PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2018
(Second Semester)

Branch - COMPUTER APPLICATIONS

MATHEMATICAL STRUCTURES

Time: Three Hours   Maximum: 75 Marks
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (5x15 = 75)

1 a If A, B and C are any three sets, prove that A u (B u C) = (A u B) u C.   (5)

   b Prove that by Venn diagram An(BoC) = (AnB)u(AnC).   (5)
   c IfU = {l,2, 3,4, 5,6,7, 8,9}
      A ={1,3, 5}, B = {2, 4, 6, 8) and C = {2, 5, 10}
      Verify (AnB)^c = A^c nB^c .   (5)

                              OR
   d If A = {1, 2, 3} , B = {3, 4} and C = {4, 5, 6}
      Find (i) A x (B u C) (ii) A x (B n C) (iii) (A xB) n (B x C) (8)

   e If f : A -» B and g : B —>C are two 1-1 and onto functions, prove that
      (i) g o f: A-> C is one to one onto and
      (ii) g o f is invertible   (7)

2 a Solve by Gauss elimination and Gauss Jordan method :
      X + 2y + z = 3; 2x + 3y + 3z = 10; 3 x - y + 2z = 13   (7+8)
                              OR
   b Solve for x from cosx - xe^x = 0 by iteration method.   (7)

   c Solve for a positive root of x^3 - 4x + 1 = 0 by Regula falsi method.   (8)

      Find the non-degenerate basic feasible solution for the T.P
      (i) Northwest Corner Rule   (5)
      (ii) Least Cost method   (5)
      (iii) Vogel's approximation method   (5)

		To Supplv		
10	20	5	7	10
13	9	12	8	20
4	5	7	9	30
14	7	i	0	40
3	12	5	19	50
60	60	20	10	

From (rows 3); Demand (bottom row)

                              OR
   b Describe the Difference between TP and Assignment problem.   (3)

      Solve the traveling salesman problem
                         To

4 a State Ford and Fulkerson's rule, **[2]**

b Draw the network : (5)

Activity :	P	Q	R	S	T	U
Predecessor :	-	-	-	P,Q	P,R	0, R

c Calculate earliest start, earliest finish, latest start and latest finish of each activity of the project and determine the critical path. **[8]**

Activity :	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration :	8	7	12	4	10	3	5	10	7	4

OR

d A project consists o the following activities and time estimates (day) : (12)

Activity :	1-2	1-3	1-4	2-5	2-6	3-6	4-7	5-7	6-7
t_o :	3	2	6	2	5	3	3	1	2
t_o :	15	14	30	8	17	15	27	7	8
t_m :	6	5	12	5	11	6	9	4	5

(i)   Draw the network.
(ii) What is the probability that the project will be completed in 27 days?

e Describe the basic difference between PERT & CPM. (13)

5 a Explain types of Grammars, (5)

b Explain operation on languages, (5)

c Explain Regular languages. (5)

OR

d Find the DFA equivalent to the NFA for which the state table is given (12)

S	t	
	a	B
S_o	0	S_o, S,
s,	Q	s_2
S_2	S_o, si, S_2	0

e Define finite state automata. (3)

z-z-z   END