TDC (CBCS) Even Semester Exam., 2019

COMPUTER SCIENCE

(2nd Semester)

Course No. : CSCDSC–201T
CSCGEC–201T

(Computer System Architecture)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

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

UNIT—I

1. Answer any *four* from the following :

(a) What is Boolean function? 1

(b) Define binary logic operations with three basic logical operations : AND, OR and NOT. 1

(c) Write the difference between combinational and sequential circuits. 1

(d) What are the state diagram and state equation for a flip-flop state transition? 1

(e) Define register. 1

2. Answer any *one* from the following :

(a) Demonstrate by means of truth table of De Morgan's theorems for three variable. 2

(b) Implement the Boolean function

$$F = xy + x'y' + y'z$$

with only OR and NOT gates. 2

3. Answer any *one* from the following :

(a) Design a combinational circuit that converts BCD code to Excess-3 code. 8

(b) What is a flip-flop? Explain the *J-K* flip-flop. 8

UNIT—II

4. Answer any *four* from the following :

(a) Convert the binary number $(1110101)_2$ to decimal number. 1

(b) Convert the decimal number $(1231)_{10}$ to binary number. 1

(c) What is gray code? 1

(d) Perform the subtraction with unsigned binary numbers by taking the 2's complement subtrahend of $(100)_2$ $(110000)_2$.   1

(e) What are the drawbacks of signed magnitude representation?   1

5. Answer any *one* from the following :

(a) Represent decimal number 8620 in (i) BCD and (ii) Excess-3 code.   2

(b) List the conditions for addition and subtraction with Signed-Magnitude Data.   2

6. Answer any *one* from the following :

(a) Show that adding B after the operation A $\bar{B}$ 1 restores the original value of A. What should be done with the end carry?   8

(b) Draw the flowchart for Booth's multiplication of signed 2's complex numbers and by applying these steps multiply (9) (13).   8

UNIT—III

7. Answer any *four* from the following :

(a) Define and draw the basic computer instruction format.   1

(b) Define (i) instruction code, (ii) operation code.   1

(c) Name the different phases of instruction cycle that consists in the basic computer.   1

(d) What is effective address?   1

(e) Define the instruction STA.   1

8. Answer any *one* from the following :

(a) Explain the difference between direct address and indirect address.   2

(b) List some Memory-Reference Instruction with symbol, operation decoder and symbolic description.   2

9. Answer any *one* from the following :

(a) What are the hardware components that consist in the basic computer? With a neat diagram, explain the Bus system for four registers.   8

(5)

(b) With a neat diagram, explain the Input-Output configuration. Also with a neat diagram demonstrate the interrupt cycle. 8

UNIT—IV

10. Answer any *four* from the following :

(a) Convert the infix arithmetic expression

$$A \quad B \quad A \quad (B \quad D \quad C \quad E)$$

to reverse polish notation. 1

(b) Define arithmetic microoperations. 1

(c) Define cache memory. Draw the diagram of memory hierarchy in a computer system. 1

(d) Draw the block diagram and timing diagram for the given microoperation :

$$P: R2 \quad R1$$ 1

(e) With a neat diagram, define the micro-programmed control organization. 1

11. Answer any *one* from the following :

(a) Write down the difference between RISC and CISC. 2

(6)

(b) An 8-bit register contains the binary value 10011100.What is the register value after an arithmetic shift right? Starting from the initial number 10011100, determine the register value after an arithmetic shift left, and state whether there is an overflow. 2

12. Answer any *one* from the following :

(a) Briefly discuss the different addressing modes. 8

(b) Write a program in assembly language to evaluate the arithmetic statement : 8

$$X \quad (A \quad B) \quad (C \quad D)$$

(i) Using a general register computer with 3 address instructions.

(ii) Using a general register computer with 2 address instructions.

(iii) Using an accumulator type computer with one address instruction.

(iv) Using a stack organized computer with zero-address operation instruction.

(7)

UNIT—V

13. Answer any *four* from the following :

   (a) Define I/O command.   1

   (b) Define control command.   1

   (c) Define status command.   1

   (d) Define output data command.   1

   (e) Define input data command.   1

14. Answer any *one* from the following :

   (a) Write down the difference between Isolated I/O and memory mapped I/O.   2

   (b) Discuss briefly asynchronous data transfer.   2

15. Answer any *one* from the following :

   (a) Explain the different modes of transfer.   8

   (b) With the block diagram, explain the DMA controller.   8

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