

ANALOG ELECTRONIC CIRCUIT (SEMESTER - 4)

CS/B.Tech(EE-N)/ SEM-4 /EC(EE)-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(EE-N)/ SEM-4 /EC(EE)-401/09
ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
ANALOG ELECTRONIC CIRCUIT (SEMESTER - 4)

Time : 3 Hours]

[Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. 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.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
b) 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.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. 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.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. 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**.
9. 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

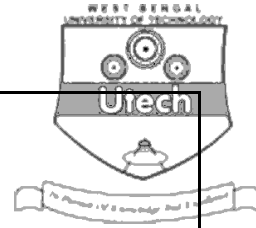
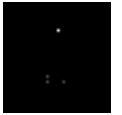
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Marks Obtained

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

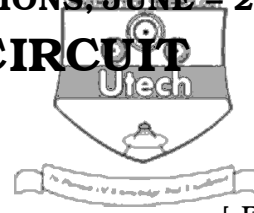
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GROUP – A**(Multiple Choice Type Questions)**1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

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

- | | |
|---------------|---------------|
| a) Triangular | b) Ramp |
| c) Spike | d) Parabolic. |
- ☐

ii) The maximum efficiency of class-B push-pull power amplifier is

- | | |
|----------|----------|
| a) 50% | b) 78.5% |
| c) 68.5% | d) 100%. |
- ☐

iii) Inversion phenomenon occurs in MOS capacitor (*p*-type semiconductor) if the bias on the metal side is

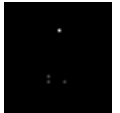
- | | |
|-------------|---------------------|
| a) positive | b) larger positive |
| c) negative | d) larger negative. |
- ☐

iv) CE amplifier is used as

- | | |
|------------------------------|------------------------|
| a) Radio frequency amplifier | b) microwave amplifier |
| c) audio frequency amplifier | d) buffer amplifier. |
- ☐

v) Thermal runaway in a transistor biased in the active region is due to

- | |
|---|
| a) heating of the transistor |
| b) change in β which increases with temperature. |
| c) base emitter voltage which decreases with rise in temperature |
| d) change in reverse collector saturation due to rise in temperature. |
- ☐



vi) In self-bias circuit (with RB_1 and RB_2) to obtain base current R_B is the equivalent base resistor and R_E is the emitter resistor



- a) $R_B \gg R_E$ improves S_1
- b) $R_B \gg R_E$ improves S_β
- c) $R_B \ll R_E$ improves both S_β and S_1
- d) R_B has no effect on the stabilization factor.

☐

vii) The maximum efficiency of transformer coupled class A power amplifier is

- a) 25%
- b) 50%
- c) 79%
- d) 100%.

☐

viii) The Q point in a voltage amplifier is selected in the middle of the active region because

- a) it gives better stability
- b) the circuit needs a small *d.c.* voltage
- c) the biasing circuit then needs less number of resistors
- d) it gives a distortionless output.

☐

ix) Power amplifiers handle signal which is

- a) small
- b) very small
- c) large
- d) none of these.

☐

x) A class B push-pull power amplifier has an *a.c.* output of 10 watts. The *d.c.* power drawn from the power supply under ideal condition is

- a) 10 watts
- b) 12.75 watts
- c) 15 watts
- d) 20 watts.

☐

- d) 75%.

- d) No Connection (NC).

- d) the inverting input terminal.

- Dia.

- d) $2V_2 - 3V_1$.

- xv) The circuit shown below uses an ideal Op-Amp. For small positive values of V_1 , the circuit works as



Dia.

- | | |
|----------------------------|------------------------------|
| a) a half wave rectifier | b) a differentiator |
| c) a logarithmic amplifier | d) an exponential amplifier. |

GROUP – B

(Short Answer Type Questions)

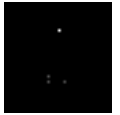
Answer any *three* of the following.

$$3 \times 5 = 15$$

2. Determine the output voltage of the circuit shown in the figure below.

5

Dia.



3. a) Define stability factor with respect to transistor biasing. WEST BENGAL UNIVERSITY OF TECHNOLOGY
- b) Derive the general expression of stability factor for any biasing circuit. 2 + 3
4. Explain the operation of non-inverting half wave Precision rectifier and draw its input and output waveforms. 5
5. Explain the working operation of Monostable Multivibrator using 555 timer. Find the expression for the pulse width. 3 + 2
6. A class-A power amplifier is coupled to a load resistance of $12\ \Omega$ by a transformer of primary to secondary turns ratio 8 : 1. The signal has a peak to peak swing of 250 mA. Calculate the power output. 5

GROUP – C

(Long Answer Type Questions)

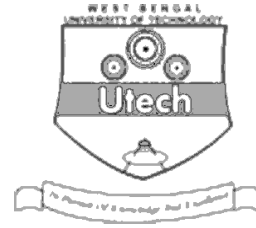
Answer any *three* of the following.

$3 \times 15 = 45$

7. What is power amplifier ? Mention the advantage of push-pull power amplifier. Derive the maximum power efficiency of a class A amplifier. How can its efficiency be improved ? What are the advantages of a class C amplifier ? Mention its application. 2 + 2 + 5 + 2 + 2 + 2
8. What do you mean by multivibrator ? Draw the circuit diagram of an astable multi-vibrator using 555 timer. Derive the expression for the frequency of oscillation of the stable multi-vibrator. How can the duty cycle be 50% by adding diode. 2 + 5 + 5 + 3
9. What is VCO ? What are the basic differences between VCO and fixed frequency oscillator ? What are the main components of PLL ? Draw the block diagram of a PLL.
10. a) What is the significance of CMRR in differential amplifier ?
- b) With neat circuit diagram, discuss the operation of an instrumentation amplifier and derive its gain equation. Discuss its merit and applications. 3 + 9 + 3

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

- a) Logarithmic amplifier
- b) Precision rectifier
- c) Switched mode power supply
- d) Triangular wave generator
- e) PLL.



$3 \times 5 = 15$

END