MCA DEGREE EXAMINATION MAY 2018
(Second Semester)

Branch - COMPUTER APPLICATIONS

MATHEMATICAL STRUCTURES

Time: Three Hours   Maximum: 75 Marks

SECTION -A (30 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks ($5 \times 6 = 30$)

1 a In a group of 60 people, 27 like cold drinks and 42 like hot drinks and each person likes at least one of the two drinks. How many like both cold and hot? (3)

b Let A= (a, b, c}, B = (d, e}, c = { a, d}
  Find (i) AxB (I)
         (ii) B x A (1)
         (iii) $A x (B \cup C)$ (2)
         (iv) $(A \cap C) x B$ (2)
         (v) $(A \cap B) x C$ (2).
   -    (vi) A x (B - C) (2)

c Find the domain of the function $y = \sqrt{x} - 2$. (2)

OR

d If f(x) = x = 3, 0 < x < 4, find its range. (3)

e Let f(x) = x + 2 and g(x) = 2x, find (f ° g) (x) and (g o f)(x). (5)

f Define the following :
   i) Union of two sets (1)
   ii) Intersection of two sets (1)
   iii) Complement of a set (1)
   iv) Difference of two sets (2)
   v) Symbolic difference of two sets (2)

2 a Solve the following system of linear equations using the method of
     Gaussian elimination :
      $x_i + 2x_2 + 3x_3 + 2x_4 = -1$
      $-x_i - 2x_2 - 2x_3 + x_4 = 2$
      $2x_i + 4x_2 + 8x_3 + 12x_4 = 4$ (8)

  b Use the Jacobi method to approximate the solution of the following
     system of linear equations :
      $5x_i - 2x_2 + 3x_3 = -1$
      $-3x_1 + 9x_2 + x_3 = 2$
      $2x_i - x_2 - 7x_3 = 3$
     Continue the iterations until two successive approximations are
     identical when rounded to three significance digits. (7)

OR

  c Which of the following systems of linear equations has a strictly
     diagonally dominant coefficient matrix?
     (i) $3x_i - x_2 = -4; 2x_i + 5x_2 = 2$ (3)
     (ii) $4x_i + 2x_2 - x_3 = -1$
          $x_J \qquad + 2x_3 = -4$
          $3x_j - 5x_2 + x_3 = 3$ (4)

  d Solve $2x^3 - 2.5x - 5 = 0$ for the root in the interval [1,2] by regual falsi
     method. (8)

3 a Find the starting solution in the following transportation problem by YAM. Also obtain the optimum solution.

	Di	D_2	D_3	D_4	Supply
S,	3	7	6	4	5 '
S_2	2	4	3	2	2
S,	4.	3	8	5	3
Demand	3	3	2	2	

OR

b Solve the following assignment problems :

	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D!	1 9	26	24	10

(9)

	1	0	3
I	(9	26	15
II	13	27	6
in	35	20	15
IV	18	30	20

(6)

4 a A project consists of 8 activities with the following relevant information:

Activity	Immediate Predecessor	Estimated duration (days)		
		Optimistic	Most likely	Pessimistic
A	-	i S i		7
B	-	1 ! 4		n,
C	-	2 | 2		8
D	A	1 1 '		1
E	B	2 (5		14
F	C	2	5	8
G	D, E	3	6	15
H	F, G	1	2	3

i) Draw the PERT network & find the expected project completion time.

ii) What duration will have 95% confidence for project completion?

iii) If the average duration for activity F increases to 14 days, what will its effect on the expected project completion time which will have 95% confidence?

OR

b Draw the network for the data given below & compete
(i) Critical path (ii) Early start & late start times for each activity
(iii) Total slack for each activity

Activity :	A	B	C	D	E	F	G	H	I
Predecessor :	-	-	-	A	B	C	D, E	B	H, F
Estimated time (weeks) :	3	5	4	2	3	9	8	7	9

5 a Suppose $L(G)$ ja^{m}b^n/m > 0,n > Oj. Find the grammar G producing L(G). (5)

b What is the classification of grammar introduced by Chomsky? (10)

OR

c Explain Automaton, Deterministic finite automaton, Non deterministic finite automaton.

Z-Z-Z   END