Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech[EEE,ICE,EE(O)]/SEM-4/EC-401/2010

2010

ANALOG ELECTRONIC CIRCUITS

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) An instrumentation amplifier has a high

      a) supply voltage b) power gain

      c) CMRR d) output impedance.

   ii) A transistor is said to be inquiescent state when

      a) no signal is applied to the input

      b) no currents are flowing

      c) it is unbiased

      d) emitter junction and collector junction biased are equal.

   iii) If three cascaded stages of amplifier have gains 10, 20, 30 the overall gain will be

      a) 200 b) 400

      c) 1200 d) 6000.

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iv) Which of the following configuration can be used as buffer ?

a) CE b) CB

c) CC d) All of these.

v) An astable multivibrator generates

a) triangular waveform b) sinusoidal waveform

c) square waveform d) none of these.

vi) For PLL

a) capture range is greater than lock range

b) capture range is less than lock range

c) capture range is equal to lock range

d) no relationship between them.

vii) The output impedance of an op-amp is

a) medium b) very low

c) very high d) none of these.

viii) Differential amplifier can be used to amplify

a) only AC signal (input)

b) only DC signal (input)

c) both AC and DC signals

d) neither AC nor DC signal.

ix) The operation of logarithmic amplifier is based on

a) the non-linear operation of an op-amp

b) the logarithmic characteristic of a *pn* junction

c) the reverse breakdown characteristic

d) the logarithmic charge and discharge of a RC circuit.

x) Multivibrator can be used for

a) generation of square waveforms

b) counting frequency divisions

c) storage of binary bit of information

d) all of these.

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xi) The ability of an amplifier to provide gain for the differential signal but reject common signal is indicated by

a) closed loop gain b) open loop gain

c) CMRR d) PSRR.

xii) A zener regulator has an input voltage from 15 V to 20 V and a load current from 20 to 100 mA. If Vz = 10 V, to hold load voltage constant under all conditions, the value of series limiting resistor should be

a) 50 Ω b) 100 Ω

c) 150 Ω d) 200 Ω.

xiii) The power dissipation in a transistor is

a) $V_{CC} \propto I_C$ b) $V_{CC} \propto I_B$

c) $V_{CE} \propto I_C$ d) $V_{CE} \propto I_C + V_{BE} \propto I_B$.

The parameters have their usual meaning.

xiv) Operational amplifier consists of

I. Differential amplifier

II. Level translator

III. Output amplifier.

Of these :

a) All b) I and II

c) II and III d) I alone.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain with relevant diagram the operation of Schmidt trigger circuit.

3. How can we protect series pass transistor of a series voltage regulator ? Explain with proper circuit diagram.

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4. Describe the operation of fullwave precision rectifier.
5. With circuit diagram show how can be build monostable multivibrator with help of IC 555.
6. What are the differences between series and shunt regulattor ? Draw a circuit diagram of a shunt regulator and explain its operation. 2 + 3

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Draw a self bias circuit. Explain the term 'self bias'. How can you determine the *Q* point of such a circuit ?
   b) Determine the *Q* point of a CE self bias circuit having the following parameters :
   V_{CC} = 15V, R_L = 470 Ω, R_1 = 4 kΩ, R_2 = 1 kΩ, R_E = 220 Ω.
   c) Show in the self bias stability, high β circuit is more stable than a low β circuit. (2 + 2 + 4) + 4 + 3
8. a) What is the CMRR in differential amplifier ?
   b) With the circuit diagram, discuss the operation of an instrumentation amplifier and derive its gain equation. Discuss its merit and applications. 5 + 10
9. a) Explain the operation of Class *B* push-pull amplifier.
   b) Prove that the maximum efficiency of Class *B* amplifier is 78·5%.
   c) What is the function of the tuned amplifier ? 5 + 7 + 3
10. a) Describe the operation of the PLL with block diagram.
    b) Define capture range and lock range. 10 + 5
11. Write short notes on any *three* of the following : 3 × 5
    a) Analog multiplier
    b) SMPS
    c) Precision rectifier
    d) Varactor diode.

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