D 12394 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS—UG)

Computer Science

BCS 3B 04—FUNDAMENTALS OF DIGITAL ELECTRONICS

Time : Three Hours Maximum : 80 Marks

Part A

Answer **all** *the questions.*
Each question carries 1 *mark.*

1. What is nibble ?
2. Define base of a number system.
3. What is the Gray code for the decimal number 6 ?
4. How many AND gates are required to realize Y = CD + EF + G.
5. For JK flip-flop with J = 1 and K = 0, the output after clock pulse will be ———?
6. On K map grouping of 0's produces ——— expression.
7. A device which convert BCD to seven segment is ———.
8. How many select lines will a 16 to 1 multiplexer will have ?
9. A full adder is characterized by ——— inputs and ——— outputs.
10. How many address bits are required to represent a 32 K memory ?

(10 × 1 = 10 marks)

Part B

Answer **all** *the questions.*
Each question carries 2 *marks.*

11. Design an exclusive OR gate with three inputs.
12. What are synchronous counters ?
13. What are excess-3 codes ?
14. What is a shift register ? Can a shift register be used as a counter ?
15. Prove that $xy + xz' + yz = xy + x'z$.

(5 × 2 = 10 marks)

Turn over

Part C

Answer any **five** *questions.*
Each question carries 4 *marks.*

16. Convert $(25.16)_8$ to binary and $(946.152)_{16}$ to binary.
17. Perform BCD addition on (a) 67 + 53 ; (b) 55 + 25.
18. State and prove De Morgans theorems.
19. What is a half adder ? Explain a half adder with truth table and logic diagram.
20. What is a decoder ? Compare a decoder and a demultiplexer with suitable block diagrams.
21. With the help of a truth table explain the working of an 8 × 3 encoder. Draw the logic diagram using gates.
22. What is a flip-flop ? What is the difference between a latch and a flip-flop ? List out the applications of flip-flop.
23. Prove that any Boolean function can be expressed as the product of max terms or sums.

(5 × 4 = 20 marks)

Part D

Answer any **five** *questions.*
Each question carries 8 *marks.*

24. Using K-map simplify the expression $f(w, x, y, z) = \Sigma (1, 3, 7, 11, 15)$ and $d(w, x, y, z) = \Sigma (0, 2, 5)$. Draw the logic diagram of the simplified expression.
25. Explain the following conversions with suitable examples : (a) decimal to Octal ; (b) Octal to binary ; (c) Hexadecimal to Octal.
26. With the help of a neat diagram explain the working of successive approximation A/D converter .
27. Distinguish between combinational logic circuits and sequential logic circuits. How are the design requirements of combinational circuits specified ?
28. Design a 3 bit up/down counter using JK flip-flop and explain its function with timing diagram.
29. Simplify the Boolean expression F = (A + E + C) (A+ B + C) (A + E). Realize the simplified expression using only NAND gates.
30. Explain the operation of Master slave JK flip-flop with truth table and logic diagram.
31. Write notes on :
    (a) Basic logic gates.
    (b) Demultiplexer trees.
    (c) Simultaneous method of A/D conversion.

(5 × 8 = 40 marks)