



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.

- 4004-(O)



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

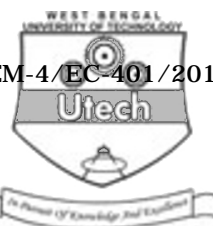
- a) Class A
- b) Class AB
- c) Class B
- d) Class C.

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.

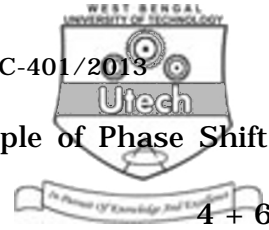
**GROUP – C**

**( 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

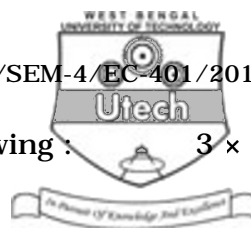
9. a) Draw the circuit arrangement and explain the operation of an Schmitt trigger circuit. 7

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 :  $3 \times 5$

- 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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