INDRAPRASTHA INSTITUTE OF INFORMATION TWCHNOLOGY DELHI
MID-SEMESTER EXAMINATION
ECE 111 DIGITAL CIRCUITS

Date: February 20, 2022. Max. Marks: 40

Q1. Consider the following logical functions:
F(X, Y, Z) = ∑ m (3, 6, 7) and G(X, Y, Z) = ∑ m (0, 1, 3)
Give the realization of the logic functions F and G using minimum number of total AND, OR and NOT gates to realize the functions. Hint: The realization could have a common minterm for both the functions. (8)

Q2. Determine the base used in each of the following cases for the equation to be correct:
(a) 14/2 = 5, (b) 54/4 = 13 (6)

Q3. Suppose a 8 bit binary number B is represented by a 2-digit hexadecimal number H. Prove that the two's complement of B is represented by the 16's complement of H. Can this be extended to any 4N bit binary number **B** and N digit hexadecimal number **H**? (9)

Q4. Logic function of a commercial TTL is given as: F = $\overline{(A\,B + C\,D)}$, known as AND OR Invert or AOI gate.
Realise this function using AND, OR and NOT gate.
Show that this gate can be used as an Universal gate to realise all functions including two input NAND and NOR functions. (9)

Q5. A company has four share-holders A, B, C and D. A owns 20%, B owns 30%, C owns 40% and D owns 10% of total shares. A policy can be passed only if share-holders holding 60% or more of the total shares vote for it. Assuming that **A**, **B**, **C** and **D** denote binary variables indicating whether the corresponding share-holder has supported a particular policy or not, obtain a Boolean expression for the condition (**P** = 1) for a policy to get accepted. (8)

Note: The maximum marks is indicated as 40 while in the lecture we announce the mid-sem examination will be for 20%. It will still contribute only 20% to the final total.