	Uneah
Name:	
Roll No.:	To Desire Of Exercising and Explored
Invigilator's Signature :	

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

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.

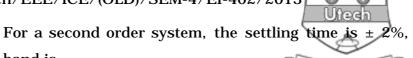
GROUP - A

(Multiple Choice Type Questions)

1.	Choose the correct alternatives for	any	ten of the following	; :
			$10\times 1=1$	0

- i) Which is not desired characteristics of an instrument?
 - a) Accuracy
- b) Fidelity
- c) Speed of response
- d) None of these.
- ii) The smallest change in the input variable being measured, that will cause a change in the output signal of the instrument is termed as
 - a) Hysteresis
- b) Drift
- c) Resolution
- d) Threshold.

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 $3/\xi\omega_n$ a)

band is

 $5/\xi\omega_n$

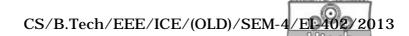
 $2/\xi\omega_n$ c)

- d)
- A 0-10A ammeter has a guaranteed accuracy of 1% of iv) full-scale deflection. The limiting error while reading 2.5A is
 - 1% a)

b) 2%

c) 3%

- d) 4%.
- In an instrument, the smallest measurable input is v) known as
 - Threshold a)
- Resolution b)
- Dead zone c)
- d) Sensitivity.
- Pirani gauge is used to measure vi)
 - **Temperature** a)
- b) High pressure
- Low pressure c)
- Flow.
- Two resistance $100\Omega \pm 5\Omega$ and $150\Omega \pm 15\Omega$ are connected in series. If the deviations are standard deviation, the resultant resistance can be expressed as
 - $250\Omega \pm 20\Omega$ a)
- b) $250\Omega \pm 10\Omega$
- $250\Omega \pm 15.8\Omega$ c)
- $250\Omega \pm 10.6\Omega$. d)



viii)	In a Q-meter, the value of shunt resistance connected					
	across the oscillator is typically of the order of					
	a)	Ω	b)	mΩ		
	c)	μΩ	d)	$\mathbf{k}\Omega$.		
ix)	A true rms responding voltmeter is					
	a)	Thermistor	b)	RTD		
	c)	LVDT	d)	Thermocouple.		
x)	The	spectrum analyzer is	used	l across the frequency		
	spec	trum of a given signal (to stu	dy the		
	a)	Current distribution	b)	Voltage distribution		
	c)	Energy distribution	d)	Power distribution.		
xi)	An a.c. voltmeter is used to measure					
	a)	average value	b)	rms value		
	c)	peak value	d)	peak to peak value.		
xii)	In a	$3\frac{1}{2}$ digit voltmeter, the	large	est number can be read		
	is					
	a)	0999	b)	1999		
	c)	4999	d)	9999.		
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(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

1

1

- 2. a) Explain the terms 'accuracy' and 'precesion' with respect to a measuring system. 2+2
 - b) Which is the more desirable parameter?

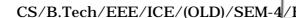
3. a) Define Linear time invariant and Linear time variant systems with example. 1+1

- b) Describe the technique used for linearizing a non-linear system for limited range about the operating point. 3
- 4. What is limiting error?

A Wattmeter having a range of 500 W has an error of \pm 1.5 per cent full scale deflection. If true power is 50 W, what would be the range of readings? 1+4

- 5. a) State the advantages of the digital voltmeter over analog voltmeter. 2
 - b) What do you mean by 3-1/2 digit display?
 - c) How are DVM classified?
- 6. a) State sampling theorem.

b) Why is sample and hold circuit required in a DAS ? Construct a suitable sample and hold (S & H) circuit and explain its function. 1+3





(Long Answer Type Questions)

Answer any three of the following.

 $3 \times 15 = 45$

- 7. a) Describe a heterodyne wave analyzer with the help of its block diagram.5
 - b) How does a wave analyzer differ from a harmonic distortion analyzer?
 - c) What do you mean by sampling ? What is a sample-and-hold circuit ? What is the advantage of the use of sample-and-hold circuit ? 2+1+2
- 8. Write short notes on any *three* of the following : 3×5
 - a) DAS
 - b) Multiplexing
 - c) Log amplifier
 - d) Reliability
 - e) RMS meter.

- 9. a) Define and give examples of 'modifying input' and 'interfering input'.
 - b) What are the names of the different standards inputs for studying the dynamic response of a system? Define and sketch them.
 - c) Pressure is abruptly changed from 5 bar to 30 bar at t=0. The transducer (being the first order) indicates a value of 20 bar after 30 seconds. Determine the time required to reach the pressure 95% of the final value.

5

- 10. a) Explain the difference between accuracy and precision in measurement.
 - b) What are the different types of standards?
 - c) Describe the international standard of Mass, Length and Time.
 - d) Ten observations of resistance made in an experiment are $100\cdot4~\Omega$, $99\cdot2~\Omega$, $101\cdot1~\Omega$, $100\cdot5~\Omega$, $99\cdot8~\Omega$, $102\cdot0~\Omega$, $99\cdot9~\Omega$, $101\cdot7~\Omega$, $100\cdot8~\Omega$ & $101\cdot2~\Omega$. Calculate (i) Arithmetic mean, (ii) Average deviation, (iii) Standard deviation, and (iv) Variance.

- 11. a) Draw the block diagram of a digital multi-meter (DMM) and explain its operation.
 - b) Define gauge factor. Calculate the gauge factor for a resistance wire strain gauge. 1+5
 - c) A capacitive transducer uses two quartz diaphragms of area 750 mm ² separated by a distance of 3.5 mm. A pressure of 900 kN/m ² when applied to the top diaphragm produces a deflection of 0.6 mm. The capacitance is 370 pF when no pressure is applied to the diaphragms. Find the value of capacitance after the application of a pressure of 900 kN/m ².

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