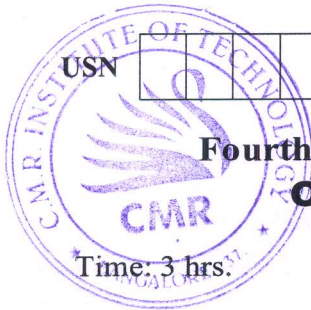


CBCS SCHEME



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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 is exactly equal to unity. (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 $\pm 15V$ 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 $V_{CC} = \pm 15V$, 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

b. With a neat diagram, explain the inverted R/2R ladder D/A converter.

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(10 Marks)

(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 $V_{CC} = 12\text{ V}$, draw the voltage across timing capacitor and the output.

(10 Marks)
