

GANPAT UNIVERSITY
B. Tech. Sem. III (EC)
Regular Examination Nov/Dec 2013
2EC304: Digital Electronics

Time: 3 Hours]

[Total Marks: 70

Instructions:

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

SECTION-I

- 1 (A) List and explain different parameters based on which digital integrated circuits are classified. 4
- (B) Compare different versions of TTL with reference to the evaluation parameters, in the form of a table. 4
- (C) Draw the circuit diagram of three different types of output configuration of TTL gates. 4

OR

- 1 Design the sequential circuit described by the following state equations. Use JK FF and Mention clearly all the design steps of clocked sequential circuit. 12

$$A(t+1) = xAB + yA'C + xy$$

$$B(t+1) = xAC + y'BC$$

$$C(t+1) = x'B + yAB'$$

- 2 (A) Design a counter with following binary sequence : 0, 1, 3, 2, 6, 4, 5, 7 and repeat. 6
- (B) Design a synchronous BCD counter using T flip flop. 6

OR

- 2 (A) Draw and explain the block diagram of 4-bit universal shift register. 6
- (B) Draw and explain the logic diagram of 4-bit binary ripple counter with the help of its state table. 6

- 3 Do as directed.

- (1) Convert 34.5678 to octal. 1
- (2) Convert 9123.321 to binary. 1
- (3) Obtain 10's complement of 3876809. 1
- (4) Obtain 2's complement of 11001100. 1
- (5) Subtract $M=1010101$ from $N=1001000$. 1
- (6) Convert 2358.897 into BCD. 1
- (7) Convert 1010101 to Gray code. 1
- (8) Convert $(11001100)_2$ to Binary code. 1
- (9) Convert $(110.111101011)_2$ in to Octal. 1
- (10) Convert $(110.111101011)_2$ in to Hexadecimal. 1
- (11) What is ASCII Code? Explain in brief. 1

SECTION-II

- 4 Reduce the following expression to the required number of literals.
- (A) $ABC + A'B'C + A'BC + ABC' + A'B'C'$ to five literals. 3
- (B) $BC + AC' + AB + BCD$ to four literals. 3
- (C) $[(CD)' + A]' + A + CD + AB$ to three literals. 3
- (D) $(A + C + D)(A + C + D')(A + C' + D)(A + B')$ to four literals. 3
- OR**
- 4 (A) Express the following function in sum of minterms and product of maxterms. 4
 $F(w,x,y,z) = y'z + wxy' + wxz' + w'x'z$
- (B) Simplify using K-map $F(P, Q, R, S) = \Pi M(0, 1, 2, 3, 6, 7, 13, 15)$. Implement the reduced function using NOR gate only. 4
- (C) Demonstrate by means of truth tables the validity of the following theorems of Boolean algebra. 4
- (a) The Associative laws.
- (b) De Morgan's Theorems for three variables.
- (c) The distributive law of + over *.
- 5 (A) Design the combinational circuit with 3 inputs and 1 output. The output is 1 when the binary value of the inputs is less than 3. The output is 0 otherwise. 4
- (B) Design a combinational circuit that accepts a three bit number and generates an output binary number equal to the square of the input number. 4
- (C) Show how a full-adder can be converted to a full-subtractor with the addition of one inverter circuit. 4
- OR**
- 5 (A) Simplify the Boolean function using K-MAP, $F(A,B,C,D) = \sum m(2,4,6,8,10) + \sum d(0,1,3)$. Draw the logic diagram from the derived Boolean equation. 4
- (B) Design 8 x 1 Multiplexer using two 4 x 1 Multiplexer 4
- (C) Draw five different logic diagrams of various implementations of half adder. 4
- 6 Do as directed.
- (1) Draw the excitation table of JK flip flop. 1
- (2) How can we convert Ex-OR gate into a NOT gate. Draw the logic symbol. 1
- (3) How many FF are required for Modulo 7 counter? 1
- (4) Write the disadvantage of Asynchronous counter? 1
- (5) List out the advantages of Master Slave FF compare to normal FF? 1
- (6) What is the advantage of JK FF over SR? 1
- (7) Draw the circuit symbol of different triggering mechanism of FF? 1
- (8) What is the difference between combinational logic circuit and sequential logic circuit? 1
- (9) What is multiplexer? 1
- (10) How many 4-bit binary parallel adders are required for 4-bit BCD adder? 1
- (11) How can we convert SR FF into D FF? 1