Reg. No. : ....

Code No. : 7193 **Sub. Code : KCAM 21**

M.C.A. (CBCS) DEGREE EXAMINATION,
APRIL 2017.

Second Semester

Computer Applications

MFCS — II

(For those who joined in July 2016 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. For the constraint of greater than or equal to type we make use of ———————— variable.

   (a) slack (b) surplus

   (c) artificial (d) basic.

2. In graphical method the restriction on number of constraint is

   (a) 2 (b) not more than 3

   (c) 3 (d) None of the above.

20. (a) Using Newton's formula, find :

    (i) tan 0.12

    (ii) tan 0.26

    from the following table :

x	$y = \tan x$
0.10	0.1003
0.15	0.1511
0.20	0.2027
0.25	0.2553
0.30	0.3093

Or

(b) Find a positive root of the equation $xe^x = 1$, which lies between 0 and 1, using bisection method.

———————

3. In non-degenerate solution number of allocated cell is

(a) equal to $m+n-1$

(b) not equal to $m+n-1$

(c) equal to $m+n+1$

(d) not equal to $m+n+1$.

4. North-West corner refers to

(a) top left corner (b) top right corner

(c) both of them (d) none of them.

5. The Hungarian method for solving an assignment problem can also be used to solve

(a) a transportation problem

(b) a traveling salesman problem

(c) both (a) and (b)

(d) none of them.

6. In assignment problem the value of decision variable x_{ij} is

(a) one or zero (b) no restriction

(c) two or one (d) none of them.

7. Each player should follow the same strategy regardless of the other player's strategy in which of the following games.

(a) pure strategy

(b) mixed strategy

(c) dominance strategy

(d) constant strategy.

8. In a mixed strategy, each player should optimize the

(a) maximum payoffs

(b) expected gain

(c) minimum loss

(d) lower value of the game.

9. The order of convergence in Newton-Raphson method is

(a) 3 (b) 2

(c) 4 (d) 1.

10. In the Newton's forward difference formula what is u

(a) $u=\frac{x-x_n}{h}$ (b) $u=x-x_n$

(c) $u=\frac{(x-x_n)^2}{h}$ (d) $u=\frac{x-x_0}{h}$.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11\. (a) The manager of an oil refinery must decide on the optimum mix of two possible blending processes of which the input and output production runs are as follows :

Process	Input		Output	
	Crude A	Crude B	Gasoline X	Gasoline Y
1	6	4	6	9
2	5	6	5	5

The maximum amounts available of crudes A and B are 250 and 200 units respectively. Market demand shows that at least 150 units of gasoline X and 130 units of gasoline Y must be produced. The profits per production run from process 1 and process 2 are Rs. 4 and Rs. 5 respectively. Formulate the problem for maximizing the profit.

Or

(b) Use graphical method to solve the following LPP.

Maximize $Z = 6x_1 + x_2$

Subject to the constraints :

$$2x_1 + x_2 \geq 3$$
$$x_2 - x_1 \geq 0$$
$$\text{and } x_1, x_2 \geq 0.$$

12\. (a) Develop a linear programming model for the following transportation problem which consisting 3 sources and 3 destinations given below :

		Destination 1	2	3	Supply
Source	1	20	10	15	200
	2	10	12	9	300
	3	25	30	18	500
Demand		200	400	400	1000

Or

(b) Convert the following transportation problem into a balanced transportation problem.

		Destination 1	2	3	4	Supply
Source	1	5	12	6	10	300
	2	7	8	10	3	400
	3	9	4	9	2	300
Demand		200	300	450	250	

13\. (a) Explain Hungarian method for solving an assignment problem.

Or

(b) Solve the following assignment problem by using Hungarian method.

		Operator 1	2	3	4	5
Job	1	10	12	15	12	8
	2	7	16	14	14	11
	3	13	14	7	9	9
	4	12	10	11	13	10
	5	8	13	15	11	15

14\. (a) Players A and B play a game in which each player has three coins (20 p, 25 p and 50 p). Each of them selects a coin without the knowledge of the other person. If the sum of the values of the coins is an even number, A wins B's coin. If that sum is an odd number, B wins A's coin. Develop a payoff matrix with respect to player A.

Or

(b) Explain two person's zero-sum game in detail.

15\. (a) Find a real root of the equation $f(x) = x^3 - x - 1 = 0$ upto three decimal places.

Or

(b) Find a real root of the equation $x = e^{-x}$, using the Newton-Raphson method.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16\. (a) Solve the following LPP using simplex method.

Maximize $Z = 10x_1 + 15x_2 + 20x_3$

subject to :

$$2x_1 + 4x_2 + 6x_3 \leq 24$$

$$3x_1 + 9x_2 + 6x_3 \leq 30$$

$$x_1, x_2 \text{ and } x_3 \geq 0.$$

Or

(b) Solve the following LPP using Big-M method.

Minimize $Z = 10x_1 + 15x_2 + 20x_3$

subject to :

$$2x_1 + 4x_2 + 6x_3 \geq 24$$

$$3x_1 + 9x_2 + 6x_3 \geq 30$$

$$x_1, x_2 \text{ and } x_3 \geq 0.$$

17\. (a) Solve the following transportation problem and obtain the initial basic feasible solution using Northwest corner rule method.

		Destination 1	2	3	4	Supply
Source	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	

Or

(b) Use Vogel's approximation method to obtain an initial basic feasible solution of the transportation problem.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

18. (a) Solve the following assignment problem in order to minimize the total cost. The cost matrix given below gives the assignment cost when different operators are assigned to various machines.

		I	II	III	IV	V
Machines	A	30	25	33	35	36
	B	23	29	38	23	26
	C	30	27	22	22	22
	D	25	31	29	27	32
	E	27	29	30	24	32

Or

(b) A machine operator processes five types of items on his machine each week and must choose a sequence for them. The set-up cost per change depends on the items presently on the machine and the set up to be made according to the following table :

To Item

		A	B	C	D	E
From item	A	∞	4	7	3	4
	B	4	∞	6	3	4
	C	7	6	∞	7	5
	D	3	3	7	∞	7
	E	4	4	5	7	∞

19. (a) Solve the following payoff matrix, determine the optimal strategies and the value of the game.

$$A \overset{B}{\begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix}}$$

Or

(b) Using the principle of dominance, solve the following game :

$$\text{Player } A \overset{\text{Player } B}{\begin{bmatrix} 3 & -2 & 4 \\ -1 & 4 & 2 \\ 2 & 2 & 6 \end{bmatrix}}$$