Printed Pages : 3

NEC-304

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 131315

Roll No.

B. Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

SWITCHING THEORY AND LOGIC DESIGN

Time : 2 Hours] [Total Marks : 50

Notes : (1) Attempt **all** questions.
(2) **All** question carry equal marks.

1. Attempt any **four** parts of the following : **3.5×4=14**

(a) Convert the following numbers into desired base :

(i) $(A6BF5)_{16} = (?)_2 = (?)_{Gray}$

(ii) (17 – 135) using 2's complement

(b) Simplify the following Boolean expression to a minimum number of literals :

(i) $\bar{A}\bar{C} + ABC + A\bar{C} + A\bar{B}$

(ii) $(\bar{x}\bar{y} + z) + z + xy + wz$

(c) Simplify the following expression into Product of sum(POS) form

(i) $AB\bar{C} + A\bar{B}D + BCD$

(ii) $AC\bar{D} + \bar{C}D + A\bar{B} + ABCD$

(d) Use Quine-Mc-Clusky (QM) method to solve the following function :

$$F(A,B,C,D) = \Sigma(5,7,8,9,10,11,14,15)$$

(e) Simplify the Boolean function 'Y' together with don't care condition 'd' using k-map and implement it with two level NAND gate circuit.

$$Y = BD + BC\overline{D} + A\overline{B}C\overline{D}$$

(f) For the Hamming code 1001101001 received at the receiver end, correct this code for error if any ?

2. Attempt any **two** parts of the following : **6×2=12**

(a) Design a BCD to 7 segment decoder. Assume positive logic, minimize the function.

(b) Design the following Boolean function using 4×1 Multiplexer.

$$F(A,B,C,D) = \Sigma m(0, 1, 3, 4, 8, 9, 15)$$

(c) Design and explain the logic and circuit of 4 bit magnitude comparator.

3. Attempt any **two** parts of the following : **6×2=12**

(a) Distinguish between synchronous and asynchronous digital sequential circuit. Design Module-5 Counter.

(b) Explain race around condition and its remedy in brief. Realise T flip flop to SR flip flop.

(c) Write down the classification of semiconductor memories. Draw and explain the programmable logic array (PLA).

4. Attempt any **two** parts of the following : **6×2=12**

(a) Explain hazard and its types. Define critical race and non critical race. Also explain the elimination of hazards in asynchronous circuits.

(b) With the help of diagram, explain the operations of Universal shift regular.

(c) An asynchronous sequential circuit described by the following excitation and output functions.

$Y = X_1 X_2 + (X_1 + X_2)y$ and $z = y$.

Where X_1 and X_2 = Input variables

Y = Excitation function

Z = Output function.

(i) Draw the logic diagram of the circuit.

(ii) Derive transition table.

(iii) Output map and obtain a flow table.
