2021
B.E. (Electronics and Communication Engineering)
Seventh Semester
Departmental Elective – IV
EC-704: Computer Architecture and Organization

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt* <u>*five*</u> *questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

Q1. Attempt the following:-

a) What is write through cache.
b) Give examples of SIMD and MIMB based architectures.
c) Write advantage and disadvantage of three address instruction.
d) What do you understand by register transfer language?
e) Convert the following arithmetic expressions from infix to reverse Polish notation.
   A * B + C * D + E * F   (5x2=10)

SECTION- A

Q2 a) Show the hardware that implements the following statement. Include the logic gates for the control function and a block diagram for the binary counter with a count enable input.
   $xyT_0, + T_1, + y'T_2 : AR \leftarrow AR + 1$ (5)
   b) A 36-bit floating-point binary number has eight bits plus sign for the exponent and 26 bits plus sign for the mantissa. The mantissa is a normalized fraction. Numbers in the mantissa and exponent are in signed-magnitude representation. What are the largest and smallest positive quantities that can be represented, excluding zero? (5)

Q3 a) An output program resides in memory starting from address 2300. It is executed after the computer recognizes an interrupt when FGO becomes a 1 (while IEN = 1).
   i. What instruction must be placed at address 1?
   ii. What must be the last two instructions of the output program?   (5)
   b) What are the basic differences between a branch instruction, a call subroutine instruction, and program interrupt?
                                                              (5)

Q4 a) A two-word instruction is stored in memory at an address designated by the symbol W. The address field of the instruction (stored at W + 1) is designated by the symbol Y. The operand used during the execution of the instruction is stored at an address symbolized by Z. An index register contains the value X. State how Z is calculated from the other addresses if the addressing mode of the instruction is
   1. direct
   2. indirect
   3. relative
   4. indexed   (5)
   b) Explain working of five segment instruction pipeline with suitable flow chart?   (5)

SECTION- B

Q5 a) What is the difference between microprocessor and a microprogram? Is it possible to design a microprocessor without a microprogram? Are all microprogrammed computers also microprocessors?   (5)
   b) Explain the address sequencing in detail.   (5)

Q6 a) Show how the booth multiplier works well for both positive and negative multipliers.   (5)
   b) Draw and explain flowchart of addition and subtract operations.   (5)

Q7 a) Why are the read and write control lines in a DMA controller bidirectional? Under what condition and for what purpose are they used as inputs? Under what condition and for what purpose are they used as outputs?   (5)
   b) Design a parallel priority interrupt hardware for a system with eight interrupt sources   (5)