



Inspiring Excellence

BRAC University
Department of Computer Science and Engineering (CSE)

CSE230: Discrete Mathematics

SET - A

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: (showing work is NOT mandatory)

(a) $-9999 \bmod 333$	$-9999 - \left\lfloor \frac{-9999}{333} \right\rfloor * 333 = -9999 - (-31) * 333$ $= -9999 + 10323 = \boxed{324}$
(b) $(32^3 \bmod 13)^2 \bmod 11$	$32^3 \bmod 13 = ((32 \bmod 13)(32 \bmod 13)) \bmod 13$ $= (6 * 10) \bmod 13 = 60 \bmod 13 = 8$ $(8)^2 \bmod 11 = 64 \bmod 11 = \boxed{9}$

[2+4=6 Marks]

Q2. Show that if a and b are congruent modulo 7, then $10a+13$ and $24b+20$ are also congruent modulo 7.

7 [8 Marks]

Q3. Calculate the octal representation of the sum: $(CBA)_{16} + (123)_4$

7 [8 Marks]

End

Q2. $a \equiv b \pmod{7} \Rightarrow a \cdot 7 = b \cdot 7 = r$ (Assume)
 Now, $10a + 13 - 24b - 20$

$$\begin{aligned}
 &= 10a + 13 - 24b - 20 \\
 &= 10(a - b) - 14b - 7 = 10 \cdot 7P - 14b - 7 \\
 &= 7(10P - 2b - 1)
 \end{aligned}$$

$$\therefore (10a + 13) - (24b + 20) = 7Q$$

$$\therefore (10a + 13) \equiv (24b + 20) \pmod{7}$$

Q3. $(CBA)_{16} + (123)_4$

$$\begin{aligned}
 &= (11001011010)_2 + (011011)_2 \\
 &= (1100101101011)_2 \\
 &= (6325)_8 \quad \boxed{\text{Ans} = 6325_8}
 \end{aligned}$$

$$\begin{array}{r}
 11001011010 \\
 011011 \\
 \hline
 110011010101
 \end{array}$$