



QUESTION BANK

Subject Code/Subject: **EC2351/ MEASUREMENTS AND INSTRUMENTATION**

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Semester : **VI**

UNIT I

BASIC MEASUREMENT CONCEPTS

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error :- accuracy and precision, types, statistical analysis – moving coil, moving iron meters – multimeters – Bridge measurements : – Maxwell, Hay, Schering, Anderson and Wien bridge.

PART –A

(1 MARK)

1. Which of the following instruments will be used to measure the temperature above 1600 0C.

- (a) A simple thermometer (b) Electrical resistance pyrometer
(c) Thermo-electric pyrometer (d) None of the above

2. Wein bridge finds application in

- (a) Frequency determination (b) Resistance measurement only
(c) Harmonic distortion analyzer (d) a and c both.

3. The most common method for measurement of low resistance is:

- (a) Wheatstone bridge (b) Potentiometer method
(c) Voltmeter-ammeter method (d) Kelvin's double bridge

4. Moving iron instruments can be used without much error upto a frequency of

- (a) 50 Hz (b) 100 Hz (c) 1000 Hz (d) 1500 Hz

5. Subtracting 437 ± 4 from 462 ± 4 would yield a result with percentage error-of

- (a) $\pm 4\%$ (b) $\pm 16\%$ (c) $\pm 8\%$ (d) $\pm 32\%$

6. The internal resistance of an ammeter should be

- (a) Very small (b) Medium (c) High (d) Infinity

7. Three resistances have the following ratings

- (i) 150Ω at 5% (ii) 100Ω at 5% (iii) 200Ω at 5%.

The percentage error when all the three are connected in series will be

- (a) $\pm(5/3)\%$ (b) $\pm 5\%$ (c) 15% (d) +5%

8. Precision measurement of resistances is generally carried out by:

- (a) Potentiometer method (b) CRO method (c) Voltmeter-ammeter method (d) Bridge method

9. An ideal meter should have

- (a) Infinite resistance (b) Finite resistance (c) Absolutely no effect on the circuit being measured
(d) Definite effect on the circuit being measured

10. Wagner earthing device:

- (a) Does not affect AC bridges (b) Affects DC potentiometer
(c) Makes possible very high accuracy in measurement
(d) Reduces the frequency and waveform errors in AC bridges

11. Thermocouple instruments are also known as

- (a) R.F. instruments (b) PMMC instruments (c) Rectifier instruments (d) Digital instruments.

12. The units for the deflection sensitivity of a CRO are

- (a) Meter/volt (b) mm/volt (c) mm/m-volt (d) m/m-volt.

13. The internal resistance of a milli-ammeter must be very low for:

- (a) High resolution (b) High sensitivity (c) Maximum voltage drop across the meter
(d) Minimum effect on the current in the circuit.

14. The instrument efficiency is defined as:

- (a) The ability of the instrument to read the smallest input changes
(b) The ratio of the measured quantity at full -scale to the power taken by the instrument
(c) The ratio of the change in output signal to the change in input signal
(d) The ability of the system to reproduce the output in the same form as the input

15. The time base signal in a CRO is a:

- (a) Rectangular waveform (b) High frequency sinusoidal wave form
(c) High frequency sawtooth wave form (d) Square wave form

ANSWER:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
c	d	d	d	d	A	c	d	c	c	c	a	d	b	c

PART-B**(2 MARKS)****16. What are the basic elements of a generalized measurement system?. (Nov/2003)**

Primary sensing element which is generally a transducer. Data conditioning element which further consists of variable conversion element and variable manipulation element.

Data transmission and presentation elements which includes data transmission system and data display system

17. List any four Static characteristics of a measuring system. (Dec-03) & MAY-12

Accuracy, Precision, Error, Resolution, Stability, Linearity etc..

18. Define the term Accuracy. (May-04)

The accuracy is defined as the degree of closeness with which the instrument reading approaches the true value of the quantity to be measured. It indicates the ability of an instrument to indicate the true value of the quantity.

