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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 $\pm 2V$, 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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