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राष्ट्रीय प्रौधोगिकी संस्थान गोवा

NATIONAL INSTITUTE OF TECHNOLOGY GOA

Farmagudi, Ponda, Goa, 403401

Programme Name: B.Tech

Online Mid Semester Examinations, October-2021

Course Name: Computer Organization and Architecture — Course Code:CS202

Date:06/10/2021 — Time:10:00 AM

Duration: 1 Hour 30 Minutes — Max. Marks: 50

ANSWER ALL QUESTIONS

1. What are the basic steps involved in execution of the instruction `ADD A, B, C` that performs addition of numbers stored at memory locations `A` and `B` and store the result at `C`. [Hint: Write about the steps corresponding to processor and memory interaction?]

[4 marks]

2.
   a. Represent the decimal values 7, -44, -13, +27, -64 as signed, 9 bit numbers in the following formats
      i. Sign-and-magnitude
      ii. 1's-Complement
      iii. 2's-Complement

   b. Let the decimal values of X and Y be -183 and -233 respectively. Represent them in a 2's compliment form. Let X' and Y' be their 2's compliment representation. Perform (i) X'+Y' and (ii) X'-Y'

   c. There is a need to build a 12-bit adder. Give the design for the same using carry look ahead principle.

[5+5+6=16 marks]

3.
   a. What are the issues in using a combinational array multiplier for signed number multiplication? Briefly explain.
   b. Multiply 11 (multiplicand) by -27 (multiplier) using Booth method

[3+7=10 marks]

4. Let $A=a_4a_3a_2a_1a_0$ and $B=b_4b_3b_2b_1b_0$ be two 5-bit numbers that need to be multiplied. Draw neat circuit diagrams for the following approaches for multiplying A and B
   i. Combinational array multiplier
   ii. Carry save adder based multiplier

[5+5=10 marks]

5. Divide 359 (dividend) with 11 (divisor) using restoring division algorithm. Assume that the divisor is represented using 5 bits.

[10 marks]