

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [2017-20]

B.A./B.Sc. FIRST SEMESTER (July – December) 2017

Mid-Semester Examination, September 2017

Date : 12/09/2017

Time : 11 am – 1 pm

COMPUTER SCIENCE (Honours)

Paper : I

Full Marks : 50

[Use a separate Answer Book for each group]

Group – A

(Answer any three questions)

[3×5]

1. a) Define algorithm. [2]
b) State the properties of an algorithm. [3]
2. a) Find the 10's complement of $(935)_{11}$. [1]
b) Convert the decimal number $(250.5)_{10}$ to base 4 and base 7. [2+2]
3. a) Represent the decimal number $(8620)_{10}$ — (i) in BCD, (ii) in excess-3 code and (iii) in 2-4-2-1 code. [1+1+1]
b) Prove that $x \cdot x = x$. [2]
4. a) What is the difference between canonical form and standard form? Which form is preferable when implementing a Boolean function with gates? [2+0.5]
b) Convert the following to the other canonical form $F(A, B, C, D) = \Pi(0, 1, 2, 3, 4, 6, 12)$. [2.5]

Group – B

(Answer any five questions)

[5×7]

5. a) Implement the function $F(a, b, c) = \sum m(1, 3, 5, 6)$ using a 4:1 MUX. [3]
b) Multiply $(9)_{10}$ and $(-3)_{10}$ using Booth's algorithm. [4]
6. a) Write the control steps for the execution of the instruction ADD R4, R5, R6. [4]
b) Implement a full subtractor using a suitable decoder. [3]
7. a) Differentiate between direct mapping and set-associative mapping of cache memory. [2.5]
b) How master-slave flip-flop is useful in solving race around condition? [2.5]
c) What is the use of 'Tag' field of main memory address in cache mapping? [2]
8. a) Realize a 16:1 MUX using necessary number of 8:1 MUXs and also explain its operation. [2.5+2.5]
b) Differentiate between dataflow and control-flow architecture. [2]
9. a) Explain : Significand underflow. [2]
b) Design logic circuit of a 3-bit PISO shift register. [3]
c) Differentiate between DRAM and SRAM. [2]
10. a) How effective address of the operand is calculated in index addressing mode? [2]
b) What is the advantage of using edge triggered flip-flop? [2]
c) Why associative memory is costly? [1.5]
d) Represent $(-12)_{10}$ in 12-bit 1's complement representation. [1.5]

11. a) “A decoder with an enable input is called a demultiplexer” —Explain. [2]
b) Explain how snooping hardware is useful in solving cache coherence problem. [3·5]
c) What is rotational latency? [1·5]

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