Roll No						



PRESIDENCY UNIVERSITY BENGALURU

SET-A

SCHOOL OF ENGINEERING END TERM EXAMINATION – MAY/JUNE 2024

Semester: Semester IV - 2022 Date: June 12, 2024

Course Code: EEE2004 v02 **Time**: 9:30 AM - 12:30 PM

Course Name : Opamps and Linear Integrated Circuits

Max Marks : 100

Program: B. Tech. Weightage: 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

Part - A

Answer any 5 questions

 $5Q \times 4M = 20M$

1. In electronics, an analog-to-digital converter (ADC, A/D, or A-to-D) is a system that converts an analog signal, such as a sound picked up by a microphone or light entering a digital camera, into a digital signal. Draw the functional block diagram of Successive Approximation ADC.

(CO1) [Knowledge]

2. IC voltage regulators are three-terminal devices that provide a constant DC output voltage that is independent of the input voltage, output load current, and temperature. List out characteristics of 3 terminal Voltage regulator ICs.

(CO4) [Knowledge]

3. An operational amplifier is an integrated circuit that can amplify weak electric signals. State assumptions made for analyzing ideal op-amp.

(CO2) [Knowledge]

4. An operational amplifier (op-amp) was developed for perform arithmetic operations. Amplifiers, buffers, comparators, filters, etc. can be implemented with simple external circuits. Draw an integrator which is wired using a resistor of 20 K ohms and C=0.01u F.

(CO2) [Knowledge]

5. The fundamental function of an op-amp is to greatly amplify the differential between the two inputs, and output the result. If input at V(+) is greater than at V(-), the op-amp will amplify and output a positive signal; if V(-) is greater, the op-amp will output an amplified negative signal. Describe the configuration of inverting op amp.

(CO3) [Knowledge]

6. Identify and describe configuration of the circuit which is basically an comparator with positive feedback. The purpose of the circuit is to convert any irregular shape wave form into square wave .thus it is also known as Square Wave generator.

(CO4) [Knowledge]

7. In the Mono stable multi vibrator R=100kohms and time delay is T=100msec Identify the value of Capacitance C?

(CO3) [Knowledge]

Part - B

Answer any 4 questions

 $4Q \times 10M = 40M$

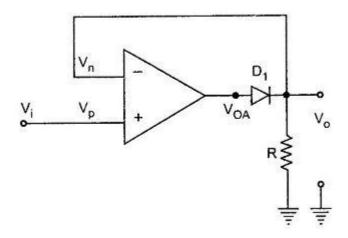
8. An operational amplifier is a DC-coupled high-gain electronic voltage amplifier with a differential input and, usually, a single-ended output. Write any three linear and non linear applications of op – amps.

(CO3) [Comprehension]

9. Mr. Kishan wants to operate a load (motor) which needs an input voltage range of -1.2 V to -57 V DC supply. He don't want to use a power converter system to get the voltage range as stated. Is there any other way through which he can get the required voltage range. If yes/No explain the method with necessary conditions.

(CO2) [Comprehension]

10. Identify the circuit shown below, also Draw the output waveform for the same.



(CO3) [Comprehension]

11. Mr. Harsh is looking to upgrade the sound system in his car by reducing the likelihood of interference from sources like low frequency noise signals. Mr. Harsh comes and approaches you regarding the suitable circuit for attenuating the high frequency Signals. Suggest him a suitable circuit with clear explanation. explain filter circuit which has a constant gain from 0 Hz to a high cutoff frequency f_L, with a gain fall off rate in stop band of 20dB/decade.

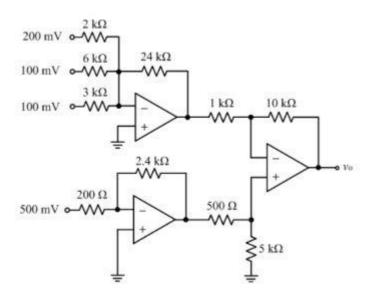
(CO2) [Comprehension]

12. The 555 timer IC is an integrated circuit used in a variety of timer, delay, pulse generation, and oscillator applications .Identify the 555 timer circuit which has one stable state and explain it with neat waveform.

(CO3) [Comprehension]

13. What is the output at each stage of the op-amps shown in figure below? The op-amps are connected to $\pm 15V$, and has a saturation of Vsat = |Vcc-2|. Assume inputs are dc signals.

(CO2) [Comprehension]



Part - C

Answer any 2 questions

 $2 \times 20M = 40M$

14. For the 555 Astable mutlivibrator RA = 50K ohm ,RB= 1K ohm& C=0.01uF Determine : i) charging pulse width Tc ii) the discharging pulse width Td iii) Free running frequency 'f' iv) duty cycle

(CO4) [Application]

15. Microprocessor-controlled circuits, Arduinos, Raspberry Pis, and other similar digital logic circuits may connect with the outside world by means of analogue-to-digital converters, or ADCs..Explain a method of analog to digital conversion which uses a successive approximation register in the design for given analog input Vi =178V and Illustrate the conversion of a ADC

(CO4) [Application]

16. Identify the Analog to Convertor which converts analog to digital signal in no time. With neat supporting diagram .explain a method of analog to digital conversion

(CO4) [Application]