

**GUJARAT TECHNOLOGICAL UNIVERSITY**

B. E. Sem. - V - Examination – June- 2011

Subject code 151003

Subject Name: Integrated Circuits and Application

Date: 24/06/2011

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) (i) List three types of linear IC packages. **07**  
(ii) What is the major difference among SSI, MSI, LSI and VLSI ICs?  
(iii) List three open loop op-amp configurations.  
(iv) Why open loop op-amp configuration are not used in linear application?  
(v) List the four negative feedback configuration  
(vi) Which are the two special cases of inverting amplifier?  
(vii) Why is it necessary to use an external offset voltage compensating network with practical op-amp circuits?
- (b) (i) Explain briefly the characteristics of an ideal op-amp. **07**  
(03)  
(ii) Define the following electrical parameters of op-amp:  
Input offset voltage, Output offset voltage (04)  
Input bias current, CMRR
- Q.2** (a) Explain application of op-amp (Inverting configuration) as summing, scaling and averaging circuit. **07**  
(b) Draw the circuit of basic integrator using an op-amp. What are the problems associated with this configuration? How they are overcome? **07**
- OR**
- (b) Write short note on: (i) sample and hold circuit **07**  
(ii) comparator circuit using op-amp
- Q.3** (a) Derive the expression for voltage gain, input resistance, output resistance and bandwidth of an inverting amplifier using op-amp with negative voltage shunt feedback. **07**  
(b) (i) What is thermal drift? How does it affect the performance of an op-amp circuit? **07**  
(ii) What is error voltage? How can it be reduced?
- OR**
- Q.3** (a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 KHz. Draw its frequency response. **07**  
(b) Draw the circuit of Peaking amplifier. If the gain is 10 at peak frequency of 16 KHz then calculate the values of all components of the circuit. **07**
- Q.4** (a) Design first order low pass Butterworth filter at cut-off frequency of 1 KHz with pass band gain of 2. Draw circuit with component value. **07**  
(b) Design a wide band-reject filter having high cut off frequency of 200 Hz and low cut off frequency of 1 KHz. **07**

**OR**

- Q.4 (a)** Explain wide band-pass filter with necessary circuit, derivation and waveforms **07**
- (b)** Draw and explain Triangular and Sawtooth wave generator circuit using op-amp. **07**
- Q.5 (a)** Design an adjustable voltage regulator using LM317 to satisfy the following specification:  
Output voltage  $V_o = 5$  to  $12$  V  
Output current  $I_o = 1$  A **07**
- (b)** State the applications of operational transconductance amplifier and explain any one with necessary circuit and derivation **07**

**OR**

- Q.5 (a)** What is PLL? Explain operation of PLL with basic blocks and mention any four applications of it in radio communication. **07**
- (b)** Explain working of monostable multivibrator using IC 555 with internal blocks. Mention applications of monostable and astable multivibrator using 555 timer **07**

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