INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR

Computer Science and Engineering

Switching Circuits and Logic Design (CS21002, Spring)

Class Test – II (part-2)

Name: _____ *Roll number:* _____

Date: Wed, Feb 10, 2021 *Marks:* 22 *Time:* 8:10-9am (FN)

Answer ALL the questions using xournal or similar software to edit the PDF

Q1: Consider a Boolean lattice for two Boolean variables a and b, $\overline{a}$ and $\overline{b}$ are their respective complememnts.

(a) Sketch this Boolean lattice indicating all possible functions of a and b at the lattice nodes 8

(b) Wrt to that lattice determine: $(a \oplus b) + (\overline{a} + b)$ 2

(c) Wrt to that lattice determine: $(a \oplus b) \cdot (\overline{a} + b)$ 2

Q2: Let B be a Boolean algebra. For $a, b \in B$, let $\overline{a}, \overline{b}$ be their respective complements.

(a) Prove that $a = b$ if and only if $(a \wedge \overline{b}) \vee (\overline{a} \wedge b) = 0$ for all $a, b \in B$. 1+4

(b) Prove that $a = 0$ if and only if $(a \wedge \overline{b}) \vee (\overline{a} \wedge b) = b$ for all $b \in B$. 1+4