B. E. Third Semester (Computer Technology) / SoE – 2018 Examination

Course Code : CT 2201 **Course Name : Computer Architecture and Organisation**

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions are compulsory.
(2) All questions carry marks as indicated.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data wherever necessary.
(5) Illustrate your answers wherever necessary with the help of neat sketches.

1. (A1) Draw a diagram which shows connection between processor and main memory. Also list the steps needed to execute the machine instruction **Add R2 , R0**. 5(CO1)

(A2) What do you mean by **$1\frac{1}{2}$** addressing method explain with example. 3(CO1)

(A3) Draw single bus structure of a computer and write its advantages and disadvantages. 2(CO1)

OR

(B1) Write the set of instruction for solving the execution : **Z = (A * (B + C – D)) / ((E + F * G) * (B + C + D)** using :

(i) Zero operand instruction

(ii) One operand instruction 4(CO1)

(B2) How sign number, characters and machine instructions can be represented in **32** – bit word information in memory ? 3(CO1)

(B3) What is the purpose of **MAR** , **MDR** and **IR** registers ? 3(CO1)

2. (A1) Draw signal bus organization of a processor ? Also write control step for execution of an complete instruction. **MOV R3 , R1**. 5(CO2)

(A2) Discuss the following assembler directives with example

(1) **EQU** (2) **DATAWORD** 2(CO1)

(A3) Explain immediate, register and indexed addressing mode with example. 3(CO1)

OR

(B1) What do you mean by big – endian and little – endian assignment. Also solve if registers **R1** and **R2** of a computer contain the addresses **1200** and **4600** respectively. What is the effective address of the memory operatned and the addressing modes in each of the following instructions ?

Move 20 (R1), R5
Add – (R2) , R5 5(CO1)

(B2) Write control sequence for complete instruction **ADD R4 , R5 , R6** using three bus organization of a processor. 3(CO2)

(B3) Explain subroutine Linkage with example. 2(CO1)

3. (A1) 'Explain "microinstruction with next address field" with suitable diagram. What is the significance of "next address" field ? 5(CO2)

(A2) Compare vertical and horizontal organization w. r. to microprogrammed control. 3(CO2)

(A3) Write short note on emulation. 2(CO2)

OR

(B1) Discuss grouping of control signal in detail. 5(CO2)

(B2) Define the term w. r. to microprogrammed control

(1) Control Word

(2) Control Store

(3) Microroutine 3(CO2)

(B3) Why microinstructions are prefetched ? What are its organizational difficulties ? 2(CO2)

4. (A1) Describe array multiplication of positive binary operands. 5(CO2)

(A2) Compute $(+21) \times (-9)$ using Booth's algorithm. 3(CO2)

(A3) Write advantages and disadvantages of Booth's algorithm. 2(CO2)

OR

(B1) Compute 16×12 using sequential multiplication algorithm. 5(CO2)

(B2) What is the disadvantage of ripple carry adder ? How it is overcome ? 3(CO2)

(B3) Compute -8×-9 using fast multiplication. 2(CO2)

5. (A1) Solve $12 \div 4$ using restoring division algorithm. 5(CO2)

(A2) Fit the number 100_{10} in IEEE Single precision formats. 2(CO2)

(A3) Compare cache memory, main memory and secondary memory w. r. to size, speed and cost per bit. 3(CO3)

OR

(B1) Discuss internal organization of semiconductor RAM memory chips. 5(CO3)

(B2) Draw block diagram for designing $64\,K \times 8$ memory using $8\,K \times 1$ memory chips. 3(CO3)

(B3) State the use of flash cards and flash drives. 2(CO3)

6. Solve any **Three** :—

(A1) Consider a computer with a **4** – ways set – associative mapped cache of the following characteristics : a total of **1 MB** of main memory, a word size of **1** byte a block size of **128** words and a cache size of **8 KB**. While accessing the memory location **0C795H** by the CPU, the contents of the **TAG** field of the corresponding cache line is :

A **000011000**
B **110001111**
C **00011000**
D **110010101** 5(CO3)

(A2)	Compare DMA and interrupt.	2(CO2)
(A3)	Explain RAW hazards with example.	3(CO2)

OR

(B1)	Discuss different data hazard in detail.	5(CO2)
(B2)	Write a note on interrupts.	3(CO4)
(B3)	Write advantages and disadvantages direct – mapping technique.	2(CO3)