

2024(Old)

(Session : 2022-25)

sem-2

Time : 3 hours

Full Marks : 60

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

1. Select the most appropriate option of the following statement : 1×10 = 10

(a) A = {∅, {∅}, 2, {2, ∅}, 3}, which of the following is true ?

(i) {{∅, {∅}} ∈ A (ii) {2} ∈ A

(iii) ∅ ⊂ A (iv) 3 ⊂ A

(b) A function is said to be _____ if and only if f(a) = f(b) implies that a = b for all a and b in the domain of f.

(i) One-to-many (ii) One-to-one

(iii) Many-to-many (iv) Many-to-one

(c) Which of the following statement is a proposition ?

(i) Get me a glass of milkshake.

(ii) God bless you !

(iii) What is the time now ?

(iv) The only odd prime number is 2.

(d) Every Isomorphic graph must have _____ representation.

(i) Cyclic (ii) Adjacency list

(iii) Tree (iv) Adjacency matrix

(e) The chromatic number of a graph is the property of _____.

(i) Graph coloring (ii) Graph ordering

(iii) Group ordering (iv) Group coloring

(f) An immediate application of minimum spanning tree _____.

(i) Gesture analysis

(ii) Handwriting recognition

(iii) Fingerprint detection

(iv) Soft computing

(g) The tree elements are called _____.

(i) Vertices (ii) Nodes

(iii) Points (iv) Edges

(h) Find the value of a_4 for the recurrence relation $a_n = 2a_{n-1} + 3$, with $a_0 = 6$.

(i) 320 (ii) 221

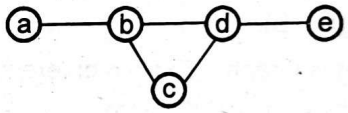
(iii) 141 (iv) 65

(i) Which of the asymptotic notation is used to provide lower bound constraints ?

(i) Ω (ii) O

(iii) θ (iv) X

(j) How many Hamiltonian paths does the following graph have ?



(i) 1 (ii) 2

(iii) 3 (iv) 4

2. What is Relation ? Which relation is said to be equivalence ? 5

Group – B

Answer any **three** questions of the following : 15×3 = 45

3. (a) If A = {1, 2, 3}, B = {2, 5, 6} and C = {1, 6, 7} then find (i) (A – B) × C (ii) (B – A) × C (iii) (A ∩ B) – (A ∩ C)

(b) What is Function ? Explain different types of function with suitable example.

4. (a) What is Asymptotic notation ? Explain the difference between Big Omega notation (Ω) and Big O notation.

(b) What is Integral approximation ? How do you find the approximation of an integral ?

5. (a) What is Propositional logic ? Find whether the below statement is tautology or not :

$\sim A \wedge B$

$\Rightarrow \sim (A \vee B)$.

(b) What is Graph ? Explain different types of graphs with neat diagram.

6. (a) What is Spanning tree ? Write the properties of a tree.

(b) Explain the difference between graph and tree. Explain graph coloring.

7. Write short notes on any **two** of the following :

(a) Well-formed formula

(b) Recurrence trees

(c) Graph Isomorphism