53 (IT 301) CPAR

2021

COMPUTER ORGANIZATION AND ARCHITECTURE

Paper : IT 301

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* A computer uses RAM chips. 10

   (i) How many 128×8 RAM chips are needed to provide a memory capacity of 2048 bytes?

   (ii) How many lines of address bus must be used to access 2048 bytes of memory? How many of these lines will be common on all chips?

   (iii) How many lines must be decoded for chip select? Specify the size of the decoders.

Contd.

(b) Draw a space-time diagram for a six-segment pipeline showing the time it takes to process eight tasks. 10

2. (a) Explain the function of a memory management unit in a typical computer. 10

(b) A ROM chip of 1024 × 8 bits has four select inputs and operates from a 5 volt power supply. How many pins are needed for the IC package ? Draw a block diagram and label all input and output terminals in the ROM. 10

3. (a) What are the possible ways to represent signed numbers in computer ? 7

(b) When does the condition of overflow occur while adding two numbers in 2's complement ? How can it be detected ? 5

(c) Evaluate the following floating-point numbers in decimal form : 8

(i) $(41200000)_{16}$

(ii) $(C4962800)_{16}$

4. *(a)* Draw the block diagram and label all input and output terminals in the RAM. Explain the function table to specify the operation of the RAM chip. 10

(b) A set-associative cache consists of 64 lines, or slots, divided into two-line sets. The main memory contains $4K$ blocks of 128 words each. Show the format of main memory addresses. 10

5. *(a)* Show the step-by-step multiplication process using Booth's algorithm when the following numbers are multiplied.
$(16) \times (-14)$ 10

(b) List and briefly explain various ways in which an instruction pipeline can deal with conditional branch instructions. 10

6. Write short notes on : 20

(a) Memory Hierarchy

(b) Interrupt

(c) Bus

(d) RISC