

- N.B.: (1) All questions are compulsory.  
 (2) **Make suitable assumptions** wherever necessary and state the assumptions made.  
 (3) **Answer** to the same questions must be written together.  
 (4) **Numbers** to the right indicate marks.  
 (5) Draw neat labeled **diagrams** wherever necessary.  
 (6) Use of **Non-programmable** calculators is allowed.

1. Attempt the following (any **THREE**) [15]

- (a) Subtract using 1's complement and 2's complement.  
 (i) Subtract  $(10011)_2$  from  $(11001)_2$   
 (ii) Subtract  $(11100)_2$  from  $(10011)_2$   
 (b) Differentiate between weighted and non-weighted codes. Give one example of each.  
 (c) Convert : (i)  $(24)_{10} \rightarrow ( )_2$       (ii)  $(36)_{16} \rightarrow ( )_{10}$       (iii)  $(7555)_8 \rightarrow ( )_2$   
 (d) Convert : (i)  $(F148.A)_{16} = ( )_2$       (ii)  $(1101110110110110.11011)_2 \rightarrow ( )_{16}$   
 (e) Perform BCD addition : (i)  $(48)_{10} + (66)_{10}$       (ii)  $(632)_{10} + (278)_{10}$   
 (f) (i)  $(10)_{10} \div (4)_{10}$       (ii)  $(DADA)_{16} + (BABA)_{16}$

2. Attempt the following (any **THREE**) [15]

- (a) List down Boolean laws.  
 (b) Write a short note on De Morgan's Theorem.  
 (c) Implement of AND gate and OR gate using universal gates.  
 (d) Reduce using Boolean law :  
 (i)  $A + \overline{BC}(\overline{AB} + \overline{ABC})$   
 (ii)  $ABC + \overline{ABC} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + \overline{A}\overline{B}C + \overline{A}B\overline{C}$   
 (e) Implement following function using Kmap :  
 $F(A, B, C, D) = \sum M(0, 1, 2, 4, 8, 10, 11, 15) + d(3, 9)$   
 (f) What are disadvantages of k-map? Explain the Q- M method. Discuss the terms 'prime implicant', 'code word' and 'reduction table'.

3. Attempt the following (any **THREE**) [15]

- (a) Write short note on Full adder.  
 (b) Write short note on Half adder.  
 (c) Design BCD to Excess 3.  
 (d) Design convertor for 4 bit binary to 4 bit gray.  
 (e) Design 2 bit magnitude comparator.  
 (f) Design BCD Adder using IC 7483.

4. Attempt the following (any **THREE**) [15]

- (a) Write short note on Master-slave JK flip flop.  
 (b) Implement following function using 16:1 Mux  $F(A, B, C, D) = \sum m(0, 1, 6, 7, 10, 11, 14, 15)$   
 (c) Draw symbol, circuit and truth table of JK flip flop.  
 (d) Describe with a truth table the working of 4:1 Mux.  
 (e) Derive JK flip flop using SR flip flop.  
 (f) What is race around condition? How can it be handled?

5. Attempt the following (any **THREE**) [15]

- (a) Write short note on SISO shift register.  
 (b) Design MOD 10 counter.

- (c) Write short not on Ring Counter.
- (d) Design Asynchronous 3-bit Up counter.
- (e) Design Mod-6 counter.
- (f) Design 2 bit Synchronous Up counter.



**Paper Discussion Schedule for all Subjects**

Date	Day	Timing	Centre
26 Nov. 2018	Monday	9.00 a.m. to 11.00 a.m.	Dadar
26 Nov. 2018	Monday	12.00 p.m. to 2.00 p.m.	Thane
26 Nov. 2018	Monday	6.00 p.m. to 8.00 p.m.	Andheri
27 Nov. 2018	Tuesday	6.00 p.m. to 8.00 p.m.	Borivali