

Roll No. ....

Total Pages : 4

**7330/N**

**J-25/2110**

**MATHEMATICAL FOUNDATION OF  
COMPUTER SCIENCE**

Paper-MS-114

Semester-I

Time allowed : 3 Hours] [Maximum Marks : 70

**Note :** Attempt **two** questions each from Section A and Section B carrying **10½** marks each and entire Section C is compulsory consisting of **14** short answer type questions of **2** marks each.

**SECTION-A**

1. Define the term Set. Briefly explain the various operations of sets with the help of Venn diagram. 10½
2. Define Function. Explain various types of Functions. 10½

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**[P.T.O.**

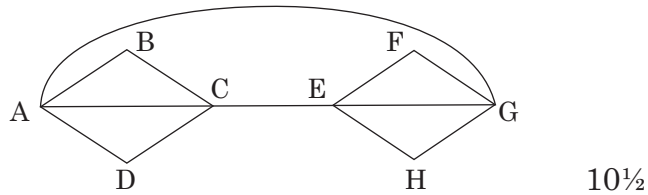
3. Use Principle of Mathematical Induction to show that : 10½  
$$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$
4. Explain any one sorting algorithm with example. 10½

**SECTION-B**

5. Solve  $S(k) - 8S(k-1) + 16S(k-2) = 0$  with  $S(2) = 16$  and  $S(3) = 80$ . 10½
6. Define an Equivalence Relation. Prove that the inverse of an equivalence relation is an equivalence relation. 10½
7. Write short note on : 3½×3
  - (a) Closure of a relation.
  - (b) Shortest Path Problem.
  - (c) Inclusion-Exclusion principle.
8. Apply Fleury's Algorithm to construct an Euler Path or Euler Circuit in the following graph :

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### SECTION-C

9. Attempt the following parts : 2×14=28

- (i) Find power set of set  $A = \{1, 2, 3\}$ .
- (ii) State De-Morgan's Laws of Set Theory.
- (iii) Define Quantifiers.
- (iv) Define Partial ordering relation.
- (v) Define composition of two functions.
- (vi) What do you mean by degree of Recurrence Relation?
- (vii) What do you mean by Inverse of a function?
- (viii) Define Connected Graph.
- (ix) What do you mean by in-degree and out-degree of a graph?

- (x) State the Pigeonhole principle.
- (xi) Define Big-O Notation and give one example.
- (xii) Define floor function and ceiling function.
- (xiii) What are the various searching algorithms?
- (xiv) Write the converse and inverse of the implication :

“If it is hot, then I take cold drinks”.