No. of Printed Pages : 3

BCS–042

BACHELOR OF COMPUTER APPLICATIONS (BCA) (REVISED)

Term-End Examination

December, 2023

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 Hours *Maximum Marks : 50*

Note : *(i) Question No. **1** is compulsory.*

*(ii) Answer any **three** questions from the rest.*

1. (a) Show that : 2

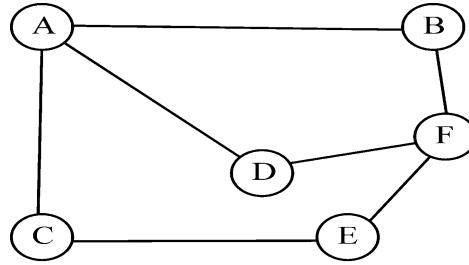
$$5n^2 + 2n + 2 = \theta(n^2)$$

(b) Solve the following recurrence relation : 3

$$T(n) = 3T\left(\frac{n}{2}\right) + n$$

(c) Write binary search algorithm and explain its best case and worst case complexity. 5

(d) Represent the following graph using Adjacency List : 4



(e) Sort the following list of elements using quick sort. Also show the steps of the operation : 6

8, 29, 30, 6, 25, 7, 8, 9

2. (a) Define the following terms : 4

(i) Connected graph

(ii) Cycle in an undirected graph

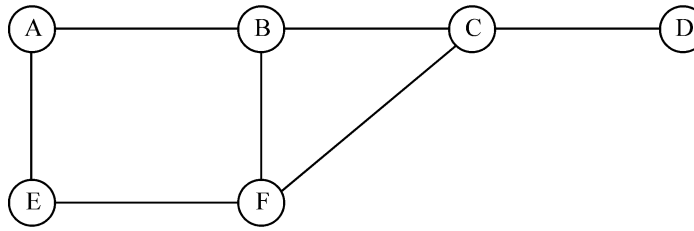
(b) Write Euclid's algorithm for finding GCD and explain it. 6

3. (a) What is spanning tree ? Explain application of spanning tree. 4

(b) Write and explain Dijkstra's single source shortest path algorithm. 6

4. (a) Briefly explain Greedy technique for designing of algorithm. 4

(b) Write DFS traversal sequence from the node A for the graph : 6



5. (a) Using mathematical induction method, show that for all positive integers n : 5

$$1+2+3+\ldots n=\frac{n(n+1)}{2}$$

(b) Write Prim's algorithm for finding minimum spanning tree and find the complexity of this algorithm. 5