NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

MID TERM - 2 EXAMINATION

Date: 17 / 11 / 2022	**Semester:** 5
Programme: B. Tech.	**Number of Pages:** 1
Course Name: Advanced Data Structures and Algorithms	**Time Allowed:** 50 minutes
Course Code: CSPC31	**Maximum Marks:** 15

Q1.	a. For Fib-Heap, write an algorithm for `cut(H, x, y)`. Here, `x` is the node in the child list of `y`. Mention its time complexity and justify.	3
	b. Prove that the total number of nodes in a binomial heap at depth `k` is ${}^{k}C_{i}$ for `i = 0, 1, ..., k`	2
Q2.	Write the procedure of calculating the prefix function in the KMP algorithm. Compute the prefix function for the pattern P = “abababcaab”. Further, explain the complexity of finding the prefix function.	4
Q3.	a. Prove that the vertex cover problem belongs to the class NP and NP-Hard.	4
	b. Give the definition of a polynomial time approximation scheme (PTAS) for a maximisation problem.	2