



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH(EE(N)/EEE(N)/ICE(N)/SEM-3/EC(EE)-301/2011-12**

**2011**

**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) A stable multivibrator may be used as

a) frequency to voltage converter

b) voltage to frequency converter

c) square wave generator

d) comparator.

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ii) Negative feedback in amplifier

- a) increases bandwidth and increases gain
- b) increases bandwidth and decreases gain
- c) decreases bandwidth and decreases gain
- d) decreases bandwidth and increases gain.

iii) Which of the following is linear ?

- a) Current to voltage converter
- b) Logarithmic amplifier
- c) Comparator
- d) Square wave generator.

iv) For a given op-amp,  $CMRR = 10^5$  and differential gain =  $10^5$ . What is the common mode gain of the op-amp ?

- a)  $10^{10}$
- b)  $10^5$
- c)  $2 \times 10^5$
- d) 1.

- resistance an



viii) The output of an integrator having square wave as input is

- a) triangular                      b) ramp
- c) spike                              d) parabolic.

ix) 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.

x) 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.

xi) 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.



xii) An 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.

### GROUP – B

( Short Answer Type Questions )

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

2. Draw the circuit of a series voltage regulator and explain its operation.
3. Define the following parameters in connection to op-amp :  
 $2 \times 2 \frac{1}{2}$ 
  - a) CMRR
  - b) Slew rate.
4. Explain the operation of a current mirror circuit.
5. Define "thermal runaway" and "stability factor" of a transistor.  
 $2 \frac{1}{2} + 2 \frac{1}{2}$
6. With a neat diagram explain the concepts of "load line" and "Q point" of a transistor.

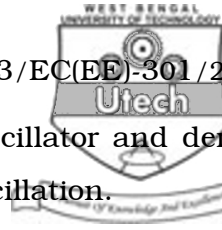


**GROUP – C**

**( Long Answer Type Questions )**

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

7. a) Write down the  $h$ -parameter equations of a transistor amplifier and define  $h$ -parameters.  $2 + 4$   
 b) Model a  $h$ -parameter equivalent circuit by following above equations. Hence derive the expressions of the following :  
 i) Voltage gain  
 ii) Input impedance.  $2 + 4 + 3$
8. a) Draw the circuit of self biasing arrangement of a  $npn$  transistor. Explain physically how this arrangement provides a good stability against temperature variation. Also derive the expression for stability factor.  $2 + 4 + 6$   
 b) Draw the circuits of fixed bias and collector to base bias arrangements of transistor.  $1 \frac{1}{2} + 1 \frac{1}{2}$
9. Explain the operation of the following circuits using op-amp :  $7 \frac{1}{2} + 7 \frac{1}{2}$   
 a) Logarithmic amplifier  
 b) Schmitt trigger.
10. a) Draw the circuit diagram of an emitter follower and explain the nature of feedback in this circuit. What type of feedback topology is used here ? Derive an expression for the voltage gain of the circuit.  $3 + 1 + 3$   
 b) Draw the circuit diagram of a push-pull class  $B$  power amplifier and derive the expression for its power efficiency.  $2 + 6$



11. a) Draw the circuit of a Wien-bridge oscillator and derive the expression for its frequency of oscillation. 8
- b) Explain the operation of a monostable multivibrator using 555 timer. 7
12. Write short notes on any *three* of the following : 3 × 5
- a) Voltage controlled oscillator
  - b) Level shifter
  - c) Precision rectifier
  - d) Switched Mode Power Supply ( SMPS )
  - e) Voltage to current converter.