19. What is an Error?. (May/June 2010)

The algebraic difference between the indicated value and the true value of the quantity to be measured is called an error.

20. What is calibration?. MAY-12

Calibration is the process of making an adjustment or making a scale so that the readings of an instrument agree with the accepted value and the certified standard.

21. What is exact difference between accuracy and Precision.?. (dec-2007)

Accuracy indicates how far the measured value is close to the true value while precision indicates how far a particular measured value is from the average of readings taken. Thus precision is not related to true value of the parameter to be measured.

22. Define the term Precision.

It is the Measure of consistency or repeatability of measurements. It denotes the amount by which the individual readings are departed about the average of number of readings.

23. What are the sources of errors in D.C voltage measurement?. (Dec-03)

The friction in the Moving System.

The Heat generated changes the resistance of working coil, causing errors.

The aging of permanent magnet and control spring.

24. Write the two conditions to be satisfied to make an a.c bridge balance. (dec-2007)

The two conditions are $Z_1 Z_4 = Z_2 Z_3$

25. What is transfer instrument?. (May/June 2010)

A Transfer instrument is one which is calibrated with d.c source and used without any modification for a.c measurements. It has same accuracy for a.c and d.c measurements.

PART – C

(16 MARKS)

26. Classify and explain the different types of standards and measurement (Dec-03)

27. Discuss different types of errors in measurement. (Dec-03) (May/June 2010)

28. Discuss the basic characteristics of measuring device (May-05)

29. Define and explain the following (May-03) & MAY-2012

(i) Instrument errors (ii) Limiting errors (iii) Environmental errors

30. Explain any one bridge circuit for measurement of inductance (Dec-04)

31. Explain the method of measuring the insulating property of a capacitor by relevant bridge circuit (May-05)

32. Explain any one bridge circuit for the measurement of inductance. (Dec-2004)

33. Explain voltage sensitive self balancing bridge, and derive the bridge sensitivity of voltage sensitive bridge with fundamentals. (Dec-2007)

34. Define dynamic response of a system and explain characteristics of dynamic response (Nov-08)

35. What are the different types of calibration? Explain. (Apr/May-2004)

36. Describe the circuit of Kelvin's double bridge used for measurement of low resistance. Derive the conditions for balance (Dec-08) (May/June 2010)

37. Explain the working of moving iron instruments (Nov-08)

38. List the advantages of Rectifier type measuring systems and explain how ac and dc voltages can be measured. (Dec-08)

UNIT II

BASIC ELECTRONIC MEASUREMENTS

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes :- delayed time base oscilloscopes, analog and digital storage oscilloscope, sampling oscilloscope – Q meters – Vector meters – RF voltage and power measurements – True RMS meters.

PART – A

(1 MARK)

39. The principle of operation of Q-meter is based on:

(a) Self inductance (b) Mutual inductance (c) Series resonance (d) Parallel resonance

40. The following error does not result in moving iron instrument with both DC and AC:

(a) Stray magnetic field error (b) Hysteresis error (c) Eddy current error (d) Temperature error

41. A measure of the reproducibility of measurements is known as

(a) Accuracy (b) Fidelity (c) Precision (d) Resolution

42. The dielectric loss can be measured by

(a) Wien bridge (b) Moving coil meter (c) Moving iron meter (d) Electro-static meter

43. Resistance thermometer method of temperature measurement is normally used for temperature below

(a) 1100 °F only (b) 650 °F only (c) 300 °F only (d) 180 °F only

44. The lower limit for bridge-method of measurement is decided by

(a) The sensitivity of detector circuit (b) Resistance of connecting wires and contact resistances

(c) Resistance of the other-three known arms (d) None of these

45. Absolute instruments are those:

(a) Which give the magnitude of the quantity under measurement in terms of the physical constants of the instrument

(b) Which give the magnitude of the quantity being measured by observing the output indicated by the instrument

- (c) Which are calibrated by comparison with a secondary instrument
- (d) Which are very commonly used.

46. Damping of the ballistic galvanometer is kept very small

- (a) To make the system oscillating
- (b) In order to get first deflection small
- (c) Make the system critically damped
- (d) In order to get first deflection large.

