

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH/ECE-(OLD)/EEE-(OLD)/ICE-(OLD)/SEM-4/EC-401/2013

2013

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) In a negative feedback amplifier, series mixing
 - a) tends to increase the input resistance
 - b) tends to decrease the input resistance
 - c) does not alter the input resistance
 - d) produces the same effect as the shunt mixing.



- ii) In an FET transconductance is proportional to
- I_{DS}
 - I_{DS}^2
 - $(I_{DS})^{1/2}$
 - $1 / I_{DS}$.
- iii) The input resistance of the MOSFET is of the order of
- 100 k ohm
 - 1 mega ohm
 - 100 mega ohm
 - 10,000 mega ohm.
- iv) The out voltage of a half wave rectifier using resistive load, no filter and sinusoidal input has ripple factor of
- 1.11
 - 1.41
 - 1.21
 - 0.81.
- v) With increase of load resistance, ripple voltage of rectifier with capacitor filter
- decreases
 - increases
 - remains same
 - gets multiplied.



x) Which of the following types of amplifier operation causes maximum distortion ?

- a) Class A
- b) Class AB
- c) Class B
- d) Class C.

xi) Cross over distortion takes place in

- a) Tuned amplifier
- b) Power amplifier
- c) Small signal amplifier
- d) Video amplifier.

xii) All oscillators are based on

- a) Positive feedback
- b) Negative feedback
- c) The piezoelectric effect
- d) High gain.



GROUP – B

(Short Answer Type Questions)

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

2. Explain the thermal run-away and the condition of thermal stability of a BJT.
3. What do you mean by biasing ? Draw and explain fixed bias circuit and determine its stability factor. $1 + 4$
4. What is slew rate of Op-Amp ? Show that Op-Amp may use as logarithmic amplifier. $1 + 4$
5. Draw the circuit diagram of a class *B* push pull power amplifier and determine the maximum conversion efficiency of the circuit.
6. Draw the circuit diagram of an instrumentation amplifier using a transducer bridge. Explain its operation.

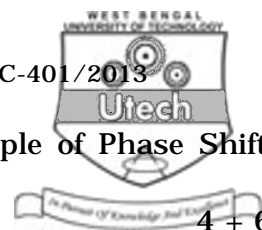
GROUP – C

(Long Answer Type Questions)

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

7. Draw the circuit diagram of an Astable Multivibrator using 555 timer. Explain its operation. Derive the expression for the frequency of oscillation of a stable multivibrator.

$4 + 6 + 5$



8. a) Draw and explain the working principle of Phase Shift Oscillator. 4 + 6

a) In an RC phase shift oscillator, if the value of

$$R_1 = R_2 = R_3 = 200 \text{ k ohm and}$$

$C_1 = C_2 = C_3 = 100 \text{ pico farad}$, find the frequency of the oscillator. 5

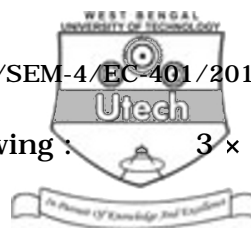
9. a) Draw the circuit arrangement and explain the operation of an Schmitt trigger circuit. 7

b) Design a wide Band-pass filter with $f_L = 200 \text{ Hz}$,

$f_H = 1 \text{ kHz}$, and a pass band gain = 4. Also find the value of Q for the filter. 8

10. a) Draw and explain the N -channel depletion MOSFET. 8

b) Determine the pinch-off voltage for an n -channel silicon FET with a channel width of $4 \times 10^6 \text{ m}$ and a donor concentration of $2 \times 10^{21} \text{ m}^{-3}$. The dielectric constant of silicon is 12 and $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$. 7



11. Write short notes on any *three* of the following : 3×5

- a) V-I converter
- b) PLL
- c) Second Order Butterworth Low-Pass filter
- d) Wein Bridge Oscillator
- e) Transformer coupled class A power amplifier.

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