University of Mumbai
Examination 2021 under Cluster 06
(Lead College: Vidyavardhini's College of Engg Tech)
Examination for Direct Second Year Students Commencing from 10th April 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2019

Examination: SE Semester III (For DSE Students)

Course Code: ELC305 and Course Name: Electronic Instruments and Measurements

Time: 2 hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The sensitivity of a voltmeter using 0-5 mA meter movement is
Option A:	50 Ω/V
Option B:	200 Ω/V
Option C:	100 Ω/V
Option D:	500 Ω/V
2.	The error determined as algebraic numerical difference between true value of the quantity and the value recorded by the measuring instrument at any instant is
Option A:	random error
Option B:	lag
Option C:	dynamic error
Option D:	fidelity
3.	Kelvin's double bridge is used to measure low resistances because
Option A:	it has high sensitivity
Option B:	there is no thermoelectric emf
Option C:	resistance variation due to temperature
Option D:	effect of contact and lead resistances is eliminated
4.	In an Anderson bridge the unknown inductance is measured in terms of
Option A:	known inductance and resistance
Option B:	known inductance
Option C:	known capacitance and resistance
Option D:	known capacitance
5.	Which of the following errors can arise, as a result of mistake in reading, parallax improper instrument location and inadequate lighting?
Option A:	construction errors
Option B:	transmission errors
Option C:	observation errors
Option D:	translation errors

6.	Q meter works on the principle of
Option A:	series resonance
Option B:	barkhausen criterion
Option C:	piezoelectric effect
Option D:	parallel resonance
7.	Electronics voltmeters which use rectifier employ negative feedback. This is done
Option A:	to increase the overall gain.
Option B:	to improve stability.
Option C:	to improve linearity of diodes.
Option D:	to improve nonlinearity of diodes.
8.	In digital meter construction, the Schmitt trigger is used for
Option A:	sinusoidal waveforms into rectangular pulses.
Option B:	rectangular pulses into Sinusoidal waveforms.
Option C:	scaling of sinusoidal waveforms.
Option D:	providing time base.
9.	Current is converted to voltage
Option A:	through a voltmeter
Option B:	through a resistance
Option C:	through an ammeter
Option D:	through a galvanometer
10.	Basic building blocks of digital multimeter are
Option A:	oscillator, amplifier
Option B:	diode, op amp
Option C:	rectifier, Schmitt trigger
Option D:	ADC, attenuator, counter
11.	Any instrument can be used as a standard to calibrate another instrument, provided that its accuracy is ____ times better than instrument to be calibrated.
Option A:	three
Option B:	five
Option C:	four
Option D:	seven
12.	The set of precision series connected resistors for use in potentiometer calibration of ammeters is called as
Option A:	shunt box
Option B:	series box
Option C:	decade box
Option D:	series - Shunt box
13.	True rms responding voltmeter uses
Option A:	Thermistors
Option B:	Thermocouple
Option C:	LVDTs
Option D:	RTDs

14.	To measure dielectric loss, We would use
Option A:	Anderson bridge
Option B:	Kelvin bridge
Option C:	Schering bridge
Option D:	Maxwell's bridge
15.	What is the effect of IC chips on DVM?
Option A:	increase in cost
Option B:	increase in power
Option C:	reduction in cost
Option D:	increase in size
16.	An instrument whose output is a sinusoidal voltage that varies over a complete frequency band slowly and continuously is known as
Option A:	Function generator
Option B:	Random noise generator
Option C:	Signal generator
Option D:	Sweep generator
17.	Value of Femto is
Option A:	10 raised to –9
Option B:	10 raised to –15
Option C:	10 raised to –12
Option D:	10 raised to –18
18.	The unique quality of every quantity which distinguishes it from all is called as
Option A:	dimension
Option B:	unit
Option C:	standards
Option D:	precision
19.	An instrument's reliability means
Option A:	the extent to which the characteristics remain non - linear
Option B:	the life of the instrument
Option C:	the extent to which the characteristics remain linear
Option D:	the degree to which the repeatability continues to remain within specific limits
20.	Damping in an instrument provides
Option A:	counter torque to deflection torque
Option B:	good accuracy
Option C:	braking action on a meter pointer
Option D:	starting torque on the meter pointer

Q2 (20 Marks)	
Q.2 A	**Solve any Two (5 marks each)**
i.	Explain the operation of spectrum analyzer.
ii.	Explain need of calibration with suitable example.
iii.	The set of 10 voltage measurements were recorded as 98, 102, 101, 97, 100, 103, 98, 106, 107 and 99. Find the precision at fourth measurement.
Q.2 B	**Solve any One (10 marks each)**
i.	Explain the operation of Kelvin double bridge with mathematical analysis.
ii.	Explain the operation of dual slope and successive approximation type dc voltmeters.

Q3 (20 Marks)	
Q.3 A	**Solve any Two (5 marks each)**
i.	Explain how potentiometer can be used for calibration of voltmeter.
ii.	Explain the operation of peak responding AC voltmeter.
iii.	Explain the operation of Wheatstone bridge.
Q.3 B	**Solve any One (10 marks each)**
i.	Explain operation of function generator with the help of block diagram.
ii.	Explain static and dynamic characteristics of an instrument

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Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	D
Q4	C
Q5	C
Q6	A
Q7	D
Q8.	A
Q9.	B
Q10.	D
Q11.	C
Q12.	A
Q13.	B
Q14.	C
Q15.	C
Q16.	D
Q17.	B
Q18.	A
Q19.	D
Q20.	C

Important steps and final answer for the questions involving numerical example

Q2(A): (iii)

$$Q.2(A)(iii)$$

$$X_n = 97 V$$

$$\overline{X_n} = \frac{1011}{10} = 101.1$$

$$\therefore Precision = 1 - \left| \frac{X_n - \overline{X_n}}{\overline{X_n}} \right|$$

$$= 1 - \left| \frac{97 - 101.1}{101.1} \right|$$

$$= 1 - 0.04$$

$$= 0.96$$