BRAC University
Department of Computer Science and Engineering (CSE)

CSE230: Discrete Mathematics

SET - B Semester: **Spring 2024** Examination: **Quiz 6**

Time: **20 minutes** Full marks: **20**

Name: solve ID: _____ Section: _____

*(There are 3 questions total. You must answer **all**.*
Feel free to use the back of the question paper, if needed.)

Q1. Find each of these values:

(a) −10101 **mod** 101	$-10101 - \left[\frac{-10101}{101}\right] * 101 = -10101 - (-101)\,101$ $= -10101 + 10201 = \boxed{100}$
(b) $(7^3$ **mod** $23)^2$ **mod** 31	$7^3 \bmod 23 = (7 \bmod 23)(7^2 \bmod 23) \bmod 23$ $= (7 \times 3) \bmod 23 = 21 \bmod 23 = 21$ $21^2 \bmod 31 = 441 \bmod 31 = \boxed{7}$

[2+4=6 Marks]

Q2. Show that if a and b are congruent modulo 7, then 8a+16 and 50b+65 are also congruent modulo 7.

$a \equiv b \pmod 7 \Rightarrow a \cdot 7 = b \cdot 7$

[8 Marks]

Q3. Calculate the octal representation of the sum: $(ABC)_{16} + (321)_4$

[8 Marks]

End

Q2. $a \equiv b \pmod 7 \Rightarrow a - b = 7p$ (Assume)

Now, $(8a+16) - (50b+65) = 8a + 16 - 50b - 65 = 8a - 50b - 49$

$= 8a - 8b - 42b - 49 = 8(a-b) - 42b - 49$

$= 8(7p) - 6 \cdot 7b - 7 \cdot 7 = 7(8p - 6b - 7)$

$\therefore (8a+16) - (50b+65) = 7Q$

$\therefore (8a+16) \equiv (50b+65) \pmod 7$

Q3. $(A\ B\ C)_{16} + (3\ 2\ 1)_4$

$= (1010\ 1011\ 1100)_2 + (11\ 10\ 01)_2$

$= (101\ 011\ 110\ 101)_2$

$= (5\ 3\ 6\ 5)_8$

Ans : $(5365)_8$

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    1 1 1
  1010 1011 1100
       1 1 1 0 0 1
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  1010 1111 0101
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