

ELECTRONIC INSTRUMENTATION & MEASUREMENT (SEMESTER - 6)

CS/B.TECH (EIE-NEW)/SEM-6/EI-603/09



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 (EIE-NEW)/SEM-6/EI-603/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

ELECTRONIC INSTRUMENTATION & MEASUREMENT (SEMESTER - 6)

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 marked '**Answer Sheet**'.
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

FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

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

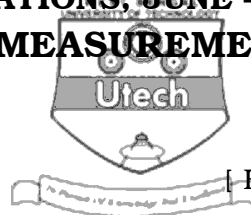
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Head-Examiner/Co-Ordinator/Scrutineer

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ELECTRONIC INSTRUMENTATION & MEASUREMENT
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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) In a phase lock loop,
- a) capture range is smaller than lock range
 - b) lock range is smaller than capture range
 - c) capture range is equal to lock range
 - d) none of these.
- ii) Spectrum analyzer is used across the frequency spectrum of a given signal to study the
- a) current distortion
 - b) voltage distortion
 - c) energy distortion
 - d) power distortion.
- iii) What type of noise is found in semiconductor devices ?
- a) Shot noise
 - b) Thermal noise
 - c) Johnson noise
 - d) None of these.
- iv) In a ballistic galvanometer, damping follows
- a) hyperbolic decay
 - b) exponential decay
 - c) logarithmic decay
 - d) exponential rise.



- 

b) 0.2 A

d) 20 A.

- 114

$$\text{b) } (2/R_1 C_1) \left\{ (V^+ - V_c)/V^+ \right\}$$
$$\text{d)} \quad (1/R_1 C_1) \left\{ (V^+ - V_c)/V_c \right\}.$$

- 11

b) LM 522

d) NE 465.

- 114

b) 0.03 cm/volt

d) 0.015 cm/volt.

- 114

b) 8 mV

d) none of these.

- 114

b) 1.002

d) none of these.

- xi) Bolometer is used to measure

- a) power b) frequency
- c) temperature d) current.



- xii) Operating temperature range of a LCD is

- wide, 0-70 degree centigrade
- restricted, 10-30 degree centigrade
- more than 70 degree centigrade
- restricted, less than 10 degree centigrade.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions.

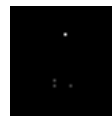
$$3 \times 5 = 15$$

2. a) What is a current mirror ?

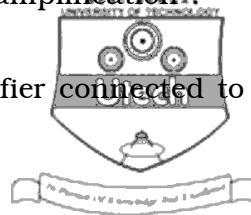
- b) Draw the circuit diagram of current mirror circuit and explain the operating principle.

$$1 + 1 + 3$$

3. A saw tooth voltage has a peak value of 160 V and a time period 3.6 sec as shown in following fig. Calculate the error when measuring the voltage with an average reading voltmeter calibrated in terms of *rms* value of a sinusoidal wave. 5



4. What is Chopper Amplifier ? How does it work for D.C. amplification ? 1 + 4
5. With diagram, explain the operation of a charge amplifier connected to a piezoelectric transducer. 5
6. a) What is noise ?
- b) What are the different types of noise ?
- c) Derive the expression of thermal noise in a resistor. 2 + 1 + 2



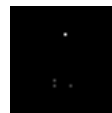
GROUP – C

(Long Answer Type Questions)

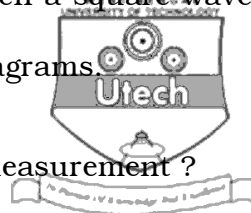
Answer any *three* of the following questions.

3 × 15 = 45

7. a) What is the operating principle of LCD display ?
- b) What are the advantages of LCD display over LED display ?
- c) Explain why reflective LCDs have many advantages over transmissive LCDs.
- d) Explain with the help of a neat diagram, the working of Digital Frequency Meter. 4 + 4 + 4 + 3
8. a) Define the Q -factor of a coil. Explain with a circuit diagram, the construction and principle of operation of a basic Q -meter.
- b) To find the self capacitance of a coil by Q -meter, the resonance was obtained with
- i) tuning capacitor of 1530 pF at 1.0 MHz and
- ii) tuning capacitor of 162 pF at 3.0 MHz.
- c) What are the errors present in Q -meter ? 1 + 7 + 4 + 3



9. a) What will effect for a phase-detector of a PLL when a square wave input is given to it ? Explain with relevant circuit and timing diagrams.



b) How is a Digital Frequency Meter used for ratio measurement ?

c) With the help of block diagram, explain about a Digital Storage Oscilloscope ?

6 + 3 + 6

10. Explain with a neat block diagram, the operation of a superheterodyne spectrum analyzer. Explain the frequency instabilities and dynamic range of a spectrum analyzer. Calculate the dynamic range of a spectrum analyzer with a third order intercept point of 20 dBm and a noise level of 100 dBm.

7 + 3 + 3 + 2

11. a) Explain the operation of a dual-slope integrating type digital voltmeter. How does range changing circuit work for a DVM ?

b) Draw the circuit for a FET-input voltmeter using dual emitter follower and an input attenuator.

c) Determine the meter reading of a FET input voltmeter, when $E = 7.5$ V and the meter is set to its 10 V range. The FET gate-source voltage is -5 V.

$V_p = +5$ V, $R_s + R_m = 1$ k Ω and $I_m = 1$ mA at full scale.

7 + 3 + 5

END