Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C. Sem- III Examination December 2010

Subject code: X30902 **Subject Name: Analogue & Digital Circuits**

Date: 13 /12 /2010 **Time: 10.30 am – 01.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Draw Block Diagram of an Op-amp. Explain Function of each block. **07**

(b) Do as Directed (One Marks Each) **07**

1) $(1011)_2 + (1101)_2 + (1001)_2 + (1111)_2 = (_____)_2$
2) $(93)_{10} = (_____)_{\text{Gray code}}$
3) $(11000)_2 - (10011)_2$ using 1's complement method
4) Multiply $(1101)_2 \times (101)_2 = (_____)_2$
5) Divide 1110101 by 1001
6) $(1110011)_{\text{Gray code}} = (___)_2$
7) $(2653)_8 = (_____)_{16}$

Q.2 **(a)** Why NAND and NOR gate are known as universal gate? Draw all the gates using NAND gate. **07**

(b) Explain with help of circuit diagram inverting & non inverting type zero crossing detectors. **07**

OR

(b) Explain Half adder & Full adder circuit with the help of truth table and logic diagram. **07**

Q.3 **(a)** i) Define : i) CMRR ii) Slew rate iii) PSRR **03**

ii) Advantages and disadvantages of Active filters. **04**

(b) Explain ideal Differentiator and ideal Integrator using Op-amp. **07**

OR

Q.3 **(a)** Draw functional block diagram of IC 555 & discuss function of each pin. **07**

(b) Explain Op-amp as Voltage follower & Summing Amplifier. **07**

Q.4 **(a)** Explain operations of J-K flip flop with the help of logic symbol, circuit diagram and truth table. **07**

(b) Minimize the following Boolean expression using K-map and realize it using AOI gates. $F(A,B,C,D) = \sum m(1,4,5,7,10,13,14,15)$ **07**

OR

Q.4 **(a)** 1) Define: i) Fan-in ii) Fan-out **02**

2) Explain Totem pole dual input type TTL NAND gate. **05**

(b) Simplify & Draw AOI diagram of following: **07**

$ABEF + AB\,EF + AB\,EF$

i) $\overline{A}\,BC\,\overline{D} + BC\,\overline{D} + B\,\overline{C}\,\overline{D} + B\,\overline{C}\,D$

Q.5 **(a)** i) Compare Combinational & Sequential logic circuits. **03**

ii) Explain De-Morgan's Theorems. **04**

(b) Classify Shift registers. Explain Serial In Parallel Out and Parallel In Parallel Out shift register. **07**

OR

Q.5 **(a)** State various ADC conversion techniques. Explain single slope type ADC converter. **07**

(b) Classify IC Voltage regulators. Explain Basic three terminal IC regulator with the help of Block diagram. **07**

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