47. The material used mostly in making standard resistor is

- (a) Constantine
- (b) Manganin
- (c) Nicrome
- (d) Gold cromium.

48. Which of the following is not a disadvantage LVDT

- (a) A LDVT is inherently low in power out
- (b) Relatively large displacements t required for appreciable differential output
- (c) They are sensitive to stray magnetic fid and vibration
- (d) All the above.

49. The potentiometer can be categorized* category of

- (a) Standard instruments
- (b) Indicating instruments
- (c) Comparison instruments
- (d) Calibrating instruments.

50. The input to an AC bridges is fed from:

- (a) An amplifier
- (b) Regulated power supply
- (c) Oscillator
- (d) DC Battery

51. The resolution of a DVM with 4 digit

- (a) 1/4
- (b) 1/10
- (c) 1/1000
- (d) 1%

52. Strain gauge is a passive transducer and is used for converting mechanical displacement into a change in:

- (a) Temperature
- (b) Resistance
- (c) Inductance
- (d) Capacitance

53. Schering bridge is used to

- (a) Determine dielectric loss
- (b) Determine the inductance
- (c) Measure mutual inductance
- (d) Measure low resistance

ANSWER:

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
c	c	c	D	a	b	a	d	b	D	c	c	c	b	a

PART-B

(2 MARKS)

54.Q Factor of coil.(Dec-03).(dec-2007)

The Q factor is defined as the ratio of power stored in the element to the power dissipated in the element. it is also defined as ratio of reactance to resistance of the reactive element.thus for coil it is defined as $Q=XI/R$.

55.What is Vector Voltmeter.

The voltmeter which is used to measure radio frequency (RF) voltage is called Vector Voltmeter. It is basically amplitude and phase measuring device. It uses two samplers to sample the two waves whose amplitude and relative phase are to be measured.

56.What t are the Main Parts of CRT?..(May-04)

The main parts of CRT are, i) Electron gun. ii) Deflection system, iii)Fluorescent screen ,iv) Glass tube ,v) Base.

57.What is Fluorescence?..(May/June 2010)

The material like phosphor converts electrical energy to light energy. Thus phosphor emits light when bombarded by the electrons. This emission of light due to excitation of phosphor is called Fluorescence.

58.What t is the Principle of dual beam oscilloscope?..(Dec-03)

It uses CRT with two separate electron guns generating two separate beams. Each beam has it's own vertical deflections plates. But the two beams are deflected horizontally by the common set of horizontal plates.

59.What is the principle of sampling oscilloscope?..(May/June 2010)

Using sampling procedure, high frequency signal is converted to the low frequency signal. Thus instead of monitoring the input signal continuously it is sampled at the regular intervals. These samples are presented on the screen in the form of dots. such samples are merged to reconstruct the input signal. The very high frequency more than 300 MHz performance can be achieved using sampling technique used in the sampling oscilloscope.

60.What t deflection system is required for dual beam oscilloscope?.

The Electrostatic deflection system is required in dual beam oscilloscope.

61.What are the two modes of operation in dual trace oscilloscope..(May-04)

1. Alternate Mode in which the electron switch alternately connects the vertical amplifier to the channel A and to the channel B.

2. Chop mode in which there is switching from one vertical channel to other many times during the sweep.

62. What are Lissajous figures?. On what factor shape of the figures depends?.

The various patterns obtained on C.R.O by applying simultaneously two different sine waves to horizontal and vertical deflection plates are called Lissajous figures. Their shapes depends on

- i) Amplitudes of two waves.
- ii) Phase difference between the two waves.
- iii) Ratio of frequencies of two waves.

63. List the Disadvantages of storage cathode ray tube..(dec-2007)

As long as image is required to be stored, the power must be supplied to the tube. The wave form can be preserved for finite amount of time only and eventually the waveform will be lost.

