CBCS SCHEME

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15EE46

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Operational Amplifiers and Linear IC's

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With a neat block diagram, explain the general stages for an op-amp. **(08 Marks)**

b. Explain the effect of feedback as input resistance (R_i) and output resistance for voltage shunt amplifier. **(08 Marks)**

OR

2 a. Define the following terms :
i) input offset voltage
ii) input offset current
iii) PSRR
iv) CMRR. **(08 Marks)**

b. The circuit of peaking amplifier is to provide a gain of 10 at a peak frequency of 16KHz. Determine the value of all components. **(08 Marks)**

Module-2

3 a. Using a 741 op-amp, design the first order active low pass filter to have a 1.0 KHz cut off frequency. **(06 Marks)**

b. Sketch the circuit of a second order active low pass active filter and explain its operation. **(10 Marks)**

OR

4 a. For a voltage regulator define.
i) Line regulation
ii) Load regulation
iii) Ripple rejection. Write equation for each. **(06 Marks)**

b. Explain the working and design to op-amp voltage follower regulator. **(10 Marks)**

Module-3

5 a. Draw the circuit diagram of a triangular/rectangular waveform generator using op-amps. Sketch the circuit waveforms and explain its circuit operation. **(10 Marks)**

b. Design a triangular waveform generator to produce a ±2V 1KHz output. Use a ±15V supply assume $I_1 = 100\mu A$. **(06 Marks)**

OR

6 a. Explain the working of Schmitt trigger in inverting mode. Draw its hysterisis curve. **(06 Marks)**

b. State the Barkhauses criteria for a sine wave oscillator. Draw the circuit diagram of an op-amp phase shift oscillator. Sketch the circuit wave forms and briefly explain the oscillator operation. **(10 Marks)**

Module-4

7 a. Show how a half wave precision rectifier can be obtained with a summing circuit to produce a full wave precision rectifier. Draw the voltage wave forms and write the equation to show that full-wave rectification is performed. **(10 Marks)**

b. Explain the working of R-2R ladder DAC. Assume that binary input is 001. **(06 Marks)**

OR

8 a. Design a precision full wave rectifier circuit to produce a 2V peak output from a sinewave input with a 0.5Vp value and 1MHz frequency. Use bipolar op-amp with a supply voltage of ±15V. Assume $I_1 = 500\mu A$. **(08 Marks)**

b. Sketch an op-amp precision clamping circuit draw the input and output waveforms and explain the circuit operation. Show how the output voltage can be biased to any desired level. **(08 Marks)**

Module-5

9 a. Draw the basic block diagram and waveforms for a PLL system. Identify each component part and explain its function. **(08 Marks)**

b. Draw the block diagram for a PLL frequency synthesizer. Sketch all waveforms and explain the system operation. **(08 Marks)**

OR

10 a. Sketch the basic circuit diagram of an astable multivibrator using 555 timer with two resistances and a capacitor. Show the capacitor and output waveforms and explain the circuit operation. **(08 Marks)**

b. Sketch the functional block diagram for a 555 IC timer. Identify all terminals and explain each component part. **(08 Marks)**

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