CBCS SCHEME

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17EE46

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Operational Amplifier and Linear IC's

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain the general stages of op-amps with a neat block diagram. **(10 Marks)**

b. Explain the working inverting and non-inverting amplifier using op-amp. **(10 Marks)**

OR

2 a. Explain with a neat diagram inverting and non-inverting summing amplifiers. **(12 Marks)**

b. Design the instrumentation amplifier with maximum input bias current 750 nA. The circuit is to produce an output ranging from 4V to 8V when the input is 10 mV to 20 mV. **(08 Marks)**

Module-2

3 a. Derive the gain equation for second order high pass Butterworth filter. **(10 Marks)**

b. Design a Butterworth second order high pass filter circuit, to have a cut-off frequency of 6 kHz. Calculate the actual cutoff frequency for the circuit using the selected component values. **(10 Marks)**

OR

4 a. Explain the following working parameter of voltage regulator with a neat diagram:
(i) Regulator action (ii) Source effect
(iii) Load effect (iv) Ripple rejection **(08 Marks)**

b. Draw and explain the working of adjustable output regulator and design the voltage regulator circuit to produce a 12 V output with a 50 nA maximum load current. **(12 Marks)**

Module-3

5 a. With a neat diagram, explain the action of RC phase shift oscillator. Write advantages and disadvantages of RC phase shift oscillator (IC 741). **(12 Marks)**

b. Determine the UTP and LTP of Schmitt trigger circuit using op-amp. Assume that the op-amp is rail-to rail operated and the diode forward voltage drop is 0.7V and draw its input and output waveforms. **(08 Marks)**

OR

6 a. With a neat diagram, explain :
(i) Comparator as zero crossing detector
(ii) Voltage to current convector with grounded load. **(10 Marks)**

b. With a neat circuit diagram, explain current to voltage converter and design the current amplifier to have a gain of 10. The maximum input current is 1 mA, R_L = 100 Ω and V_{CC} = 15 V. **(10 Marks)**

Module-4

7 a. Explain the working of precision full wave rectifier with necessary circuit diagram and write difference between ordinary rectifier and precision rectifier. **(10 Marks)**

b. With neat circuit, explain linear Ramp ADC with necessary input and output waveforms. **(10 Marks)**

OR

8 a. Design a precision full wave rectifier circuit to produce a 2V peak output from a sine wave input with a 0.5 V_p value and 1 MHz frequency. [V_{CC} = ±15V. Assume I_1 = 500 μA] **(08 Marks)**

b. Draw and explain working of integrated circuit 8 bit DAC. **(08 Marks)**

c. Calculate the analog output voltage (DAC) when the input is V_{ref} = 10 V and $R = R_F$ = 5 KΩ.
(i) 00001 (ii) 10000 (iii) 11111 **(04 Marks)**

Module-5

9 a. Draw the basic block diagram PLL and explain each components with necessary waveforms. **(08 Marks)**

b. Draw and explain circuit diagram of Astable multivibrator using 555 Timer and design the Astable multivibrator to have a ±9V, 1 kHz output. **(12 Marks)**

OR

10 a. Explain PLL IC565 application as frequency multiplier and frequency synthesizer. **(10 Marks)**

b. Draw and explain working of Monostable multivibrator using 555 Timer and draw its input and output waveforms. **(10 Marks)**

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