Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH. (COMPUTER SCIENCE ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2018

COMPUTER ORGANIZATION AND DESIGN [CSE 2101]

REVISED CREDIT SYSTEM
(22/12/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. What are the rules of overflow conditions on arithmetic operations in a computer? Consider the numbers A which is equal to maximum number that can be represented using 10 bits and B which is the least number that can be represented using 10 bits. Perform addition as A + B and subtraction as A – B of two numbers. Indicate if there is any overflow. **3M**

1B. Write a RISC program for dot product of two vectors. **4M**

1C. Describe Auto-increment and Auto-decrement with an example for each. **3M**

2A. Starting from basic principles obtain the expressions for Generate and Propagate functions of 4-bit Carry Look-ahead Circuit. From the derived expression obtain a bit-stage cell. Using these cells and 4-bit CLC, construct a 4-bit Carry Look-ahead Adder. **5M**

2B. Divide 30 by 13 using Non Restoring division algorithm. Show your calculations stepwise, to compute Quotient and Remainder. **5M**

3A. Consider the Register Transfer Description as in Fig. Q.3A. Draw a neat microprogrammed control unit. Explain your design with the help of the contents of condition-select field and actions taken.

```
Declare registers A[4], B[4], C[4];
Declare buses inbus1[4], inbus2[4], inbus3[4], outbus[4];
Start:   A←inbus1, B←inbus2, C←inbus3;
Loop:    A←A-1;
         B←B-1;
         C←C-1;
         if A[0] = 0 and B[0] = 0 or C[0] = 0 then go to Loop
Output: outbus = A;
         outbus = B;
         outbus = C;
Halt:    go to Halt;
```

Fig. Q.3A **4M**

3B. Write the binary listing of the microprogram for the microprogrammed control unit you designed in question 3A. **3M**

3C. Explain unencoded format and encoded format of control information in microprogrammed control unit with an example for each. **3M**

4A. Draw the internal organization of a 16 X 16 memory chip. Explain its working principle. **4M**

4B. Explain with a neat sketch, how virtual memory address translation takes place based on the concept of fixed-length pages. **4M**

4C. Draw typical ROM cell and explain PROM. **2M**

5A. With a neat diagram, explain the principle of direct memory access and the use of DMA controller in a computer system. **4M**

5B. Explain the principle behind the transfer of control through the use of interrupts. **4M**

5C. Name the components that appear in the design of Hardwired control unit and Microprogrammed control unit. **2M**