Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: Integrated Circuits & Applications

Subject Code: 4TE04ICA1 **Branch: B.Tech (Electrical)**

Semester: 4 **Date: 18/04/2019** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

1) Draw the equivalent circuit of an op-amp.

2) Draw the pin diagram of 741 IC

3) List the characteristics of an ideal op-amp.

4) Give any four linear applications of operational amplifier.

5) What is the effect of negative feedback on the gain of an amplifier?

6) Draw the ideal gain versus frequency response of first order high pass filter.

7) Draw the pin diagram of 555 IC.

8) What is the gain of a voltage follower circuit?

9) An opamp can amplify only dc signals.Determine whether the given statement is True or False.

10) Give any four advantages of negative feedback.

11) What is the phase difference between input and output signal for inverting amplifier circuit?

12) Draw only the circuit diagram of an integrator circuit.

13) Which amplifier can be used to calibrate the physical input quantity to electrical output quantity?

14) In a RC phase shift oscillator, the gain of an opamp should be_____.

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

(a) Draw the circuit diagram of inverting amplifier with negative feedback and derive the following equations. **07**

a) Closed Loop Voltage Gain b) Input Resistance with Feedback

(b) Draw the circuit diagram of voltage follower circuit (unity gain amplifier) and explain its operation. Derive the following equation for voltage follower circuit. **07**

a) Input Resistance with Feedback b) Output Resistance with Feedback

Q-3 **Attempt all questions** **(14)**

(a) Draw the circuit diagram of differential amplifier with one op-amp and derive the following equations. **07**

a) Closed Loop Voltage Gain b) Input Resistance with Feedback

(b) Draw the circuit diagram of instrumentation amplifier using transducer bridge and explain how it can be used to measure the physical quantity. **07**

Q-4 **Attempt all questions** **(14)**

(a) Draw the circuit diagram of zero cross detector circuit and explain its operation with necessary waveforms. **07**

(b) Draw the circuit digram of positive clipper circuit and explain its operation with necessary waveforms **07**

Q-5 **Attempt all questions** **(14)**

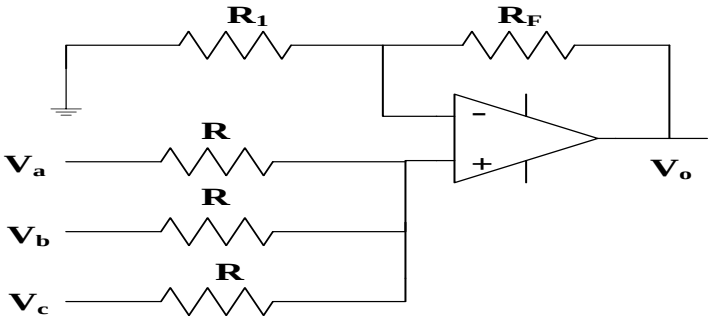
(a) Draw the circuit diagram of Astable multivibrator using 555 timer and explain its operation with necessary waveforms. **07**

(b) Draw the circuit diagram of weinbridge oscillator and explain its operation with necessary conditions for oscillations. **07**

Q-6 **Attempt all questions** **(14)**

(a) Draw the high frequency equivalent circuit of an op-amp and show that open loop gain is a function of frequency. Draw the gain versus frequency response.

(b) The circuit shown in below figure is to be used as an averaging amplifier with the following specification: $V_a = V_b = 1.5V$, $V_c = 3V$, $R_1 = R = 1.5k\Omega$ and $V_o = 5.2V$. Determine the required value of R_F.



Q-7 **Attempt all questions** **(14)**

(a) The 741 IC op-amp having the following parameter is connected as a non-inverting amplifier with $R_1 = 470\Omega$ and $R_F = 4.7K\Omega$: **07**

Open Loop Gain $A = 400{,}000$ Input Impedance $= 33M\Omega$

Output Impedance $R_o = 60\Omega$ Unity Gain Bandwidth $f_o = 0.6MHz$

Compute: i) Gain with Feedback A_F

ii) Input Impedance with Feedback R_{iF}

iii) Output Impedance with Feedback R_{OF}

iv) Bandwidth with Feedback f_F

(b) Draw the circuit diagram and waveforms of schmitt trigger circuit and explain its operation. Give the equations for uppper thresold voltage and lower thresold voltages. **07**

Q-8 **Attempt all questions** **(14)**

(a) Draw the circuit diagram of first order low pass filter circuit and explain its operation. Draw the response gain versus frequency. **07**

(b) Draw the circuit diagram of wide band pass filter circuit and explain its operation. Draw the response gain versus frequency. **07**