Roll Number:.....

National Institute of Technology Kurukshetra
Mid Term Exam-I, Even Sem 2024-25

Program: B.Tech. **(CS / AIDS / M&C)** Semester: 2nd
Subject: Digital System Design CourseCode:CSIC 100
Maximum Marks: 15 Time allowed: 50 Min.

Instructions: All questions are Compulsory.
Attempts all parts of a question together.

Q1: (a) Prove that Gray code is both a reflective and unit distance code? **[5 x 1]**
(b) What is the range of signed decimal values that can be represented by 8 bits?
(c) The solutions of the quadratic equation $x2 - 13x + 32 = 0$ are $x = 5$ and $x = 4$. What is the base of the numbers?
(d) Let the representation of a number in base 3 be 210. What is the hexadecimal representation of the number?
(e) In 16-bit 2's complement representation, the decimal number -28 is _____.

Q2: (a) What is the use of self-complementing property? Demonstrate 6 3 1 1 BCD code is self-complementary. **[3 x 2]**
(b) What is the largest binary number that can be expressed with 12 bits? What are the equivalent decimal and hexadecimal numbers?
(c) Formulate a weighted binary code for the octal digits, using the following weights:
(a) 6, 3, 1,-1 (b) 6, 4, 2, 1

Q3: The state of a 12-bit register is 010101100100. What is its content if it represents **[4]**
(a) Three decimal digits in BCD?
(b) Three decimal digits in excess-3 code?
(c) Three decimal digits in 8-4-2-1 code?
(d) A binary number?

OR

Consider an eight-bit ripple-carry adder for computing the sum of A and B, where A and B are integers represented in 2's complement form. If the decimal value of A is one, the decimal value of B that leads to the longest latency for the sum to stabilise is-----. Write complete steps.