



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

	InSem Examination-IWinter 2023		
	Exam Seat No.:		
	Academic Year:2023-2024	Semester:III	
	Name of Programme: S.Y. B.Tech Electrical Engineering	Pattern:2022	
	Name of Course:Analog and Digital Circuits	Course Code:ELE222002	
	Max. Marks:30	Duration:1 hour	

	<p><b>Instructions:</b> Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none"><li>1. This question paper contains 02 page(s).</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question</li></ol>	
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**Question No. 1 Attempt following Question**

- a) Differentiate between ideal and practical OPAMP (4) CO2

**OR**

- b) Draw the circuit diagram of inverting ZCD. Draw associated waveforms (input and output) (4) CO2

- c) Draw the circuit diagram and derive the output equation of a differentiator using OPAMP. (5) CO2

**OR**

- d) Draw the circuit diagram and explain high pass active filter design. (5) CO2

- e) The output 20mV of LVDT is connected to the input to the 3-OPAMP instrumentation amplifier. The required output is 2V. Draw the diagram of instrumentation amplifier. All resistances are equal to 10 kOhm except the gain set resistance. Calculate the value of gain and gain set resistance. (6) CO4

**OR**

- f) In pulse width modulation, the square wave of 1kHz is required. Draw the square wave generator using OPAMP and calculate all parameter values with  $C=0.01$  micro-Farad and  $R_1=10\text{kOhm}$ . (6) CO4

**Question No. 2 Attempt following Question**

- a) A Wien Bridge Oscillator circuit is required to generate a sinusoidal waveform of 5,200 Hertz (5.2kHz). Draw the diagram and calculate the values of other circuit elements if  $R_f=10\text{ kOhm}$  and  $R=10\text{kOhm}$ . (6) CO4

**OR**

- b) Draw the circuit diagram and design an active low pass filter using OPAMP with a cutoff frequency of 500Hz with  $C=0.01$  micro-Farad and a pass band gain is 5. Take feedback resistance as 10 kOhm. (6) CO4
- c) Draw the circuit diagram and explain working of a triangular wave generator using OPAMP with associated waveforms. (5) CO2

**OR**

- d) Draw and explain V to I converter using OPAMP. (5) CO2
- e) In open loop configuration, the input of 2V ac is connected to pin 2 of IC741 and pin 3 is grounded. Input to pin 7 is +12V, and pin 4 is -12V. Draw a diagram and input and output waveform. (4) CO2

**OR**

- f) In closed loop configuration, the input of 2V ac is connected to pin 3 of IC741 and pin 2 is grounded. Input to pin 7 is +12V, and pin 4 is -12V. The  $R_1=10\text{kOhm}$  and  $R_f=20\text{kOhm}$ . Draw a diagram and input and output waveform. (4) CO2