CBCS SCHEME

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18EE46

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Operational Amplifiers and Linear ICs

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define following:
(i) Slew Rate (ii) CMRR (iii) PSRR
(iv) Differential Gain (A_d) (v) Offset Voltage **(10 Marks)**

b. Mentioned the ideal op-amp characteristics of 741. **(10 Marks)**

OR

2 a. With a neat block diagram, explain the representation of op-amp and also explain op-amp symbol. **(10 Marks)**

b. Draw the circuit of a voltage follower using op-amp and prove that its gain in exactly equal to units. **(10 Marks)**

Module-2

3 a. What are the difference between active filters and passive filters? **(10 Marks)**

b. Design a first order low pass filter with a cutoff frequency of 1 kHz and a pass band gain of 2. **(10 Marks)**

OR

4 a. Design the narrow band pass filter with two feedback paths with f_c = 1.5 kHz, Q = 7 and A_F = 15. Calculate the new value of resistance in the circuit which will change f_c to 2 kHz. **(10 Marks)**

b. With a neat diagram, explain the operation of an adjustable output regulator. **(10 Marks)**

Module-3

5 a. Sketch the circuit of triangular wave form generator. Draw the output wave forms from the circuit and explain its operation. **(10 Marks)**

b. Design a RC phase shift oscillator for an output frequency of 5 kHz. Use LM741 with ±15V power supply. **(10 Marks)**

OR

6 a. With a neat diagram, explain the operation of inverting op-amp, comparator and also draw various waveforms. **(10 Marks)**

b. With a neat diagram and waveform, explain the operation of Schmitt trigger circuit. Draw hysteresis curves. **(10 Marks)**

Module-4

7 a. Explain the precision full wave rectifier circuit as a combination of half wave and full wave rectifier. **(10 Marks)**

b. Using bipolar op-amps with V_{CC} = ±15V, design input impedance precision full wave rectifier circuit. The input peak voltage is to be 1V and no amplification is to occur. **(10 Marks)**

OR

8 a. Define the following terms of ADC:
(i) Resolution
(ii) Accuracy
(iii) Monotonicity
(iv) Conversion time **(10 Marks)**

b. With a neat diagram, explain the inverted R/2R ladder D/A converter. **(10 Marks)**

Module-5

9 a. What is PLL? Explain the working of the building blocks of PLL. **(10 Marks)**

b. With a neat diagram and waveforms, explain voltage controlled oscillator. **(10 Marks)**

OR

10 a. Explain the functions of each of pins 555 timer. List the important features of 555 timer. **(10 Marks)**

b. Design a 555 based square wave generator to produce a symmetrical square wave of 1 kHz.

c. If $V_{CC} \cong 12$ V, draw the voltage across timing capacitor and the output. **(10 Marks)**

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