

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE SEM-III Examination May 2012****Subject code: 130902****Subject Name: Analog & Digital Electronics****Date: 09/05/2012****Time: 02.30 pm – 05.00 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) Explain DeMorgan's Theorem with necessary truth table. Prove that **07**  

$$AB + A\bar{B}(\bar{A}\bar{C}) = A$$
- (b) List advantage of negative feedback. Derive equation of voltage gain, input resistance for closed loop inverting amplifier (OP-AMP based) **07**
- Q-2** (a) Define OP-AMP. Briefly explain (1) PSRR (2) CMRR (3) Slew Rate **07**  
 (b) Derive Expression for voltage gain of three OP-AMP based Instrumentation amplifier (Differential Input Amplifier) **07**
- OR
- (b) What is shift Register? Explain operation of 4 bit left shift Register with necessary diagram. **07**
- Q-3** (a) Explain operation of JK flip flop using necessary schematic diagram and truth table. What is race around condition? How to rectify it? **07**  
 (b) Explain voltage to current converter with grounded load **07**
- OR
- Q-3** (a) Explain operation of Diode Transistor Logic (DTL) with necessary diagram. List its advantages. **07**  
 (b) Describe operation of D/A converter with binary-weighted resistors **07**
- Q-4** (a) Describe operation of NAND gate as Universal gate **07**  
 (b) Derive output voltage equation of a basic Differentiator. How to rectify stability and high frequency noise problem in it? **07**
- OR
- Q-4** (a) Explain principle of Basic Comparator. Describe operation of Schmitt Trigger with necessary diagram. **07**  
 (b) What is PLL? Discuss different applications of PLL in details. **07**
- Q-5** (a) What is Gray Code? List its applications and advantages. **07**  
 (b) Draw Pin diagram of IC-555. Explain operation of Astable multivibrator using IC-555. Define % duty cycle **07**
- OR
- Q-5** (a) What is Decoder? Draw truth table and logic diagram of 3 to 8 line Decoder. Give difference between Decoder and Demultiplexer. **07**  
 (b) What are the advantages of adjustable voltage regulator? Draw typical connection diagram of LM317 voltage regulator. Find its output voltage. Why capacitors and diodes are connected for practical regulator? **07**