



Name :
Roll No. :
Invigilator's Signature :

**CS/BCA/SEM-1/BCA-101/2011-12
2011**

DIGITAL ELECTRONICS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) $(A + A' B + B')$ is equal to
 - a) A
 - b) B'
 - c) 1
 - d) 0.
- ii) (10110) is equivalent to
 - a) 20
 - b) 22
 - c) 24
 - d) 18.
- iii) A BCD counter is an example of
 - a) a decade counter
 - b) a full modules counter
 - c) both (a) and (b)
 - d) none of these.



- iv) The output of a gate is LOW if and only if all its inputs are HIGH. It is true for
- a) AND
 - b) XNOR
 - c) NOR
 - d) NAND.
- v) De-Morgan's law states that
- a) $(A + B)' = A' \cdot B'$
 - b) $(A + B)' = A' + B'$
 - c) $(A \cdot B)' = A' \cdot B'$
 - d) both (a) and (c).
- vi) The complement of a variable is always
- a) 0
 - b) 1
 - c) equal to the variable
 - d) the inverse of the variable.
- vii) 2's complement of '101011' is
- a) 010100
 - b) 010011
 - c) 101001
 - d) 010101.
- viii) What is the ASCII code of 'A' ?
- a) 98
 - b) 0100
 - c) 1100
 - d) none of these.
- ix) 4-bit register can store
- a) a bit at a time
 - b) a byte at a time
 - c) a nibble at a time
 - d) none of these.
- x) In toggle state of JK Flip-Flop
- a) present output is opposite of previous output
 - b) present output is same as previous output
 - c) both (a) and (b)
 - d) none of these.



- xi) Full adder can add
- a) two binary numbers b) three binary numbers
 c) four binary numbers d) none of these.
- xii) MOD - 10 counter can count up to
- a) 9 b) 10
 c) 8 d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. State and prove De-Morgan's theorems.
3. Express the Boolean function $F = AB + \bar{A}C$ in a product of maxterm form.
4. Define multiplexer. Why is it called "Data Selector" ? $3 + 2$
5. Use 4 : 1 MUX and other necessary logic gates to design a full adder.
6. What is flip-flop ? What is meant by race condition ? $1 + 4$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Using K-map method, simplify the following Boolean function and obtain minimal SOP expression :
 $Y = \sum m (0, 2, 3, 6, 7) + \sum d (8, 10, 11, 15)$.
- b) Implement the Boolean Function $F = (A, B, C, D) = \sum m (0, 1, 3, 8, 9, 15)$ using two 4 - to-1 multiplexer and one OR gate.
- c) Design a gray code to binary converter circuit of 5 bits.
 What is nibble ? $5 + 5 + (4 + 1)$



8. a) Design a half adder circuit using minimum number of 2-input NOR gates only. Write Down the truth table and Boolean functions also.
- b) Convert a *D* flip-flop to a J-K flip-flop. You can use additional circuiting if required.
- c) What is full subtractor ? Explain its basic structure with proper logic diagrams and truth tables. 5 + 5 + 5
9. a) Convert the following :
- i) $(AC15)_{16} = (?)_{10}$
- ii) $(1011001)_2 = (?)_{10}$
- b) Discuss about the design of an odd parity generator.
- c) Explain the concept of parity checking.
- d) What is the advantage of J-K flip-flop over SR flip-flop. 5 + 5 + 2 + 3
10. a) What is the difference between sequential and combinational circuit ?
- b) Describe the propagation delay of a flip-flop.
- c) Express the Boolean function $F = AB + A'C$ in a product of maxterm form. 5 + 5 + 5
11. a) Draw a block diagram and write truth table of a *D* flip-flop.
- b) Compare asynchronous and synchronous counter.
- c) Use 4 to 1 MUX and other necessary logic gate to design a full adder. 5 + 5 + 5
12. Write short notes on any *three* of the following : 3 × 5
- a) EPROM
- b) *D* flip-flop
- c) Ripple counter
- d) Encoder
- e) 4-bit parallel Adder.

