

(040810102)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2017

FIRST SEMESTER

Branch - Computer Science

Paper I — DISCRETE MATHEMATICAL STRUCTURES

(Old Syllabus)

Time : 3 Hours

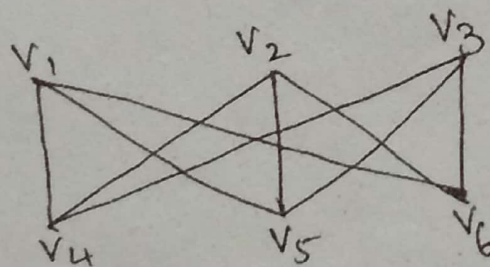
Max. Marks : 70

PART - A

Answer any FIVE of the following.

(Marks : 5 × 4 marks = 20 marks)

1. Show that  $(p \wedge q) \rightarrow (p \vee q)$  is a tautology.
2. Write the principle of inclusion.
3. How many distinguishable permutations of the letters in the word BANANA are there?
4. How many ways a committee of 5 teachers and 4 students can be chosen from 9 teachers and 15 students?
5. Define lattice.
6. Define the term adjacency matrices with an example.
7. Is  $K_{3,3}$  is planar or not?



$K_{3,3}$

8. Define the terms :
  - (a) Complete graph
  - (b) Multi graph with a neat diagram.

[P.T.O]

## PART - B

Answer ONE question from each Unit.

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

### UNIT - I

9. (a) By mathematical induction show that for all  $n \geq 1$ ,  $1 + 2 + 3 + \dots + n = n(n+1)/2$ .

Or

- (b) Describe the De Morgan's law with the help of an example.  
(c) Write the principle of Exclusion.

### UNIT - II

10. (a) Find the coefficient of  $x^9 y^3$  in expression of  $(2x - 3y)^{12}$ .  
(b) Define recurrence relation with an example.

Or

- (c) What are inhomogeneous recurrence relations? Explain with an example.  
(d) Solve the recurrence relation  $F_n = 2F_{n-1} - 2F_{n-2}$  where  $F_0 = 1$  and  $F_1 = 3$ .

### UNIT - III

11. (a) Define equivalence relation.  
(b) Show that the identity relation on a set  $S$  is an equivalence relation.

Or

- (c) What is relation? Explain the properties of relations with an example.

### UNIT - IV

12. (a) Explain depth first search and breadth first search from graphs.  
(b) State and prove Euler's formula.

Or

- (c) Define  
(i) Spanning tree  
(ii) Network flows.  
(d) State and prove Four-colour problem.