**[Total No. of Questions - 9] [Total No. of Printed Pages - 4]**
**(2123)**

**1366**

**B. Tech 3rd Semester Examination**

**Digital Electronics (O.S.)**

**EC(ID)-3001**

**Time : 3 Hours** **Max. Marks : 100**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** (i) Attempt any five questions. All questions carry equal marks.

(ii) Section E (all parts) is compulsory.

(iii) Attempt one question from each sections A, B, C and D of the question paper.

## SECTION - A

1. (a) Perform the following conversion:

(i) $(1011.01)_2 \rightarrow (?)_{10}$

(ii) $(365.24)_8 \rightarrow (?)_{10}$

(iii) $(0.6234)_{10} \rightarrow (?)_8$

(iv) $(2003.31)_{10} \rightarrow (?)_{16}$

(v) $(AFB\ 2)_{16} \rightarrow (?)_2$ **(2×5=10)**

(b) Perform the following binary arithmetic operation.

(i) $(10111)_2 - (11001)_2$

(ii) $(101.11)_2 \times (111.01)_2$

(iii) $(111110.1)_2 \div (0101)_2$

(iv) $(DDCC)_{16} + (BBAA)_{16}$

(v ) Subtract $(5C)_H$ from $(94)_H$ **(2×5=10)**

2. (a) (i) Perform $(9)_{10} - (5)_{10}$ using 2's complement method.

(ii) How 10's complement subtraction take place?

(iii) Add the following BCD numbers

0110 and 0010

1000 0110 and 0001 0011

(iv) Express the number $(137)_{10}$ in BCD and binary. Explain any difference between the two results.

(v) What do you mean by gray code? Why it is called minimum change code? **(2×5=10)**

(b) (i) If the 7 bit Hamming code word received by a receiver is 1011011. Assuming the even parity state whether the received code word is correct or wrong. If wrong, locate the bit in error. **(5)**

(ii) What is the need for error detection and correction code? List the various methods for the same. **(5)**

## SECTION - B

3. (a) (i) Simplify the following expression.

$$y = \overline{(\overline{AB} + \overline{A} + AB)}$$

$$y = A\overline{B}C + \overline{A}BC + ABC$$ **(5)**

(ii) Realize the following Boolean expression using only NAND and NOR gates.

y = (AB + BC)C **(5)**

(b) Simplify and minimise the following four variable switching function using the seine MC clusky tabulation method
$F(A, B, C, D) = \Sigma(0, 1, 2, 3, 4, 6, 8, 9, 10, 11)$ **(10)**

4. (a) (i) Simplify the following equation using the Karnaugh mapping procedure.

$$X = \overline{A}\overline{B}\overline{C} + A\overline{C}\overline{D} + A\overline{B} + ABC\overline{D} + \overline{A}\overline{B}C$$ **(5)**

(ii) What are the limits on the fan out of a gate? Write expression for fan out. **(5)**

(b) With the help of a suitable sketch deserve the working of a full adder. Realise full adder using NAND gate. **(10)**

## SECTION - C

5. What does the term logic family signify?

(a) Explain (i) Resistor transistor logic (RTL)

(ii) Emitter coupled logic (ECL) **(10)**

(b) (i) What precaution are necessary for handling MOS devices? **(5)**

(ii) Briefly describe the advantages and disadvantages of ECL. **(5)**

6. (a) Give a comparison of logic families in tabular form with respect to different parameters. **(10)**

(b) Explain the working of CMOS NAND and NOR gates. **(10)**

## SECTION - D

7. (a) Explain the operation of J-K master slave flip flop. **(10)**

(b) With a neat diagram explain the operation of 4 bit SISO (serial in serial out) register. Draw the timing diagram and give its truth table. **(10)**

**[P.T.O.]**

8. (a) Explain the term asynchronous. Describe the working of asynchronous decade counter. **(10)**

   (b) What is a multivibrator? Explain astable multivibrator using IC555. **(10)**

## SECTION - E

9. (i) Explain the difference between weighted and non weighted code. Give example of each.

   (ii) Write the truth table of EXNOR gate.

   (iii) Explain and mention the universal gate.

   (iv) What is the difference in mapping a POS expression and an SOP expression?

   (v) What is propagation delay? Which logic family has least propagation delay?

   (vi) What is race around condition in J-K flip flop?

   (vii) What is meant by term edge triggered?

   (viii) What is the MOD number of a counter signifies?

   (ix) What two principle function are performed by a shift register?

   (x) What is meant by clipping circuits? Explain. **(2×10=20)**