

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2115

Roll No.

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B.Tech.

(SEM. V) ODD SEMESTER THEORY

EXAMINATION 2013-14

ANALOG INTEGRATED ELECTRONICS

Time : 3 Hours

Total Marks : 100

Note :— Attempt all questions.

1. Answer any **four** parts of the following : (5×4=20)
 - (a) Briefly explain the need for compensating networks in op-amps.
 - (b) Explain the effect of negative feedback on frequency response.
 - (c) The 741 IC is connected as a non-inverting amplifier. What maximum gain can be used that will keep the amplifiers' response flat to 10 kHz ?
 - (d) How does the high frequency model of an op-amp differ from the equivalent circuit of an op-amp ?
 - (e) Why are low closed loop gains avoided with uncompensated op-amps ? Explain.

(f) What is the frequency response ? Define “break frequency” and “bandwidth”.

2. Answer any **two** parts of the following : (10×2=20)

(a) Explain the working of practical Integrator. Also derive and explain its frequency response. Design a practical integrator circuit with a d.c. gain of 10, to integrate a square wave of 10 kHz.

(b) Draw and explain the commonly used three op-amp instrumentation amplifier. Derive expression for its gain. Also design the instrumentation amplifier to have a variable differential gain in the range 5-200. Use a 50 kΩ potentiometer.

(c) (i) Draw the V-I converter and derive output voltage equation for grounded load.

(ii) Explain the difference between inverting and differential summing amplifiers.

3. Answer any **four** parts of the following : (5×4=20)

(a) Design a low pass filter using Op-Amp at a cut-off frequency of 1 kHz with pass gain of 2. And plot the frequency response of this low pass filter.

- (b) Design a multiple feedback narrow band pass filter with $f_c = 1 \text{ kHz}$, $Q = 3$ and $A = 10$.
- (c) Draw the circuit diagram of a All Pass Filter and show that phase is given by $\Phi = -2 \tan^{-1} \omega RC$.
- (d) Design a Wide Band Pass Filter with lower cutoff frequency 200 Hz and higher cutoff frequency 1 kHz and a pass band gain = 4.
- (e) Explain the operation of a 3-bit R-2R type DAC.
- (f) Discuss the successive approximation type A/D converter.
4. Answer any **two** parts of the following : **(10×2=20)**
- (a) Using op-amp design triangular wave generator and square wave generator.
- (b) What are the advantages of the adjustable voltage regulator over the fixed voltage regulator ? Describe the working of adjustable voltage regulator.
- (c) Write short notes on the following :
- (i) Precision rectifiers
- (ii) Schmitt trigger.

5. Answer any two parts of the following : (10×2=20)

- (a) Explain the basic principles of a PLL with suitable block diagram and mention its applications in detail.
- (b) List the characteristics of an Operational Transconductance Amplifier (OTA). Draw the inverting and non-inverting amplifier using OTA.
- (c) Write short notes on the following :
 - (i) Log and Antilog amplifiers
 - (ii) Analog Multipliers.