
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
CS21003 Algorithms I: First Class Test 2021 Spring

Date of Examination: 30th January 2021

Duration: 30 minutes + 5 minutes (for scanning, concatenating, and uploading)

Full Marks: 10

Subject: CS21003 Algorithms I

Part II

Answer all question.

1. What are the best-case, average-case, and worst-case time complexity of the binary search algorithm in Big- Ω notation? Justify your answer.

[2 Marks]

2. Derive the asymptotic complexity of $T(n)$ in terms of Θ for the following recurrence.

(a)

$$T(n) = \begin{cases} T(n-1) + T(n-2) & \text{if } n \geq 2 \\ 0 & n = 0 \\ 2 & n = 1 \end{cases}$$

[4 Marks]

(b)

$$T(n) = \begin{cases} T\left(2^{\log^{11} n}\right) + T\left(2^{\log^{17} n}\right) + 13 \log \log n & \text{if } n \geq 10^{20} \\ 1 & \text{otherwise} \end{cases}$$

[4 Marks]

All the best
