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 : $10 \times 1 = 10$

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) peack 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 × 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 × 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