

CS/BCAN/Odd/SEM-1/BCAN-101(New)/2018-19



**MAULANA ABUL KALAM AZAD UNIVERSITY OF  
TECHNOLOGY, WEST BENGAL**

**Paper Code : BCAN-101**

**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 alternative for *any ten* of the following: 1×10=10
- (i) In a multiplexer, the output depends on its
- |                    |                   |
|--------------------|-------------------|
| (a) Data inputs    | (b) Select inputs |
| (c) Select outputs | (d) None of these |
- (ii) Which of the following condition is not allowed in SR flip-flop?
- |               |               |
|---------------|---------------|
| (a) $S=0 R=0$ | (b) $S=0 R=1$ |
| (c) $S=1 R=0$ | (d) $S=1 R=1$ |
- (iii) The logical expression  $Y=A+AB+AB'C+A'BC'D+1$  is equivalent to
- |              |       |
|--------------|-------|
| (a) $A + C'$ | (b) 1 |
| (c) $A'$     | (d) A |
- (iv) A flip-flop has \_\_\_\_\_.
- |                       |                      |
|-----------------------|----------------------|
| (a) one stable state  | (b) no stable states |
| (c) two stable states | (d) None of these    |

- (v) The dual of a Boolean expression is obtained by
- (a) interchanging all 0s and 1s
  - (b) interchanging all 0s and 1s, all + and ‘.’ signs
  - (c) interchanging all 0s and 1s, all + and ‘.’ signs and complementing all the variables
  - (d) interchanging all + and ‘.’ signs and complementing all the variables
- (vi)  $A + A'B$  is equal to
- (a)  $A + B$
  - (b)  $A$
  - (c)  $B$
  - (d)  $A' + B$
- (vii)  $11101 \div 1100$  is equal to
- (a) 10.1101
  - (b) 100.1101
  - (c) 10.01101
  - (d) None of these
- (viii) In general, a sequential logic circuit consists of
- (a) only flip-flops
  - (b) only gates
  - (c) flip-flops and combinational logic circuits
  - (d) only combinational logic circuits
- (ix) Race condition arises in
- (a) S-R Latch
  - (b) S-R F/F
  - (c) J-K F/F
  - (d) T F/F
- (x) When two  $n$  bit binary numbers are added, the sum will contain at most
- (a)  $n$  bits
  - (b)  $n + 1$  bits
  - (c)  $n+2$  bits
  - (d)  $n + n$  bits
- (xi) While performing BCD addition, if the value of each 4-bit group becomes \_\_\_\_\_ we add 6 with that group.
- (a) greater than 9
  - (b) greater or equal to 9
  - (c) greater than 6

**Group – B**

**(Short Answer Type Questions)**

**Answer any three of the following.**

5×3=15

2. Difference between Synchronous and Asynchronous counters.

3. Simplify the expressions:

(i)  $A = XYZ + XY'Z + XYZ'$

(ii)  $B = P + P'Q + P'Q'R + P'Q'R'S$

2+3=5

4. Subtract  $(-33)$  from  $(-57)$  using 2's complement method.  
 Convert  $(4536)_{10}$  to  
 (i) 2421 code  
 (ii) 5421 code 3+2=5
5. Draw the truth table and logic circuit of a full-subtractor. Using K-map find out the expression for difference (D) and borrow (B). 5
6. What is flip-flop? What is race condition? 1+4=5

**Group – C**

**(Long Answer Type Questions)**

**Answer any three of the following.**

15×3=45

7. (a) Using K-map method minimize the following expression:  
 $F(w, x, y, z) = m\Sigma(1,5,6,12,13,14) + d\Sigma(2,4)$ .  
 Implement the logic circuit using NAND gates only.
- (b) Implement Ex-OR gate using NAND Gate and NAND gate using NOR gate. (5+4)+(3+3)=15
8. (a) Define excitation table of flip-flop and propagation delay.  
 (b) Using the logic diagram convert a J-K flip-flop  $D$  flip-flop and  $T$  flip-flop.  
 (c) Design a J-K master-slave flip-flop with circuit diagram and give the truth table. 5+5+5=15
9. (a) Write down the simplified Boolean expression in  
 (i) sum of product form and  
 (ii) product of sum form for  
 $Y(A,B,C,D)=\Pi M(0,1,3,5,6,7,9,10,11,12,13,15)$
- (b) Implement a full adder using 2 half adders. (4+4)+7=15
10. (a) Design a carry look ahead adder.  
 (b) Design a combinational logic circuit to implement 4-bit odd parity checker. 9+6=15
11. Write short notes on any three of the following: 5×3=15  
 (i) PIPO  
 (ii) Ripple Counter  
 (iii) 4-bit parallel adder  
 (iv) Gray Code  
 (v) Master slave J-K flip-flop