

**M TECH**  
**(SEM-I) THEORY EXAMINATION 2018-19**  
**FOUNDATION OF COMPUTER SCIENCE**

Time: 3 Hours

Total Marks: 70

Note: Attempt all sections equally &amp; give answers in a neat &amp; suitable manner.

**SECTION A****1. Attempt all questions briefly. 2 x 7 = 14**

- a. Define Stack?
- b. What you meant by Push Down Automata?
- c. What is P and NP Class?
- d. What is Queue?
- e. Explain Red Black Tree.
- f. Explain Binary Search.
- g. Explain Hash Table.

**SECTION B****2. Attempt any three of the following: 7 x 3 = 21**

- a. Explain insertion and deletion algorithms in Red-Black trees with examples.
- b. Explain insertion and deletion of elements in suffix trees with suitable examples.
- c. What are Binomial Heaps? What are its applications?
- d. Explain single ended priority queue operations.
- e. What is the average successful search time taken by binary search on a sorted array of 10 data items?

**SECTION C****3. Attempt any one part of the following: 7 x 1 = 7**

- (a) A natural merge sort is to be used to sort the file of integers: 12, 37, 42, 9, 5, 7, 50, 40, 45, and 92. What is order of the numbers after one pass of the sort?
- (b) What language is represented by the regular expression:  $b(a + b)^* + (b + a)^*a$ ?

**4. Attempt any one part of the following: 7 x 1 = 7**

- (a) Prove that the language  $L = \{a^n \mid n \text{ is prime}\}$  is not regular.
- (b) Design a DFA which accepts precisely the set of all binary strings having odd number of 0s and odd number of 1s.

**5. Attempt any one part of the following: 7 x 1 = 7**

- (a) With suitable examples, explain the optimal page replacement and most recently used page replacement algorithms.
- (b) Explain FIFO page replacement algorithms.

**6. Attempt any one part of the following: 7 x 1 = 7**

- (a) Discuss the methods for OS audit.
- (b) Write note on virtualization technique for security.

**7. Attempt any one part of the following: 7 x 1 = 7**

- (a) Write Short Notes on Following: (i) Parallel & Distributed Database (ii) Emerging Database Techniques.
- (b) Explain Object Oriented & Object Relational Database methodology.