| 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:

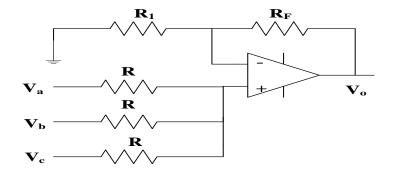
(14)

- 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_____.



| Attem Q-2 | pt any | four questions from Q-2 to Q-8 Attempt all questions | (14) |
|--------------|------------|---|------|
| | (a) | Draw the circuit diagram of inverting amplifier with negative feedback and derive | 07 |
| | | the following equations. | |
| | | a) Closed Loop Voltage Gain b) Input Resistance with Feedback | |
| | (b) | Draw the circuit diagram of voltage follower circuit (unity gain amplifier) and | 07 |
| | | explain its operation. Derive the following equation for voltage follower circuit. | |
| | | a) Input Resistance with Feedback b) Output Resistance with Feedback | |
| Q-3 | | Attempt all questions | (14) |
| (a) | (a) | Draw the circuit diagram of differential amplifier with one op-amp and derive the | 07 |
| | | following equations. | |
| | | a) Closed Loop Voltage Gain b) Input Resistance with Feedback | |
| (b) | | Draw the circuit diagram of instrumentation amplifier using transducer bridge and | 07 |
| | | explain how it can be used to measure the physical quantity. | |
| Q-4 (a) | | Attempt all questions | (14) |
| | (a) | Draw the circuit diagram of zero cross detector circuit and explain its operation | 07 |
| | | with necessary waveforms. | |
| | | Draw the circuit digram of positive clipper circuit and explain its operation with | |
| | (b) | necessary waveforms | |
| Q-5 | | Attempt all questions | (14) |
| | (a) | Draw the circuit diagram of Astable multivibrator using 555 timer and explain its | 07 |
| | | operation with necessary waveforms. | |
| | (b) | Draw the circuit diagram of weinbridge oscillator and explain its operation with | 07 |
| | | necessary conditions for oscillations. | |
| | | 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 $R_F = 4.7 K\Omega$:

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.

Q-8 Attempt all questions

(14)

- (a) Draw the circuit diagram of first order low pass filter circuit and explain its07operation. Draw the response gain versus frequency.
- (b) Draw the circuit diagram of wide band pass filter circuit and explain its operation.07Draw the response gain versus frequency.

