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<b>NEW SCHEME</b>
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**Fifth Semester B.E. Degree Examination, July 2006**  
**Electrical and Electronics Engineering**  
**Operational Amplifiers and Linear IC's**

Time: 3 hrs.]

[Max. Marks:100

**Note:** 1. Answer any FIVE full questions.  
 2. Assume suitable data wherever required.

1.
  - a. Design a high  $Z_{in}$  capacitor coupled voltage follower. Show that the input impedance is very large compared to the capacitor coupled voltage follower. (06 Marks)
  - b. Design a capacitor coupled inverting amplifier using 741 with a gain of 50 and the output amplitude is 2.5 volts. The signal frequency range is 10 Hz to 1 KHz. The load resistance is 250 ohms. (08 Marks)
  - c. A difference amplifier has the following components  $R_1=R_2=6.8\text{ K}\Omega$ ,  $R_3=R_4=68\text{ K}\Omega$ , Load  $R_L=1.5\text{ K}\Omega$ , Input capacitors  $C_1=2.2\text{ }\mu\text{fd}$ ,  $C_2=0.2\text{ }\mu\text{fd}$  and Output capacitor  $C_3=1\text{ }\mu\text{fd}$ . Determine the circuit lower cut off frequency and the maximum differential input voltage if the output amplitude is not to exceed 5 volts. (06 Marks)
  
2.
  - a. What are the causes of circuit instability? List the precautions to be taken for circuit stability. (08 Marks)
  - b. Explain the frequency compensating methods adopted to stabilize the op-amp circuits. (06 Marks)
  - c. A 741 with a slew rate of  $0.5\text{ v}/\mu\text{sec}$  is used as a voltage follower,
    - i) Calculate the slew rate limited cut off frequency if the sine wave output is 5 volts,
    - ii) If this circuit is to operate with a unity gain cutoff frequency of 800 KHz, calculate the maximum peak value of the sinusoidal output voltage,
    - iii) If the upper cut off frequency is 8 KHz, calculate the maximum value of the peak output voltage. (06 Marks)
  
3.
  - a. With a neat circuit diagram explain the working of a precision full wave rectifier with relevant waveforms. (08 Marks)
  - b. Explain the working of a precision clamping circuit with a neat circuit diagram and relevant waveforms. (06 Marks)
  - c. With a neat circuit diagram and relevant waveforms explain the working of a voltage follower peak detector. (06 Marks)
  
4.
  - a. Explain the working of a capacitor coupled crossing detector with a neat circuit diagram and relevant waveforms. (06 Marks)
  - b. Explain the input / output characteristics of a inverting Schmitt trigger circuit using op-amp. (08 Marks)
  - c. Explain how variable UTP and LTP are adjusted in an inverting Schmitt trigger with a neat circuit diagram and relevant wave forms. (06 Marks)

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- 5 a. With a neat circuit diagram and relevant waveforms explain the working of a triangular / rectangular waveform generator using op-amps. (08 Marks)
- b. With a neat circuit diagram explain the working of a RC phase shift oscillator using op-amp. (06 Marks)
- c. Design a RC phase shift oscillator using 741 and a supply of  $\pm 12$  volts to generate an output frequency of 3.5 KHz. (06 Marks)
- 6 a. What is the difference between active and passive filters? What is significance of the order of the filter? Explain the terms high pass filter, low pass filter, band pass filter and band stop filter. (10 Marks)
- b. Explain the terms phase lag circuit and phase lead circuit with reference to an all pass filter. (06 Marks)
- c. Design a first order LPF using op-amp for a cut off frequency of 1 KHz. (04 Marks)
- 7 a. With a block diagram explain the working of a PLL. (06 Marks)
- b. Explain the terms line regulation and load regulation for a dc voltage regulator. (06 Marks)
- c. With a neat circuit diagram explain the working of a precision voltage regulator. (08 Marks)
- 8 Write short notes on :
- a. Use of a single polarity supply in op-amps.
- b. Sample and hold circuit.
- c. Astable multivibrator. (20 Marks)
- d. Wien bridge oscillator