Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V(OLD) EXAMINATION – SUMMER 2019

Subject Code:151003 Date:06/06/2019

Subject Name: Integrated Circuit and Applications

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.**

Q.1 **(a)** Which type of feedback is used in inverting op-amp? Derive exact expressions for voltage gain, input resistance, output resistance and bandwidth for inverting op-amp. **07**

(b) Explain following terms related to op-amp: **07**
(1) CMRR (2) PSRR (3) Slew Rate (4) Channel separation in multiple op-amps IC (5)Equivalent input noise voltage and current (6) Input offset current (7)Input offset voltage

Q.2 **(a)** (i) Draw and explain the block diagram of Op-Amp **03**

(ii) List three open loop op-amp configurations. Why open loop op-amp configuration are not used in linear application? Mention some of the linear applications of op – amps? **04**

(b) Draw the differential amplifier circuit using single op-amp and derive the expression for output voltage as a function of input voltages. Comment on its input resistance. **07**

OR

(b) Draw the high frequency model of an Op-Amp and Obtain the expression for the open loop gain as a function of frequency. **07**

Q.3 **(a)** Derive the expression for the closed loop voltage gain, input resistance and output resistance of voltage series feedback amplifier. **07**

(b) Implement an integrator using Op-Amp. Obtain the expression for the output voltage V_0.Sketch the output waveform for an input square waveform. Show the frequency response of an ideal and a practical integrators. **07**

OR

Q.3 **(a)** Explain the working of a Voltage to Current converter with floating load. Illustrate the application of this circuit as a Zener diode tester. **07**

(b) Show how Op-Amp can be used as an averaging, summing amplifiers using non inverting configuration. **07**

Q.4 **(a)** Explain the application of Op-Amp as : (i) Peaking Amplifier (ii) Schmitt Trigger **07**

(b) Explain the operating principle of a Phase Locked Loop. **07**

OR

Q.4 **(a)** Explain with a neat circuit diagram and waveforms, the operation of a monostable multivibrator using 555 timer. **07**

(b) Design a Delyiannis-Friend circuit with f_0= 12.5 kHz, Q= 10, and mid band gain H= 26 dB. **07**

Q.5	**(a)**	Derive transfer function of Sallen-key low pass filter.	**07**
	(b)	Draw and explain working op-amp based full-wave rectifier circuit. How is it better in performance compared to full-wave rectifier circuit without op-amp?	**07**

OR

Q.5	**(a)**	Which type of feedback is used in Schmitt trigger circuit? Discuss its operation and derive expressions for lower and upper threshold voltage. Design the Schmitt trigger circuit for upper and lower threshold voltage equal to 25 mV and -25 mV. Op-amp maximum output voltages are ± 14 V. Take ± 15V as op-amp supply voltage.	**07**
	(b)	Draw the circuit diagram of triangular waveform generator and explain the operation with necessary equations and waveforms.	**07**

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