PART – C

(16 MARKS)

64. With a neat block diagram explain the function of a general purpose oscilloscope(May-04)(May/June 2010)

65. Write Brief notes on:

- a. Storage oscilloscope.
- B. Sampling oscilloscope

66. Briefly explain the operations of different types of storage oscilloscopes.(Dec-03)

67. Sketch the basic block diagram for a digital storage oscilloscope and explain the operation.(May-05)

68. With a neat block diagram, explain the working of vector voltmeter(May-05)

69. Explain the working of electronic multimeter with necessary diagrams.(May-03)

70. Explain the working of the following types of CRO (i) Dual trace oscilloscope (ii) Dual beam oscilloscope.(Dec-08)

71. Explain the functioning of a strip chart recorder and also the types of marking mechanisms.(Dec-08)

72. Explain the working of magnetic recorders and also explain how equalization technique is carried out in a magnetic recorder using direct recording(Dec-08)

73. Write in detail about Automation voltmeters(Dec-08)(May/June 2010)

74. Describe the operation of Power scope with a suitable diagram and mention its applications(Jun-09)

75. Explain how the Q-meter can be used for the measurement of Q-factor and effective Resistance and discuss the source of error(Dec-06)

UNIT III

SIGNAL GENERATORS AND ANALYZERS

Function generators – pulse and square wave generators, RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer :- digital spectrum analyzer, Vector Network Analyzer – Digital L,C,R measurements, Digital RLC meters.

PART – A

(1 MARK)

76. For measuring high value of capacitor and low value of inductor one will use

- (a) Series connection Q-meter
- (b) Parallel connection Q-meter
- (c) Direct connection Q-meter
- (d) All the above

77. A galvanometer can't be used for the measurement of

- (a) Measuring current and voltage of small magnitude
- (b) Determining the equality of two currents
- (c) Measuring the quantity of electricity or current impulse
- (d) Measuring the voltage impulse.

78. An instrument has sensitivity of 1000 ohm/volt. On the 100 volt scale, this instrument will have internal resistance of:

- (a) 10 ohms
- (b) 10,000 ohms
- (c) 100,000 ohms
- (d) 1000 ohms.

79. X and Y plates of a CRO are connected to unequal voltages of equal frequency with phase shift of 90°. The Lissajous figure on the screen will be

- (a) Circle
- (b) Straight line
- (c) Ellipse
- (d) Figure of eight

80. Which of the following is a null detection device?

- (a) Ballistic galvanometer (b) D'Arsonval galvanometer (c) Potentiometer (d) Ammeter.

81. AQUADAG is a

- (a) Non-conductive coating on the screen of a CRT to collect the high velocity electrons
(b) Non-conductive coating on the screen of a CRT to collect the secondary-emission electrons
(c) Conductive coating on the screen of a CRT to collect the low velocity electrons
(d) None of these

82. The dielectric loss of a capacitor can be measured by

- (a) Hay bridge (b) Schering bridge (c) Maxwell bridge (d) Anderson bridge

83. The ratio arm is used in bridge method of measurement basically

- (a) To speed up the response time for balancing
(b) To reduce the error due to the errors in known resistances
(c) To simplify the calculations
(d) To enhance the range of measurement.

84. The internal resistance of the ammeter should ideally be

- (a) Zero (b) Very large (c) Very small (d) Infinite.

85. Which bridge is used for measuring audio and H.F. oscillation?

- (a) Wein bridge (b) Maxwell bridge (c) Schering bridge (d) None of the above.

86. The essential requirement of a measuring instrument is :

- (a) That its resistance should be low
(b) That its introduction into the circuit under measurement does not alter the circuit conditions and the power consumed by it for its operation is small
(c) That its resistance should be infinite
(d) That it is always connected in series in the circuit.

87. Eddy current damping cannot be used for dynamometer type instruments because

- (a) The presence of a permanent magnet required for such purpose would affect the deflection and hence the reading of the instrument
(b) Eddy current will pass through the iron and thereby causing loss
(c) The size of the instrument will increase
(d) All of the above.

