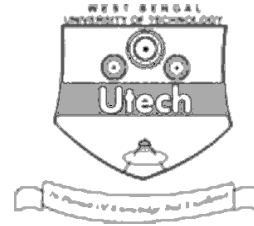


ANALOG ELECTRONIC CIRCUIT (SEMESTER - 4)

CS/B.Tech(ICE,EEE,ECE(O),EIE(O),EE(O)/SEM-4/EC-401/09



1.
Signature of Invigilator

2.
Signature of the Officer-in-Charge

Reg. No.

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Roll No. of the Candidate

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**CS/B.Tech(ICE,EEE,ECE(O),EIE(O),EE(O)/SEM-4/EC-401/09
ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
ANALOG ELECTRONIC CIRCUIT (SEMESTER - 4)**

Time : 3 Hours]

[Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

- This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
- In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
 - For **Groups – B & C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
- Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
- Read the instructions given inside carefully before answering.
- You should not forget to write the corresponding question numbers while answering.
- Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
- Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
- You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
- Rough work, if necessary is to be done in this booklet only and cross it through.

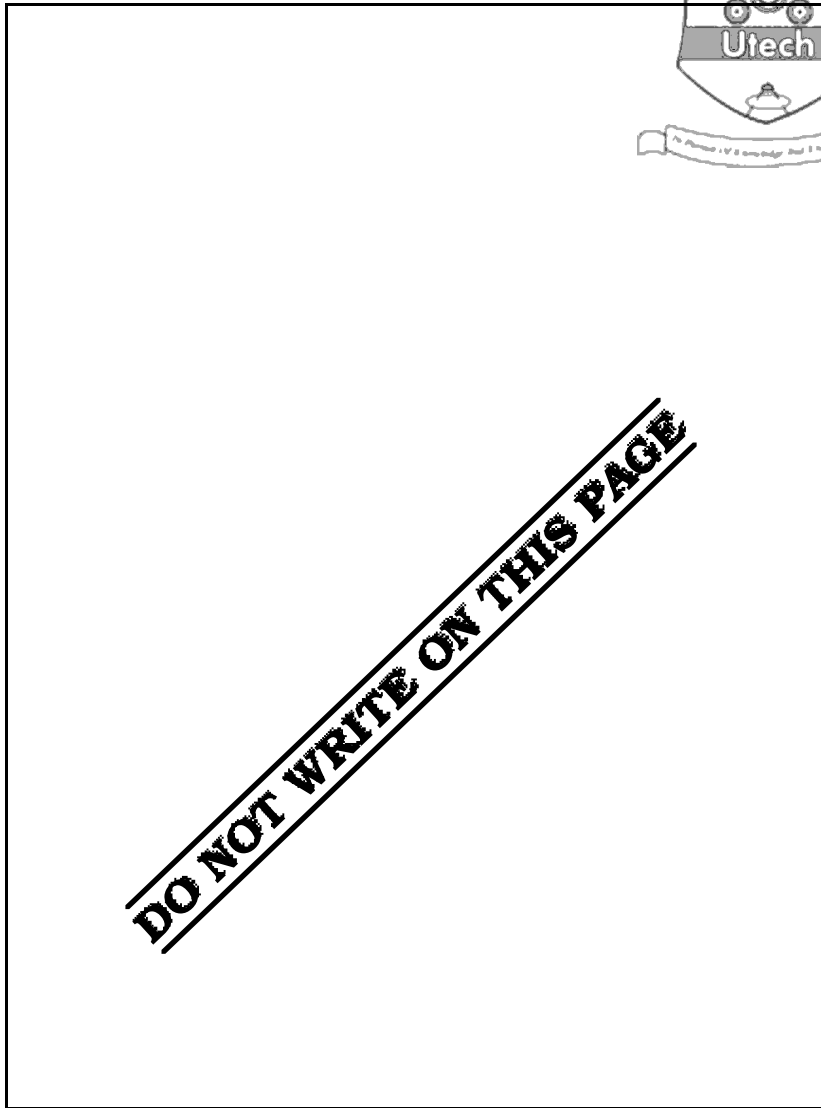
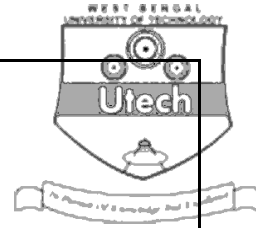
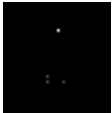
No additional sheets are to be used and no loose paper will be provided

FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

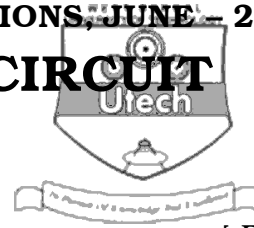
Question Number	Group – A					Group – B					Group – C			Total Marks	Examiner's Signature
Marks Obtained															

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Head-Examiner/ Co-Ordinator/ Scrutineer



