Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV (NEW) EXAMINATION – WINTER 2024

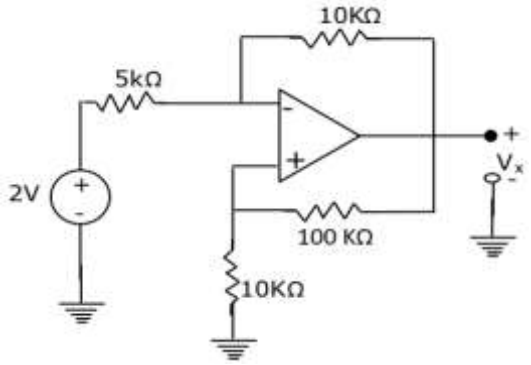
Subject Code:3141002 Date:19-11-2024

Subject Name: Analog Circuit Design

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Why don't we see junction capacitances in h-parameter model? Why do they exist in hybrid-pi model?	**03**
	(b)	 Determine the value of output voltage V_x for the above circuit.	**04**
	(c)	Derive an expression for transistor trans-conductance in CE configuration for hybrid-pi model.	**07**
Q.2	**(a)**	Define and briefly explain the term : Slew rate, for OP-AMPs	**03**
	(b)	Explain the concept of virtual ground and discuss how it is different from actual ground.	**04**
	(c)	Derive an expression for the input conductance for the hybrid-π model in CE configuration.	**07**
		OR	
	(c)	Derive an expression for the base-spreading resistance for the hybrid-π model in CE configuration.	**07**
Q.3	**(a)**	State at least one use of Class A, Class B and Class C amplifiers.	**03**
	(b)	Compare Voltage-series feedback amplifiers with current series feedback amplifiers.	**04**
	(c)	Derive an expression for the frequency of oscillations for the Wien Bridge oscillator.	**07**
		OR	
Q.3	**(a)**	List the disadvantages of active RC filters.	**03**
	(b)	Explain the Barkhausen criterion for oscillators.	**04**
	(c)	Derive an expression for output resistance for current-series feedback amplifier using BJT.	**07**

Q.4	**(a)**	List the characteristics of an ideal OP-AMP.	**03**
	(b)	Derive an expression for the output of the differentiator circuit using OP-AMP.	**04**
	(c)	Describe the process of designing a second order active high pass filter with a suitable example.	**07**

OR

Q.4	**(a)**	Give full classification of Oscillators.	**03**
	(b)	Discuss the factors affecting the stability of oscillators.	**04**
	(c)	Describe the complete process of state variable filter design in details.	**07**

Q.5	**(a)**	State the applications of electronic filter circuits.	**03**
	(b)	Derive an expression for the output of an OP-AMP as a non-inverting amplifier.	**04**
	(c)	Draw the internal block diagram and explain the working of IC 555 based mono stable multi-vibrator	**07**

OR

Q.5	**(a)**	State the main factors governing the design of large signal (power) amplifiers.	**03**
	(b)	Give classification of types of filters with their responses.	**04**
	(c)	Explain the design of a LM 317 based voltage regulator with an example	**07**

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