88. Low resistance is measured by

- (a) De Sauty's bridge (b) Maxwell's bridge (c) Kelvin's double bridge (d) Wien bridge

89. The colour of the spot on the screen of a CRO is a characteristic of :

- (a) Electron gun in a CRT
(b) The type of the waveform being observed
(c) The coating material on the screen
(d) The velocity of the electrons striking the screen

90. No eddy current and hysteresis losses occur in

- (a) Electro-static instruments (b) PMMC type instruments (c) Moving iron instruments
(d) Electrodynamometer instruments

ANSWER:

76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
a	d	c	a	b	c	b	b	a	a	b	a	c	c	a

PART-B

(2 MARKS)

91. What do you mean by heterodyne principle ? (May/June 2010) Basically heterodyning means mixing. The input signal is mixed or heterodyned with higher intermediate frequency (IF) with the help of a local oscillator. When the local oscillator is tuned, the frequency components of the signal get shifted into the pass band of amplifier. Then the output of the IF amplifier is applied to meter after rectifying it.

92. What is Harmonic distortion. (Dec-03)

If the signal of fundamental frequency f has the other frequency components present in it, which are multiples of fundamental frequency, such as $2f, 3f, \dots$ then it is called harmonic distortion. The additional frequency component

signals are called the harmonics. The component $2f$ is called second harmonic, $3f$ is called third harmonic and so on. The distortion of main signal waveform is an important effect of harmonics.

93. What are the drawbacks of tuned circuit analyzers?

At low frequencies, high values of L and C are required hence size becomes impractical.

Harmonics are very close in signal frequency hence difficult to distinguish.

94. What is real time spectrum analyzer? (Dec-2007)

The spectrum analyzer which presents the effect of changes in all the input frequency on its spectrum display is called real time spectrum analyzer.

95. Give the functions of an attenuator in a signal generator.

1. To control the output amplitude level.
2. To provide the stable output.
3. To reduce the power level of the signal by a fixed amount.

96. Define Rise time and Fall time of a pulse.

The Rise time of a pulse is defined as the time needed for the pulse to go from 10% to 90% of its amplitude. Similarly the fall time is the time for the trailing edge to go from 90% to 10% of its amplitude.

97. Write applications of spectrum analyzer. (Dec-03)

- i) Modulation measurement.
- ii) Harmonic distortion measurement.
- iii) Noise Measurement.

98. What is the use of distortion meter? (Dec-2007)

The application of purely sinusoidal input signal to an amplifier should result in purely sinusoidal at the output but practically it's not possible this is because of various types of distortion. Such a distortion due to inherent nature of amplifier.

99. What is known as window in FFT spectrum analyzer?

The input signal sampled for specified period of time is called window

100. Write any three applications of wave analyzer? (May/June 2010)

To carry out simple harmonic analysis

To measure signal energy with the well defined bandwidth

It can be used separately and display about 50 harmonics.

PART – C

(16 MARKS)

101. Describe a signal generator using feedback for amplitude modulation. (Dec-08)

102. What is frequency synthesizer and describe its types with circuits in detail. (Dec-08)

103. Describe the working of a spectrum analyzer with its basic circuit. (Dec-08)

104. Discuss any one – Wave analyzer in detail. (Dec-08)

105. Explain the functional block diagram of Function generator and mention its features. (Jun-09) (May/June 2010)

106. Explain with the help of block diagram, fundamental suppression distortion analyzer. Discuss its two modes of operation. (Jun-09)

107. With a block diagram explain operation of a heterodyne wave analyzer. (May-05)

108. Explain various applications of the spectrum analyzer. (May-03)

109. With the help of neat block explain the operation of a sweep frequency generator. (Dec-03)

110. How a spectrum analyzer can be used to operate and measure VHF? Draw the waveforms and Block diagram. (Dec-08) (May/June 2010)

UNIT IV

DIGITAL INSTRUMENTS

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – Automation in digital instruments, Automatic polarity indication, automatic ranging, automatic zeroing, fully automatic digital instruments, Computer controlled test systems, Virtual instruments.

