Madras University

M.C.A Digital Computer Fundamentals Question paper

Time: Three hours Maximum: 75 marks

PART A - [5 x 5 = Marks 25]

Answer ALL questions.
All questions carry equal marks.

1. (a) (i) Compare between 1's and 2's complements.
(ii) What do you mean by binary number?

Or

(b) (i) Define binary logic.
(ii) How negative numbers are stored in a digital computer?

2. (a) By means of truth tables prove the validity of the following theorems of Boolean algebra:
(i) distributive law
(ii) absorption theorem.

Or

(b) Define duality. show that the dual of the exclusive-OR is equal to its complement.

3. (a) What is an encoder? Give the truth table of octal to binary encoder.

Or

(b) Discuss the differences between combinational circuits and sequential circuits.

4. (a) Write a short note on accumulator register.

Or

(b) Draw a neat diagram for a 4 bit adder/subtractor circuit.

5. (a) Discuss how an instruction is executed.

Or

(b) Draw the block diagram of control logic and discuss.

PART B - [5 x 10 = Marks 50]

Answer any FIVE questions.
All questions carry equal marks.

6. (a) Write a short note on alphanumeric codes.

(b) Convert the following decimal number to binary.
(i) 12.0625
(ii) 673.23.

7. (a) What is the differences between canonical form and standard form?

(b) Give an algorithm for converting decimal number to its octual equivalent.

8. (a) Using truth table prove or disprove the following : D A B BC (. + B) + (C + AD) D +

(b) Obtain the simplified expression in product of sums F (A, B, C, D) = ùù (0, 1, 2, 3, 4, 10, 11)

9. (a) Show how a full-adder can be converted to a full-subtractor with the addition of one inverted circuit.

(b) Design a combinational circuit to convert a 8-4-2-1 code to excess-3 code.

10. (a) Explain the different triggering techniques of flip-flops.

(b) Explain the working of a T flip flop.

11. Discuss the following in detail :

(a) Shift-registers.

(b) Multiplexers.

12. Design a '4 bit combinational logic shifter.

13. Discuss the different microoperations for registers.