

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI  
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CYCLE TEST -II

Subject Code/ Name: CSPC34/ Computer Organization

Date: 2 / 11 / 2022

Marks: 20

Time: 11:00AM-12:00 PM

Answer all the questions

1. Calculate  $1.666015625 \times 10^0 \times (1.9760 \times 10^4 + -1.9744 \times 10^4)$  by hand, assuming each of the values are stored in the 16-bit half precision format. Assume 1 guard, 1 round bit, and 1 sticky bit, and round to the nearest even. Show all the steps, and write your answer in both the 16-bit floating point format and in decimal. (4)

2. Draw neatly the data path diagram for the MIPS load instruction. Use a pencil and ruler. (4)

3. For the code below: (1+2+2)

```
lw $t0, 0($s1)
add $t1, $s1, $a2
sub $t0, $t0, $s2
sw $t1, 0($s1)
addi $s1, $s1, -4
```

- Identify all the data dependencies in the code given below and identify which dependencies will cause data hazards without forwarding hardware.
  - Assuming there is no special hardware that is added for forwarding, add "nop" instructions to the code to avoid the data hazards.
  - Assume that the hardware supports forwarding and stalling. Show from which pipeline register the data is taken from and where it is forwarded. How many cycles will it take to execute this code (no need for nops)?
4. Using a table calculate 16 divided by 5. You should show the contents of each register on each step. Assume both inputs are unsigned 5-bit integers. (3)
5. Briefly describe the floating-point load and store instructions. (2)
6. What is the need of a biased representation for the exponent in IEEE-754 format? (2)