111. The following detector is generally used in AC bridges for audio frequency range:

- (a) AC volt meter (b) C.R.O. (c) Headphones (d) Vibration galvanometer

112. For the measurement of very very high resistance (insulation resistance) the instrument used is

- (a) An avometer (b) A multimeter (c) A megger (d) An ohm meter

113. The temperature coefficient of resistance for thermistors is

- (a) Low and negative (b) Low and positive (c) High and negative (d) High and positive

114. Rectifier instruments indicate

- (a) R.m.s. value (b) Peak values (c) Average value (d) None of these.

115. The Lissajous pattern obtained on a CRO is used to determine:

- (a) Amplitude of applied signal (b) Current in a circuit (c) Phase shift and frequency (d) Distortion in a system

116. Number of significant figure in 0.130450 is

- (a) 7 (b) 5 (c) 3 (d) 6

117. Which of the following is a primary cell

- (a) Zinc-carbon dry cell (b) Lead-acid wet cell (c) Nickel-cadmium wet cell (d) None of these.

118. If two numbers A and B with relative errors of 3% to 4% are multiplied the relative error in the result would be

- (a) 4% - 3% (b) 4% x 3% (c) 4% + 3% (d) 4%/3% 1

119. Commonly used standard capacitor is

- (a) Concentric cylinder type (b) Parallel plate type (c) Concentric sphere type (d) None of the above.

120. DVM is the abbreviation for:

- (a) Digital vacuum meter (b) Digital volume meter (c) Digital voltmeter (d) Divider voltage meter

121. Which of the following is used to measure the leakage resistance of a capacitor ?

- (a) Megger (b) Schering bridge (c) Potentiometer (d) Loss of charge method

122. The necessary' conditions for balancing of AC bridges are

- (i) The product of the magnitude of the opposite arms must be equal
(ii) The sum of the phase angles of the opposite arm must be equal
(a) T,T (b) T,F (c) F,T (d) F,F

123. A voltmeter using a 50 μ A meter has a sensitivity of

- (a) 20 K Ω /V (b) 50 K Ω /V (c) 2000 Ω /V (d) 20M Ω /V.

124. Inductance is measured by

- (a) Wien bridge (b) Schering bridge (c) Maxwell's bridge (d) Owen bridge

125. If the voltmeter resistance is increased, the error in the reading:

- (a) Is independent of the voltmeter resistance
(b) Increases or decreases depending upon the value of the quantity being measured
(c) Increases (d) Decreases

ANSWER:

111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
c	c	c	a	c	d	a	c	a	c	b	a	a	c	d

PART-B

(2 MARKS)

126. What are the essential parts of the ramp type DVM? (dec-2007)

The essential parts of ramp type DVM are voltage to frequency converter and decade counting units along with ramp generator and oscillator.

127. What are the additional features found on individual digital multimeter?

In addition to the visual display the output from the digital multimeter can also be used to interface with some other equipments.

128. What are the advantages of digital instruments? (May-04)

Readings speed is very high due to digital display

They can be programmed and well suited for computerized control.

129. What are the principles of ramp type DVM? (May/June 2010)

Basic principles of such a measurement is based on the measurement of the time taken by a linear ramp to rise from zero volt to the level of the input voltage or decrease from the level of the input voltage to zero.

130. Why is period mode preferred for measurement of very low frequency in a frequency counter? (Dec-03). (dec-2007)

When the frequency to be measured is low, then the accuracy of the frequency counter decreases because with low frequency very less number of pulses get connected to the gating circuit. So it's more suitable to measure period than frequency.

131. What is the important of gate time in frequency counter? (May/June 2010)

Gating circuit consists of AND gate when the enable signal is provided to the AND gate. It allows a train of pulses to pass through the gate for the time period selected by the time base circuit. The pulses are counted and then the second pulse generated from the time base generator disables AND gate.

132. How is trigger time error reduced? (Dec-03)

The cross over frequency must be selected as \sqrt{f} for f is clock frequency of counter.

The accuracy of the measurement is the function of time since the lost calibration against the standard large amplitude signal and fast rise time minimized trigger level errors.

