2020

COMPUTER SCIENCE — GENERAL

Paper : GE/CC-1

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer **question no. 1** and **any four** questions from the rest.

1. Answer **any five** questions : 2×5

   (a) What do you mean by a positional number system? Name two of such number systems.

   (b) State De Morgan's laws for *n* number of literals.

   (c) What is the function of preprocessor in computer system?

   (d) What is the sum of all the minterms in a boolean algebraic expression and what is the product of all maxterms in a boolean algebraic expression?

   (e) State the difference between loader and linker.

   (f) Draw the logic diagram of a full adder.

   (g) What is the purpose of cache memory in a computer system?

   (h) What is parity of a binary number?

2. (a) Explain the concepts of system software and application software.

   (b) Differentiate between compilers and interpreters.

   (c) What is computer virus? 4+4+2

3. (a) Prove that NOR is an universal gate.

   (b) Explain the concept of Hamming code with the help of an example.

   (c) What do you understand by pseudocodes? 3+5+2

4. (a) Draw K-Map for the Boolean function :

   $F (W, X, Y, Z) = \Sigma\, m\, (0, 1, 2, 5, 9, 11, 15) + \Sigma\, d\, (3, 7, 8, 13)$

   Group the K-Map properly. Now find the minimized expression.

   (b) Perform the subtraction using 2's complement method :

   $(110000)_2 – (100111)_2$

   (c) Convert 25_{10} to binary. (2+1+2)+3+2

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5. (a) Differentiate between combinational and sequential circuits.

   (b) What is ring counter?

   (c) Draw block diagram of an adder/subtractor and explain its operation.   4+2+4

6. (a) What is the purpose of a multiplexor?

   (b) Draw logic diagram of a 4×1 MUX.

   (c) Draw the truth table of the 4×1 MUX and derive Boolean expression for output function.
   2+4+4

7. (a) Consider a R–S flip flop :

   (i) Draw its logic diagram.

   (ii) Draw its characteristic table and write its characteristic equation.

   (iii) Explain its operation.

   (b) What is the advantage of using J–K flip flop over R–S flip flop?   (2+3+3)+2

8. Write short notes on *any two* of the following :   5×2

   (a) Low level languages

   (b) Generations of computers

   (c) Decoder

   (d) Alphanumeric codes.

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