AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-2026 Monsoon

CSE601 Computational Thinking
End-Term Examination
Sunday, 07 December 2025. 02:00 – 03:30

Name:	Roll no.	A U 2							Marks /30

Write your answers on this sheet and on the answer book. Attach this sheet to the answer book and then submit it. Answer all questions.

1. Answer the following questions in brief.

Marks

(a) Explain how graphs can be used to model electronic mail messages in a network. Should the edges be directed or undirected? Should multiple edges be allowed? Should loops be allowed? *(1)*

(b) Describe a graph that models the electronic mail sent in a network in a particular week. *(1)*

(c) How can a graph that models e-mail messages sent in a network be used to find people who have recently changed their primary e-mail address? *(1)*

(d) How can a graph that models e-mail messages sent in a network be used to find electronic mail mailing lists used to send the same message to many different e-mail addresses? *(1)*

2. The complementary graph $\bar{G}$ of a simple graph G has the same vertices as G. Two vertices are adjacent in $\bar{G}$ if and only if they are not adjacent in G.

(a) If G is a simple graph with 15 edges and $\bar{G}$ has 13 edges, how many vertices does G have? *(1.5)*

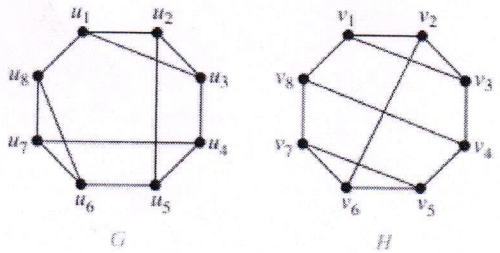
(b) If the simple graph G has v vertices and e edges, how many edges does $\bar{G}$ have? *(1.5)*

(c) If the degree sequence of the simple graph G is 4, 3, 3, 2, 2, what is the degree sequence of $\bar{G}$? *(1.5)*

(d) If the degree sequence of the simple graph G is $d_1, d_2, \ldots, d_n$, what is the degree sequence of $\bar{G}$? *(1.5)*

3. Do as directed.

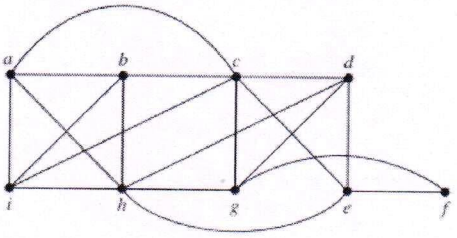
(a) Determine whether the below graphs are isomorphic or not. *(2)*



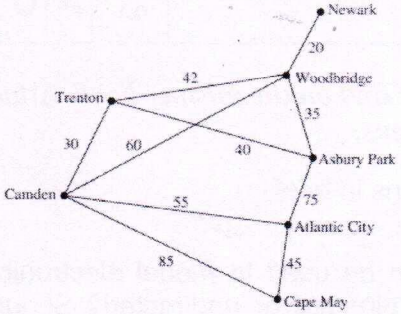
G *H*

(b) Represent the graph $K_{2,3}$ with an adjacency matrix. *(2)*

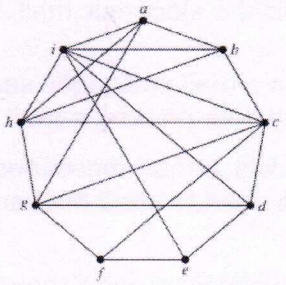
(c) Determine whether the given graph has an Euler circuit or an Euler path. *(2)*



(d) Find a shortest route in distance between Newark and Camden. *(3)*



(e) Find chromatic number of given graph. *(1)*



4. (a) Given the pre-order A, B, D, H, I, E, J, C, F, G and in-order H, D, I, B, E, J, A, F, C, G, construct and draw the binary tree. *(2)*

(b) How many leaves does a full 3-ary tree with 100 vertices have? *(2)*

(c) Use Huffman coding to encode these symbols with given frequencies: A: 0.10, B: 0.25, C: 0.05, D: 0.15, E: 0.30, F: 0.07, G: 0.08. What is the average number of bits required to encode a symbol? *(3)*

(d) Write the compound proposition $(\neg p \wedge (q \leftrightarrow \neg p)) \vee \neg q$ as an ordered rooted tree and express it in prefix, postfix, and infix notation. *(3)*