

Roll No																			
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION – AUGUST 2024**

<b>Semester : IV</b>	<b>Date : 6<sup>th</sup> August 2024</b>
<b>Course Code : ECE3001</b>	<b>Time : 09:30 A.M. – 12:30 P.M.</b>
<b>Course Name : Linear Integrated Circuits</b>	<b>Max Marks : 100</b>
<b>Program : B. Tech. (ECE)</b>	<b>Weightage : 50%</b>

**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.
- (v) Use semilog sheet to plot the magnitude response

**PART A**

**ANSWER ANY 3 QUESTIONS**

**3Q X 5M = 15 M**

1	List 5 properties of an ideal op-amp	(CO 1)	[Knowledge]
2	Define the following parameters a. Slew rate b. CMRR List the value of the above parameters for an ideal op-amp and 741 IC	(CO 1)	[Knowledge]
3	Draw the circuit of a non-inverting comparator which will compare $v_{in}(t) = 10 \sin(200\pi t)$ with a reference voltage of 3 V. Draw the input waveform and the corresponding output waveform and the transfer characteristics.	(CO 3)	[Knowledge]
4	Draw the circuit of a voltage to current converter with grounded load and derive the expression for the load current.	(CO 2)	[Knowledge]
5	Draw the circuit diagram of a current to voltage converter and explain.	(CO 1)	[Knowledge]

**PART B**

**ANSWER ANY 2 QUESTIONS**

**2Q X 20M = 40M**

6	Draw the circuit diagram of an inverting Schmitt trigger for a case in which the absolute value of UTP and LTP will not be the same. Derive an expression for the triggering voltages. Estimate the value of the components to be used if $V_{LTP} = -1 V$ and $V_{UTP} = 8 V$ . Draw the input waveform, the corresponding output waveform and the transfer characteristics if $v_{in}(t) = 10 \sin(400\pi t)$ . Let $V_{sat} = 12 V$	(CO 3)	[Comprehension]
7	Draw the circuit diagram of a first order low pass filter. Estimate the component values to be used if the cut off frequency required is 1200 Hz and a pass band gain of 2.	(CO 3)	[Comprehension]

	<p>Draw the magnitude response of the filter in a semilog sheet considering the following frequencies.</p> <table border="1"> <tr> <td><math>f</math> (Hz)</td> <td>10</td> <td>100</td> <td>200</td> <td>700</td> <td>800</td> <td>1000</td> <td>1500</td> <td>2000</td> <td>5000</td> <td>10k</td> <td>100k</td> <td>500k</td> <td>1M</td> </tr> </table> <p>Find the steady state output when the following input is applied to the filter  <math>v_{in}(t) = 4 + 2 \sin(20\pi t) + 2 \sin(2 \times 10^6 \pi t)</math></p>	$f$ (Hz)	10	100	200	700	800	1000	1500	2000	5000	10k	100k	500k	1M		
$f$ (Hz)	10	100	200	700	800	1000	1500	2000	5000	10k	100k	500k	1M				
8	<p>Draw the circuit diagram of a 555 timer which can be used to generate a 500 Hz square wave with a duty cycle of 80%. Explain the working of the circuit with the help of the block diagram. Estimate the components values to be used. Draw the output voltage and the voltage across the capacitor. Use a capacitor of <math>10\mu F</math> and <math>V_{cc} = 12 V</math></p>	(CO 3)	[Comprehension]														

<b>PART C</b>			
<b>ANSWER ANY 3 QUESTIONS</b>		<b>3Q X 15M=45M</b>	
9	<p>Draw the circuit diagram of a 2 bit flash ADC and explain. Design the encoder also and show the final circuit.</p>	(CO 3)	[Application]
10	<p>Draw the circuit diagram of an instrumentation amplifier. Derive an expression for the output voltage. Estimate the component values to be used if the gain is to be between 200 and 800.</p>	(CO 2)	[Application]
11	<p>Draw the circuit diagram of a 3 bit R-2R DAC. Explain the working. Tabulate the output voltage if the feedback resistor used is <math>2R</math> and the reference voltage is <math>2 V</math>.</p>	(CO 2)	[Application]
12	<p>Draw the circuit diagram of a square wave generator using op-amp for a frequency of 2000 Hz. Explain the working of the circuit. Draw the output voltage and the voltage across the capacitor. Use <math>C = 0.01 \mu F</math> and <math>V_{sat} = 15 V</math></p>	(CO 2)	[Application]