

M.Sc. DEGREE EXAMINATION, NOVEMBER 2016

FIRST SEMESTER

Branch — Computer Science

Paper I — DISCRETE MATHEMATICAL STRUCTURES

Time : 3 Hours

Max. Marks : 70

## PART – A

Answer any FIVE of the following.

(Marks :  $5 \times 4$  marks = 20 marks)

1. Prove the De Morgan's law for any two sets  $A$  and  $B$ .
2. Define the following terms with an example
  - (a) permutation
  - (b) combination.
3. Solve the recurrence relation using the characteristic roots  
 $a_n - 3a_{n-1} - 4a_{n-2} = 0$  for  $n \geq 2$  and  $a_0 = a_1 = 1$ .
4. Find the coefficient of  $x^9y^3$  in expression of  $(2x - 3y)^{12}$ .
5. Define Lattice.
6. Define Directed Graph with an example.
7. Define tree and prove ' $n$ ' vertices has exactly  $(n - 1)$  edges.
8. Define Isomorphism in groups.

## PART – B

Answer ONE questions from each Unit.

(Marks :  $4 \times 12.5$  marks = 50 marks)

## UNIT – I

9. (a) Define Rules of inference.
- (b) Use the rules of inference show that the conclusion is valid.  
 "A student in the class has not read the book" and "Everyone in the class passed the first exam" imply "someone who passed the first exam has not read the book".

Or

- (c) Verify the following statements are tautology are not :

- (i)  $\{[(p \vee q) \rightarrow r] \wedge (\sim p)\} \rightarrow (q \rightarrow r)$

- (ii)  $((P \rightarrow Q) \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)).$

## UNIT - II

10. (a) State the binomial theorem.  
 (b) Find the recurrence relation and initial condition for the sequence  
 0, 2, 6, 12, 20, 30, 42,.....

Or

- (c) Find and prove a formula for the sum of first  $n$  cubes, that is  $1^3 + 2^3 + 3^3 + 4^3 + \dots + n^3$ .

## UNIT - III

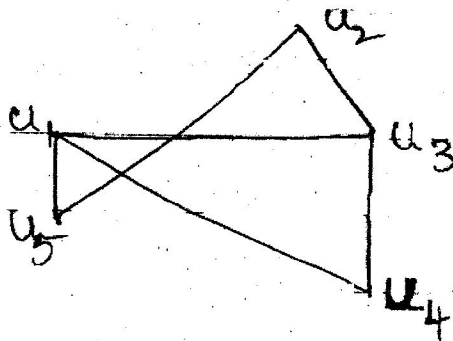
11. (a) Prove that the relational numbers are countable.

Or

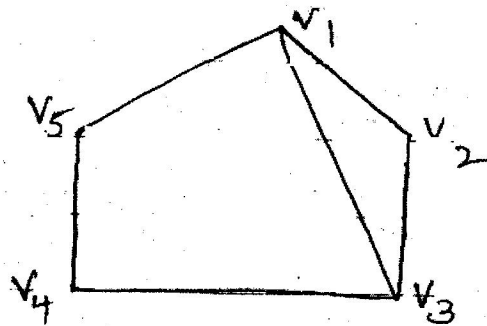
- (b) Define relation? Explain the properties of relations with an example.

## UNIT - IV

12. (a) Define graph? Determine whether the groups  $G$  and  $H$  are isomorphic or not



(G)



(H)

Or

- (b) State and prove Euler's formula.  
 (c) Find the chromatic number of the graph.

