

BCA 4th Semester Exam., 2018

**DIGITAL ELECTRONICS, COMPUTER
SYSTEM ARCHITECTURE AND
ORGANIZATION**

Time : 3 hours

Full Marks : 60

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **SEVEN** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question Nos. 1 is compulsory.

1. Choose the correct answer : 2×6=12

(a) What is the octal equivalent of given binary number?

011001

- (i) 32
- (ii) 31
- (iii) 34
- (iv) 33

(b) Identify the term, which indicates a set of logical address.

- (i) Memory space
- (ii) Disk space
- (iii) Address space
- (iv) Location

(c) In which type of flip-flop, the indeterminate condition of the S-R flip-flop (when $S = R = 1$) is eliminated?

- (i) Edge-triggered flip-flop
- (ii) J-K flip-flop
- (iii) D flip-flop
- (iv) T flip-flop

(d) The bulk of the binary information in a digital computer is stored in memory, but all computations are done in

- (i) timing control
- (ii) memory registers
- (iii) processor registers
- (iv) program control

(Turn Over)

(e) What digit is added to the Excess-3 code generation?

(i) 3

(ii) 4

(iii) 2

(iv) 1

(f) A full-adder is simply a connection of two-half adders joined by

(i) AND gate

(ii) OR gate

(iii) NAND gate

(iv) NOR gate

2. Given the Boolean function

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

(a) List the truth table of the function.

(b) Draw the logic diagram using the original Boolean expression.

(c) Simplify the algebraic expression using Boolean algebra. 4+4+4

(Turn Over)

3. (a) Simplify the following Boolean function in product-of-sums form by means of a four-variable map. Draw the logic diagram with (i) OR-AND gates and (ii) NOR gates :

$$F(w, x, y, z) = \Sigma(2, 3, 4, 5, 6, 7, 11, 14, 15)$$

(b) Construct a 16-to-1-line multiplexer with two 8-to-1-line multiplexers and one 2-to-1-line multiplexer. Use block diagrams for the three multiplexers. 6+

4. (a) Convert the following decimal numbers to binary :

1231; 673; 1998

(b) Convert the following binary numbers to decimal :

101110; 1110101; 110110100

6+

5. (a) What is destructive reading of a memory cell? Give an example of destructive read cell.

(b) What is the distinction between the write time of a memory and its access time? 6+

6. If a computer is a single-address computer, word addressed, has 64 operation codes and 16 K addresses, answer the following questions :
- (a) What is the length of the instruction register?
 - (b) How many bits are there in the PC register?
 - (c) What is the length of ACC register?
- 4+4+4
7. (a) What is the difference between a direct and an indirect address instruction? How many references to memory are needed for each type of instruction to bring an operand into a processor register?
- (b) A CPU with a 20 MHz clock is connected to a memory unit whose access time is 40 ns. Formulate a read and a write timing diagram using a READ strobe and a WRITE strobe. Include the address in the timing diagram.
- 6+6
