VIT-AP UNIVERSITY

Apply Knowledge. Improve Life!

QUESTION PAPER

Name of the Examination: Win 2023-24 – CAT-1

Course Code: ECE2015 | **Course Title: Computer Architecture**

Set number: 5 | **Date of Exam:** 06/02/2024 (FN) (B1)

Duration: 90 mins | **Total Marks: 50**

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. Convert the following decimal numbers to binary and binary numbers to decimal for the 2 types of representations i.e. Magnitude-Only Representation and Sign-Magnitude Representation.

(a) -2864 (b) -97763 (c) 10111010100101 (d) 1111001010010100010

(e) 01001001100

(10M)

Q2. Write a program for the IAS computer which realizes the below given C program using address modify instructions.

```
void main () {
int a = -50, b = 5 ;        // declaration and initialization of two integer variables a, b
while (a < 0)
        {                   // beginning of "While" loop
        a = a + b;          // Add 'a' and 'b' and store it in 'a'
        }
}
```

(15M)

Q3. Consider a processor having the clock period of 2ns which is ready to execute a program having an instruction mix as follows: 1 million of ALU-related instructions, 1 million of load/store instructions, 3 million of branch instructions and 3 million of other type instructions having CPI of 1, 1, 4, 3. Compute the CPI, MIPS rate, and execution time required for executing the program?

(10M)

Q4. Show the machine code equivalent of the below given IAS program that is stored in memory along with the data operands. Also, show the values of the registers PC, MAR, AC, MQ, MBR, IR, IBR while executing the first instruction and the last one. Assumptions of data stored in memory can be made wherever required.

```
800: LOAD M(500)
     ADD M(501)
801: ADD M(502)
     ADD M(503)
802: ADD M(504)
     STOR M(701)
803: LOAD M(600)
     ADD M(601)
804: ADD M(602)
     ADD M(603)
805: ADD M(604)
     SUB M(701)
806: JUMP+ M(807,20:39)
     STOR M(702)
807: LOAD -M(702)
     STOR M(700)
```

(15M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	2	2	1, 2, 3	1	1	10
Q2	1	1	1, 2, 3	1	1	15
Q3	2	2	1, 2, 3	1	1	10
Q4	1	1	1, 2, 3	1	1	15