ANALOG ELECTRONIC CIRCUIT

SEMESTER - 4



Time : 3 Hours]

[Full Marks : 70

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

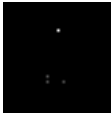
- | | |
|-------------------|----------------------|
| a) supply voltage | b) power gain |
| c) CMRR | d) output impedance. |
-

ii) A transistor is said to be in quiescent state when

- a) no signals are 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. |
-



iv) Which of the following configurations 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

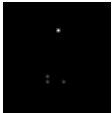
- a) capture range is greater than lock range
- b) capture range is less than lock range
- c) capture range is equal to lock range
- d) no relationship between them.

vii) The output impedance of an Op-Amp is

- a) medium
- b) very low
- c) very high.

viii) A differential amplifier has a differential gain of 20,000, CMRR = 80 dB. The value of common mode gain is given by

- a) 2
- b) 1
- c) 1/2
- d) 0.



5

ix) In the circuit shown below the value of I_o is



Dia.

- | | |
|-----------|-----------|
| a) - 4 mA | b) + 4 mA |
| c) 3 mA | d) 5 mA. |

x) An ideal regulated power supply should have regulation which is

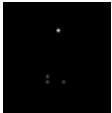
- | | |
|------|---------|
| a) • | b) 50% |
| c) 0 | d) 75%. |

xi) An Op-Amp has slew rate $0.5 \text{ V}/\mu\text{s}$. If a signal is applied to the input of that Op-Amp having frequency 20 kHz , then what is the peak value of the output wave ?

- | | |
|----------------------|----------------------|
| a) 39.8 V | b) 3.98 V |
| c) 0.398 V | d) 398 V . |

xii) To avoid thermal runaway in the design of an analog circuit the Q -point of the BJT should be such that it satisfies the condition

- | | |
|-------------------------------------|-------------------------------------|
| a) $V_{CE} = \frac{1}{2} V_{CC}$ | b) $V_{CE} \leq \frac{1}{2} V_{CC}$ |
| c) $V_{CE} \geq \frac{1}{2} V_{CC}$ | d) $V_{CE} = 0.78 V_{CC}$. |



6

xiii) The maximum efficiency of a Class B push-pull power amplifier is approximately

- a) 25%
- b) 50%
- c) 70.2%
- d) 78.6%



xiv) In an amplifier, if conduction is during the cycle from 0° to 9° and again from 180° to 270° , the amplifier will be termed as

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

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. What is bias compensation and why is it needed ? Explain with circuit diagram using diode compensation technique how compensation is accomplished for the variation in base emitter voltage due to temperature. 1 + 1 + 3

3. Draw the circuit diagram of voltage to current converter and explain its operation when load is

i) floating

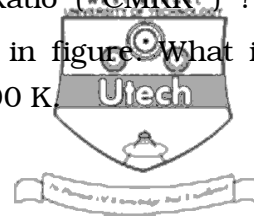
ii) grounded.

5

4. What are the differences between series and shunt regulators ? Draw the circuit for a series regulator. 5

5. Draw the circuit to generate periodic pulses of 50% duty using 555 timer. Explain the operation of the circuit. 2 + 3

6. What do you mean by Common Mode Rejection Ratio (CMRR)? Find out the expression of CMRR of a differential amplifier shown in figure. What is the value of CMRR if $R_1 = 5\text{ K}$, $R_2 = 10\text{ K}$, $R_3 = 10\text{ K}$ and $R_4 = 100\text{ K}$.



5

Dia.

GROUP – C**(Long Answer Type Questions)**Answer any *three* of the following.

3 × 15 = 45

7. a) Draw the circuit diagram of a voltage to current converter (grounded load) and explain its operation. 5
- b) What is Schmitt trigger ? Explain with circuit diagram. 5
- c) Explain logarithmic amplifier with circuit diagram. 5
8. a) What is the main disadvantage of a Class A power amplifier ? Explain with a circuit diagram the operation of a Class B push-pull power amplifier. 7
- b) Obtain the maximum efficiency of the circuit. 5
- c) What do you mean by cross-over distortion ? Explain with necessary waveform. How do you eliminate this distortion ? 3
9. a) Draw the *a.c.* equivalent circuit of a dual input balanced output differential amplifier and find out the expression of differential gain (A_{id}), input impedance and output impedance. 10
- b) How does input bias current limit the performance of an ideal Op-Amp ? How do we compensate the effect of input bias current ? 5

10. a) Draw the circuit diagram of a logarithm amplifier with temperature compensating network and find out the expression of output voltage. From that expression explain how temperature compensating has been done. 8
- b) How does astable multivibrator using 555 timer work as a square wave generator ? Explain with necessary circuit diagram and waveform. 7
11. Write short notes on any *three* of the following : 3 × 5
- a) Precision Rectifier
- b) Instrumentation Amplifier
- c) Practical Integrator
- d) High Frequency Model of a Transistor.

END