OR

XV. In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes find (i) the mean queue size (ii) the probability that the queue size exceeds 10.

***