

## 2006 PUNJAB TECHNICAL UNIVERSITY M.C.A

COMPUTER MATHEMATICAL FOUNDATION  
MCA-104, 1st Semester(2096)

**Time: 3 Hours**  
**Max Marks:75**

Note: The question paper will consist of TWO parts A and B.

(a) Part A is compulsory and have 15 short answer questions(40-60 words) of 2 marks each.

(b) Part-B have 12 long answer questions of 5 marks each, out of which candidate have to attempt 9 questions.

Part – A

(15x2=30)

1.

- (i) If  $A = \{f\}$ , then find  $P(A)$ .
- (ii) Draw Venn diagram for  $B-A$  and  $A \cup B$ .
- (iii) Define relation with the help of an example.
- (iv) Define inverse relation with the help of an example.
- (v) Give one example of a Proposition and non-proposition each.
- (vi) If  $P(x)$  is the statement “ $(n+1)(n+2)$  is even”, then what is  $P(3)$ ?
- (vii) Draw a truth table for XOR.
- (viii) Differentiate between tautology and contradiction.
- (ix) What is the use of existential quantifier?
- (x) Differentiate simple and multigraph.
- (xi) What is chromatic number?
- (xii) What is graph coloring?
- (xiii) Define diagonal matrix with the help of an example.
- (xiv) Define skew symmetric matrix with the help of an example.
- (xv) Give example of matrices  $A$  and  $B$  such that  $AB=BA$ .

Part-B

(Marks: 5 each)

2. Prove that  $(A \cup B)^c = A^c \cap B^c$ .

3. Let  $A$  and  $B$  be any two disjoint sets then prove that

$$|A \cup B| = |A| + |B| - |A \cap B|$$

4. If  $R$  is the relation in  $N \times N$  defined by  $(a,b)R(c,d)$  if  $a+d=b+c$ , show that  $R$  is an equivalence relation.
5. Give example of a Relation, which is both equivalence, and partial order relations.
6. Prove by induction that  $2+5+8+11+\dots+(3n-1)=n(3n+1)/2$  for all natural number.
7. Prove that the sum of the cubes of three consecutive integers is divisible by 9.
8. Prove by truth table that  $p \rightarrow (q \wedge r) = (p \rightarrow q) \wedge (p \rightarrow r)$ .
9. Prove that for any two matrices  $A$  and  $B$ ,  $(A+B)c = Ac + Bc$ .
10. Solve the following systems of equations, with Gauss elimination Method:  
 $x+y+z=1, x+2y+3z=6$  and  $x=3y=4z=6$
11. Define Bipartite graph. When it is said to be Complete Bipartite graph? Also draw  $K_{3,4}$  Complete Bipartite graph.
12. Discuss Matrix representation of Multigraph with a suitable example.
13. Let  $f(x)=x^2-5x+6$ . Find  $(A)$  if

$$A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$$

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