

7R  
15

Exam. Code: 0931  
Sub. Code: 6932

1128  
B.E. (Electronics and Communication Engineering)  
Seventh Semester  
EC-704: Computer Architecture and Organization

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

SECTION-A

(10\*1=10)

1. a. Represent the following conditional control statement by two register transfer statements with control functions.

If (P=1) then (R1←R2) else if (Q=1) then (R1←R3)

- b. Define microoperation, microinstruction & microprogram.
- c. Explain execution of Branch and save Return address (BSA) instruction.
- d. Differentiate between hardwired and microprogrammed control.
- e. Write the functions of address sequencer.
- f. Convert the following arithmetic expression from infix to reverse polish notation:

$A + B * [C * D + E * (F + G)]$

- g. Discuss various types of CPU organization.
- h. State the major characteristics of RISC and CISC.
- i. What is priority interrupt?
- j. A nonpipelined system takes 50ns to process a task. The same task can be processed in a six-segment pipeline with a clock cycle of 10ns. What is the speedup ratio of the pipeline for 100 tasks? What is the maximum speedup that can be achieved?

SECTION-B

2. a. Represent a number 263.3 in IEEE-754 32-bit floating point notation. (4)
- b. What do you understand by general register organised CPU? Draw the block diagram of bus organization for general register organized CPU, which has following control word (instruction format).

SEL A (3-bits)	SEL B (3-bits)	SEL D (3-bits)	OPR (5-bits)
----------------	----------------	----------------	--------------

Where SEL A and SEL B are two source register and SEL D is destination register field. OPR is 5-bit operation code field. (6)

3. a. What is Assembler? Discuss step by step working of a assembler to generate binary code of a program. (5)
- b. Write an assembly language program to multiply two positive numbers. (5)
4. a. An instruction of computer system has two parts: Op-code and Operand. Instruction is stored at two consecutive locations of memory as given below. It has one general purpose register (R1) and index register (XR). Content of memory with their addresses are given

P.T.O.

below. Contents of Register R1 and index register XR are 400 and 100 respectively. What will be value of AC after the execution of instruction, in following addressing modes? (5)

- i) Register addressing mode
- ii) Register indirect addressing
- iii) Immediate addressing
- iv) Direct addressing
- v) Indirect addressing
- vi) Indexed addressing

Address	Contents
200	Load to AC
201	500
399	450
400	700
500	800
600	900
702	325
800	800

- b. Evaluate the arithmetic statement using zero, one and two address instructions. (5)

### SECTION-C

5. a. With the help of neat block diagram explain the function of microprogram sequencer? (5)
- b. The 8-bit registers A, B, C & D are loaded with the value  $(F2)_H$ ,  $(FF)_H$ ,  $(B9)_H$  and  $(EA)_H$  respectively. Determine the register content after the execution of the following sequence of micro-operations sequentially.
  - (i)  $A \leftarrow A + B$ ,  $C \leftarrow C + \text{shl}(D)$
  - (ii)  $C \leftarrow C \wedge D$ ,  $B \leftarrow B + 1$
  - (iii)  $A \leftarrow A - C$
  - (iv)  $A \leftarrow \text{shr}(B) \oplus \text{cir}(D)$  (5)
6. a. Draw the flowchart for Booth's multiplication process. Multiply the following pairs of signed 2's complement numbers. Assume  $A = 010111$  is the multiplicand and  $B = 110110$  is the multiplier. (5)
- b. What are the main advantages of using Input / Output interface? Why interfacing is used in digital computers? (5)
7. a. What is Associative Memory? With the help of block diagram explain its hardware organization and its working. (5)
- b. A block-set-associative cache consists of a total of 64 blocks divided into 4 block sets. The main memory contains 4096 each consisting of 128 words.
  - (i) How many bits are there in main memory address?
  - (ii) How many bits are there in each of the TAG, SET and WORD fields? (3)
- c. Explain how cache memory is different from virtual memory. (2)