NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA
THEORY EXAMINATION
MID-1, Question Paper

Month and year: **Sept, 2021**
Program: **B. Tech** Semester: **3rd**
Subject: **Design and Analysis of Algorithms** Course code: **ITPC21**
Maximum Marks: **15** Time allowed: **50 minutes**

Note: Attempt all questions. All questions carry equal marks. Unless stated otherwise, the symbols have their usual meanings in context with subject. Assume suitably and state, additional data required, if any. The candidates, before starting to write the solutions, should please check the question Paper for any discrepancy, and also ensure that have been delivered the question paper of right course no. and right subject title.

Q-1: Use a recursion tree method to give an asymptotically tight solution to the recurrence

$T(n)=T(\alpha n) + T((1-\alpha)n) + cn$, where α is a constant in the range $0<\alpha<1$ and $c>0$ is also a constant.

Q-2: Consider the regularity condition $a.f(n/b) \leq c.f(n)$ for some constant $c<1$ which is part of case-3 of master theorem. Give an example of constants $a \geq 1$, and $b>1$ and a function $f(n)$ that satisfies all the conditions in case-3 except the regularity condition.

Q-3: Write the algorithm for min-heapify procedure. Explain it with suitable example. Also compute its time complexity.