**Summer20 CSE207 Sec 5 Lab Assignment 8**

## **Binary Heap**

1. Write a program to find k largest element in an array. You have to **use binary heap to** solve the mentioned problem.

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| **Sample Input** | **Sample Output** |
| 1, 23, 12, 9, 30, 2, 50 | K:3  Element: 50, 30, 23 |

1. Write a program to sort elements of an array in ascending order using Binary Heap.

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| **Sample Input** | **Sample Output** |
| 12, 11, 13, 5, 6, 7 | 5 6 7 11 12 13 |

1. Write a program to convert an array to Max Heap.

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| **Sample Input** | **Sample Output** |
| 3 5 9 6 8 20 10 12 18 9 | 20 18 10 12 9 5 9 3 8 6 or [any Max Heap formed from input elements] |

1. Write a program to convert an array to Min Heap.

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| **Sample Input** | **Sample Output** |
| 20 18 10 12 9 5 9 3 8 6 | 3 5 9 6 8 20 10 12 18 9  or [any Min Heap formed from input elements] |

1. Write a program to find smallest and largest element of a binary heap.

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| **Sample Input** | **Sample Output** |
| 3 5 9 6 8 20 10 12 18 9 | Min: 3  Max: 20 |

1. Write a class Priority\_Queue that maintains a list or set **S** using max heap and supports the following operations:

* Insert( *x* ) – Inserts element *x* into set *S*, according to its priority
* Maximum( ) – Returns, but does not remove, the element of *S* with the largest key
* Extract-Max( ) – Removes and returns the element of *S* with the largest key
* Increase-Key( *x, k* ) – Increases the value of element *x*’s key to the new value *k*

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| Sample Input | Sample Output followed by operation |
| PQ.insert(3)  PQ.insert(5)  PQ.insert(9)  PQ.insert(6)  PQ.insert(8)  PQ.insert(20)  PQ.insert(10)  PQ.insert(12)  PQ.insert(18) | S:  20 18 10 12 6 5 9 3 8 |
| PQ.Maximum() | 20 |
| PQ.Extrcat-Max() | Return 20  S:  18 12 10 8 6 5 9 3 |
| PQ.Increase-Key(3, 11) | S:  18 12 10 11 6 5 9 8 |