Unit 2 · How Computers Store Everything

WORKSHEET

Full marks 35

Name _____ Class _____ Roll no. ____ Date _____ Marks _____ / 35

1 Key words [4]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

ASCII	**character code**	**code point**	**font**	**overflow**	**RGB**	**sample**	**Unicode**	**UTF-8**	**vector**

The number a computer stores for a letter, a digit or a space is its _____. An early table of these codes, with 128 codes for English, is _____. One table of codes for every writing system in the world is _____, and each character's number in it is its _____. The way most websites store those numbers, 1 byte for English and 3 bytes for Devanagari, is called _____. A file with a drawing for each character is a _____. When an answer needs more bits than the computer keeps for it, the extra bit is lost: this is _____. A color kept as three numbers for its red, green and blue light is stored as _____.

2 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which is 22 in binary? [1]

a. 11010 **b.** 10110
c. 10011 **d.** 1110

ii. What is 0110 + 0011 in binary? [1]

a. 0111 **b.** 1011
c. 1001 **d.** 1111

iii. In ASCII, **B** is 66. What is the code for **b**? [1]

a. 67 **b.** 32
c. 98 **d.** 132

iv. How many bytes does the word **घर** (घ and र) take in UTF-8? [1]

a. 2 **b.** 4
c. 6 **d.** 8

v. A pixel is stored as red 255, green 255, blue 0. What color is it? [1]

a. green **b.** brown
c. yellow **d.** white

3 Binary numbers [8]

Show your working.

a. Write 44 in binary by halving. Fill in the table, then read the remainders from the bottom up. [2]

Divide	Answer	Remainder
44 ÷ 2		
22 ÷ 2		
11 ÷ 2		
5 ÷ 2		
2 ÷ 2		
1 ÷ 2		

44 in binary:

b. Add these binary numbers. Check each answer in decimal. [3]

i. 0101 + 0110
ii. 1011 + 0111
iii. 01101001 + 00010111

c. An 8-bit computer adds 11110000 and 00100000. [3]

i. What is the true answer, in binary and in decimal?
ii. What does the computer's byte hold?
iii. What is this problem called, and how can a program avoid it?

4 Text is numbers [9]

Write short answers to the following questions.

a. In ASCII, the capital letters run in order from **A** = 65, and the small letters from **a** = 97. Decode this message: 78 101 112 97 108 [2]

b. On the screen, **किताब** seems to begin with the vowel sign ि, drawn before क. In what order are its codes stored, and why does it look different on the screen? **[2]**

c. How many bytes does **Nepal** take in UTF-8, and how many does **नेपाल** take (stored as न, े, प, ा, ल)? Why is there a difference? **[2]**

d. Rita opens a notice her father typed in 2008 and sees `;"rgf`. On her father's old computer it showed सूचना. **[3]**

i. Why does Rita see different letters?

ii. Why can't she find the notice by searching for सूचना?

iii. How can she fix the file? What must she check after fixing it?

5 Colors from numbers **[2]**

Fill in the table.

Write the RGB numbers (0 to 255) for each color of light.

Color	Red	Green	Blue
black			
white			
yellow			
cyan			

6 Calculations [5]

Show your working.

a. A picture is 1,200 pixels across and 900 pixels down, with 3 bytes a pixel. [3]

i. How many pixels does it have?

ii. How many bytes do the pixels need?

iii. About how many MB is that? (1 MB = 1,024 × 1,024 bytes.)

Answer: _____

b. An "HD voice" call stores 16,000 samples a second, 16 bits (2 bytes) each, for one loudspeaker. How many bytes does one minute take? About how many KB? (1 KB = 1,024 bytes.) [2]

Answer: _____

7 Think [2]

Think, then answer.

Ramesh types **घर** where he meant **घाम**, and his spell-checker shows no red line. Why not? Why can't a spell-checker check an old notice typed in Preeti at all?

_____

_____

_____

_____

8 Activity: You, in numbers

(not marked)

Write your name in English, one letter in each row, with its ASCII code (A = 65, a = 97, letters in order) and the code in 8-bit binary. In the last row, write the RGB numbers of your favorite color, if you can mix it in the color widget.

Letter	ASCII code	8-bit binary
My favorite color:	Red, Green, Blue:	