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10EE56

Fifth Semester B.E. Degree Examination, Jan./Feb.2021
Linear IC's and Applications

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of Standard tables is permitted.***

PART – A

1 a. Sketch the circuit of a capacitor coupled high Zin non-inverting amplifier, explain design and the circuit operation. Obtain the equation for input impedance of the circuit. **(08 Marks)**

b. Briefly discuss the upper cut off frequency can be set for inverting amplifier. **(06 Marks)**

c. Design a capacitor coupled voltage follower using a 741 op-amp. The lower cut off frequency for the circuit is to be 50 Hz and the load resistance is $R_L = 3.9\ K\Omega$. **(06 Marks)**

2 a. Explain phase lead and phase lag compensation methods and show how its effects operational amplifier frequency response. **(08 Marks)**

b. List the precautions that should be observed for operational amplifier circuit stability. **(06 Marks)**

c. Using the gain band width product, determine the cut off frequencies for the inverting amplifier when the compensating capacitor is,

(i) $C_f = 30$ pF and
(ii) $C_f = 3$ pF .

Assume GBW ≃800 kHz for 30 pF and GBW3≃8 MHz for 3 pf capacitor. **(06 Marks)**

3 a. Draw a precision full wave rectifier circuit using a precision half wave circuit and a summing circuit. Explain its working and draw all relevant waveforms. **(08 Marks)**

b. Sketch and explain the operation of precision clipping circuit consisting of a dead zone circuit and a summing circuit. **(06 Marks)**

c. Design an adjustable peak clipping circuit to clip at approximately $\pm(3\text{ to }5V)$. The circuit is to have unity voltage gain before clipping. **(06 Marks)**

4 a. Draw an op-amp inverting Schmitt trigger circuit, explain its operation and design steps. Sketch typical input output characteristics. **(08 Marks)**

b. Draw the circuit of an op-amp monostable multivibrator, show the relevant waveforms and explain the operation. **(06 Marks)**

c. Using a BIFET op-amp, design the astable multivibrator to produce a $\pm 9V$, 1 kHz output. **(06 Marks)**

PART – B

5 a. With a neat circuit diagram and wave form, explain the operation of Wein bridge oscillator. **(08 Marks)**

b. Write a short note on signal generator output controls and explain it with a suitable circuit. **(06 Marks)**

c. Design a triangular waveform generator to produce a $\pm 2\,V$, 1 kHz output. Use a $\pm 15V$ supply and specify the minimum op amp SR. **(06 Marks)**

6 a. Sketch the circuit of a second-order high-pass filter. Explain its operation and design procedure with frequency response curve. (08 Marks)
b. Sketch the circuit of a First order low-pass filter. Explain its operation and design procedure with frequency response curve. (06 Marks)
c. Using a BIFET op-amp, design the first order high-pass active filter to have a 10 kHz cut off frequency. Draw the circuit diagram and indicate all the values. (06 Marks)

7 a. Explain the operation of PLL with a block diagram. List the application of PLL. (08 Marks)
b. Show how a switched capacitor can be used to simulate a resistor and discuss the advantages of this process in IC applications. (06 Marks)
c. Draw the circuit of a power amplifier using op-amp and briefly explain. (06 Marks)

8 a. Sketch the circuit of a precision voltage regulator. Explain its operation, design procedure and equation for line and load regulation. (08 Marks)
b. Explain positive voltage regulator using 723IC with its pin diagram. (06 Marks)
c. An LM317 regulator is to provide a 6 V output from a 15 V supply. The load current is 200 mA. Determine suitable resistance values for R_1 and R_2 and calculate the regulation power dissipation. (06 Marks)

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