

7. What do you mean by Minimum Spanning Tree ? Explain Kruskal Algorithm for MST with a suitable example.
8. What is a Linked List ? How are linked lists more efficient than arrays ? Explain with a suitable example.
9. What is Queue ? How to implement a queue using stack ? Explain with a suitable example.

**MSCCS-07/MSCCS-201/  
MSCCSC-201/MCA-201**  
**December – Examination 2021**  
**MSCCS (Final)/MCA (IInd Year)**  
**Examination**  
**Data Structure and Algorithm**  
**Paper : MSCCS-07/MSCCS-201/  
MSCCSC-201/MCA-201**

*Time : 1½ Hours ] [ Maximum Marks : 80*

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*Note* :- The question paper is divided into two Sections A and B. Write answers as per the given instructions.

**Section–A** **4×4=16**

**(Very Short Answer Type Questions)**

*Note* :- Answer any *four* questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries 4 marks.

**Section-B****4×16=64****(Short Answer Type Questions)**

*Note* :- Answer any *four* questions. Answer should not exceed **200** words. Each question carries 16 marks.

1. (i) What is the maximum number of nodes in a binary tree of height  $k$  ?
- (ii) Why do we need data structure ? Give an example.
- (iii) State the 0/1 Knapsack Problem ? Explain with an example.
- (iv) Give a short description of divide and conquer strategy.
- (v) What do you mean by NP-hard and NP-complete problems ? Give an example of each.
- (vi) What do you mean by a Binary Tree ? Give an example.
- (vii) What do you mean by Planar Graph ? Give an example.
- (viii) Write the condition when the Circular Queue is overflow.

2. Design an algorithm/pseudocode for selection sort. Illustrate the working of selection sort on the following array with 7 elements :  
30, 45, 25, 32, 55, 60, 49.
3. What do you understand by the complexity of an algorithm ? Write worst case and best case complexity of linear search.
4. What do you mean by Depth First Search of a Graph ? How do you know when to use DFS over BFS ?
5. Write a program/algorithm to find the duplicate values in an array. Find its complexity also.
6. State the steps and convert the following expression from infix to postfix notation :

$$R / D - Y * (G / C * (D - E) + B / Z) + S * A$$