						<u> </u>	<u>Orean</u>
Name :							A
Roll No.:							o of Knowledge And Experient
Invig	gilato	r's Si	gnature :				••
CS/B.TECH(ICE-OLD)/SEM-3/IC-301/2011-12							
2011							
MEASUREMENT FUNDAMENTALS							
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.	1. Choose the correct alternatives for the following :						
							10 × 1 = 10
	i) RTD is an example of transducer.						
		a)	passive		b)	active	
		c)	analog		d)	digital.	
	ii)	For	an overdampe	ed system	the o	damping co	efficient is

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b) t > 1

d) t = 0.

a) t < 1

c) t = 1

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iii) A linear potentiometer is a order instrument

a) first

b) zero

- c) second
- d) third.

iv) Bourdon gauge is useful to measure the

a) flow

b) level

c) force

d) temperature.

v) Dimension of power is

- a) ML 2 T $^{-2}$
- b) $ML^2 T^{-3}$
- c) MLT $^{-2}$
- d) ML 2 T $^{-1}$.

vi) The manufacturer specifies

- a) absolute error
- b) relative absolute error
- c) guaranteed error
- d) all of these.

vii) A 0-10 A ammeter has guaranteed accuracy of 1% of full-scale deflection. The limiting error while reading $2.5~\mathrm{A}$ is

a) 1%

b) 2%

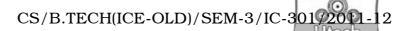
c) 4%

d) 8%.

viii) A set of readings has a wide range and therefore it has

- a) low precision
- b) high precision
- c) low accuracy
- d) high accuracy.

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- ix) If the standard deviation of any measurement is $\pm 3\sigma$ the probability of occurrence is
 - a) 0.6828

- b) 0.50
- c) 0.9546
- d) 0.9974.
- x) A thermometer can measure the temperature from
 10°C to 100°C. The scale range and scale span of the instrument are respectively
 - a) -10° C to 100° C and 100° C
 - b) 110°C and 110°C
 - c) 100°C and 110°C
 - d) all of these.

GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

- 2. Describe the signal conditioning circuit in signal measurement system.
- 3. Calculate the accuracy of measuring 50 V by
 - a) a voltmeter (range 0 200 V d.c.) whose accuracy is 0.1% F.S. and
 - b) a voltmeter (range 0 100 V d.c.) whose accuracy is 2% of measured value. $2\frac{1}{2} + 2\frac{1}{2}$
- 4. Define the voltage standard. Compare and contrast between saturated and unsaturated Weston cell. 2 + 3
- 5. a) What is the difference between sensitivity and dead band of a measurement system?
 - b) What is lag of a system response?
- 6. What is meant by direct and indirect method of calibration? Explain with example.

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GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- 7. For normal distribution of data, deduce the expression for probable error in terms of average deviation and standard deviation.
 - Explain the statement : "A measurement data is specified within $\pm 3\sigma$ limit".
 - What are the basic methods of rejecting the data ? 10 + 3 + 2
- 8. What are different standards available on total quality management system? Discuss the structures of different standards.

 5 + 10
- 9. Write short notes on any *three* of the following: 3×5
 - a) Precision and accuracy
 - b) Current standard
 - c) Least square method
 - d) Reliability of measurement.
- 10. a) What is the difference between dynamic and static characteristics of an instrument?
 - b) Why is analysis of dynamic characteristic essential for a system?
 - c) Calculate the following for a first order system of step input:
 - i) Steady state error
 - ii) Dynamic error
 - iii) Settling time.
- 11. What are the different types of error in a measurement system? Discuss the sources of these errors and the techniques of elimination or reduction of these errors.

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5 + 5 + 5

