Note: To get the points of each question, you need to show the details of your solution. Listing only the final answer will give you zero point.

Question 1: Construct a table for a 5-3-2-1 weighted code for decimal digits, and write $(9731)_{10}$ using this code.

Question 2: The solutions to a quadratic equation $x^2 - 13x + 32 = 0$ are $x = 5$ and $x = 4$ What is the base of the numbers? To get the mark of this question, Show the details of your solution. **Final answers are NOT accepted.**

Question 3: Convert the following binary numbers to decimal

(a) 100010110

(b) 10101011

(c) 1011011011

(d) 10000000000

Question 4: Convert the following decimal values to binary

(a) 217

(b) 186

(c) 265

(d) 957

Question 5: Convert each of the following hexadecimal numbers to its equivalent decimal value

(a) 36

(b) ABCD

(c) 89

(d) 2000

Question 6: Convert each of the following decimal numbers to hexadecimal

(a) 372

(b) 2313

(c) 33

(d) 1024

Dr. Rami Alazrai

Question 7: The numbers below are expressed in 6-3-1-1 code. Convert them to decimal

(a) 010101010101

(b) 000110000100

(c) 10111

(d) 1110101

Question 8: Encode the following decimal numbers in Excess-3 code and then attach an even parity bit.

(a) 38

(b) 275

(c) 9201

(d) 51

Question 9: Each of the following numbers represents a signed decimal number in the $2's$-complement system. Determine the decimal value in each case.

(a) 01101

(b) 11101

(c) 01111011

(d) 11111111

(e) 01111111

(f) 10000000

Question 10: Perform the following operations in the $2's$-complement system.

(a) Add -87 to +256

(b) Add -35 to +65

(c) Add +490 to +22

(d) Add -255 to -230

(e) Add -129 to +128

(f) Add +986 to +123

For each of the above operations:

- Determine the minimum number of bits required to represent both summands. You might need to sign-extend one of the summands, since for proper summation, both summands must have the same number of bits.

- Perform the binary addition in $2's$-complement arithmetic. The result must have the same number of bits as the summands.

- Determine whether there is overflow or no.

- To avoid overflow, determine the minimum number of bits required to represent both the summands and the result.