



Name :

Roll No. :

Invigilator's Signature :

**CS/B.TECH (EE-OLD)/SEM-4/EC(EE)-401/2013
2013**

ANALOG ELECTRONICS CIRCUIT

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) To improve the efficiency of an amplifier we have to
 - a) reduce the power dissipation rating
 - b) reduce supply voltage
 - c) reduce the load power
 - d) reduce unwanted power loss.



- ii) An instrumentation amplifier
- a) is a differential amplifier
 - b) has a gain less than 1
 - c) has a very high output impedance
 - d) has low CMRR.
- iii) To avoid false triggering of the Ne 555 timer, the Reset pin (pin 4) is generally connected to
- a) Pin 8
 - b) Pin 1
 - c) Pin 3
 - d) No connection.
- iv) The O/P pulse width for a monostable multivibrator using IC 555 where external resistance and capacitance are 20 k and 0.1 micro F is
- a) 2.1 s
 - b) 2.5 ms
 - c) 2.2 ms
 - d) 2 ms.
- v) The output of an integrator having square wave as input is
- a) Triangular
 - b) Ramp
 - c) Spike
 - d) Parabolic.



- vi) The all pass filter has
- a) no pass band
 - b) one stop band
 - c) same gain at all frequency
 - d) a first roll-off above cut-off.
- vii) The all pass filter is used when
- a) high roll-off rate is needed
 - b) phase shift is important
 - c) a maximally flat pass band is needed
 - d) a ripple stop band is important.
- viii) An IC741 is a / an
- a) Operational amplifier
 - b) Diff. amp.
 - c) Timer
 - d) MOSFET.
- ix) A summing amplifier can have
- a) no more than two input signals
 - b) two or more input signals
 - c) a small open loop voltage gain
 - d) none of these.



- x) A precision diode may be used for
- a) half-wave and full wave rectification
 - b) peak value detector
 - c) clipper and clamper
 - d) all of these.
- xi) The centre frequency of a band pass filter is always equal to the
- a) band width
 - b) geometric average of the cut-off frequency
 - c) band width divided by 2
 - d) 3-dB frequency.
- xii) A band stop filter is sometime called a
- a) snubber
 - b) notch filter
 - c) phase shifter
 - d) time delay circuit.
- xiii) An operational amplifier can be used to perform mathematical operations such as
- a) addition
 - b) subtraction
 - c) scale changer
 - d) all of these.



xiv) Schmitt trigger is a comparator using

- a) negative feedback b) positive feedback
- c) both (a) and (b) d) none of these.

xv) The voltage — follower has a

- a) closed loop voltage gain of unit
- b) small open loop voltage gain
- c) closed loop bandwidth of zero
- d) large close loop output impedance.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What are the criteria of a good instrumentation amplifier ? Why is it needed ? Draw the circuit diagram of an instrumentation amplifier.
3. Explain the operation of non-inverting half wave precision rectifier and draw its input output waveforms.
4. Draw and explain the peak detector circuit using Op-Amp.
5. Draw and explain the V to I converter using floating load and grounded load.
6. Draw and explain sample and hold circuit using Op-Amp.

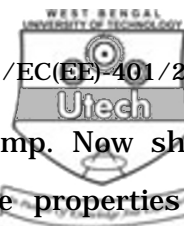


GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Define slew — rate of an Op-Amp. 2
- b) What is the input bias current of Op-Amp ? Derive the input bias current compensation technique. 2 + 5
- c) What is a voltage follower circuit ? Why is it used ? 4 + 2
8. a) Draw and explain Schmitt Trigger circuit using Op-Amp. 5
- b) Draw and explain anti-log amplifier circuit using Op-Amp. 5
- c) Draw and explain first order High pass filter circuit using Op-Amp. 5
9. a) Draw internal block diagram of 555 and explain the function of each block. 7
- b) Draw the circuit diagram of astable multivibrator using 555 timer. Derive the expression for the frequency of oscillation of the astable multivibrator. 8



10. Draw an inverting amplifier using an Op-Amp. Now show where the virtual ground is. What are the properties of virtual ground ? What is the closed loop voltage gain and input impedance. 4 + 2 + 4 + 5

11. a) Draw the characteristic of an ideal comparator. 5
- b) Write a short note of frequency of an Op-Amp. 5
- c) Why are slew rates affected by frequency of input signal ? Draw the slew rate expression. 5
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