PART – C

(16 Marks)

133. Explain the various types of ADC with suitable sketches. (Dec07)

134. Discuss in detail the working of the successive approximation DVM. (May 03)

135. Explain with neat diagram the working of linear ramp type DVM. (Nov 07)

136. Draw and explain the circuit of digital frequency meter (May-04) (May/June 2010)

137. Discuss briefly various types of digital voltmeters. (May-05)

138. Explain the working of digital multimeter with a schematic block diagram. (Dec-04)

139. Explain universal counter with the help of block diagram.

140. Write note on measurement errors in frequency counter. (May-04)

141. Explain different techniques used for extending frequency measurement range. (May-04)

142. Explain the various guarding techniques. (Dec-06)

143. With a neat schematic, explain the operation of a dual slope analog to digital conversion. (Dec-06)

144. With a block schematic, explain the frequency mode and the frequency ratio mode operation of a frequency counter. (Dec-06) (May/June 2010)

145. What is meant by gating error in a frequency counter? How does it arise? Can it be eliminated? (Nov-06)

UNIT V

DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENT

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – data loggers – computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflectometer.

PART – A

(1 MARK)

146. A varactor is

- (a) A diode used as a variable capacitor
- (b) A diode used for high speed switching
- (c) A diode used as a variable inductor
- (d) A diode used as a variable resistor.

147. Schering bridge is used to measure:

- (a) Resistance
- (b) Frequency
- (c) Input voltage
- (d) Capacitance and its power-factor

148. The form factor in AC means the ratio of

- (a) Peak value to average value
- (b) Peak value to RMS value
- (c) R.M.S. value to average value
- (d) R.M.S. value to peak value

149. Siemens is a unit for measuring

- (a) Conductance
- (b) Resistance
- (c) Flux density
- (d) Electric field

150. A dual-trace CRO has

- (a) One-vertical and one horizontal amplifier
- (b) Two vertical and one horizontal amplifier
- (c) One vertical and two horizontal amplifier
- (d) Two vertical and two horizontal amplifiers.

151. Strain gauge is used :

- (a) To convert sound energy into electrical energy
- (b) To sense temperature
- (c) To convert electrical current into a mechanical displacement
- (d) To convert mechanical displacement into a change in resistance.

152. The difference between the indicated value and true value of a quantity is known as

- (a) Relative error (b) Absolute error
- (c) Gross error (d) Dynamic error

153. Damping force is one:

- (a) Which causes the moving system of the instrument to move from its zero position
- (b) Which opposes the deflecting force and increases with the deflection of the system
- (c) Which acts on the moving system of the instrument only when it is moving and always opposes its motion
- (d) Without which the deflection of the moving system would be indefinite.

154. A CRO can display

- (a) AC signals (b) DC signals(c) Both AC and DC signals(d) Time-invariant signals

155. For very high resistance (insulation resistance) measurement, the instrument used is:

- (a) Multimeter (b) Potentiometer(c) Wheatstone bridge (d) Megger

156. To determine the voltage polarity across a resistor we have to know:

- (a) The battery voltage(b) The value of the resistor(c) The temperature of the resistor
- (d) The direction of the current

157. High quality factor (Q) of an inductor can be measured by:

- (a) Hay's bridge (b) Anderson bridge(c) Wien bridge (d) Schering bridge

158. The rating of a battery is given by:

- (a) KW (b) KVA(c) Ampere-hours (d) VARh

159. A general thermocouple instrument cannot be described with the feature of

- (a) High sensitivity(b) Absence of frequency errors
- (c) Dependence on ambient temperatures(d) Small power loss.

160. Which of the following statement is true ?

- (a) A galvanometer with low resistance in parallel is a voltmeter
- (b) A galvanometer with low resistance in series is an ammeter
- (c) A galvanometer with high resistance in series is an ammeter
- (d) A galvanometer with high resistance in parallel is a voltmeter.

ANSWER:

146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
a	d	c	a	a	d	d	C	c	d	d	d	a	c	d

PART-B

(2 MARKS)

161. Mention the term used to specify the characteristics of an instrumentation amplifier?(Dec-03)

The characteristics of an instrumentation amplifier are explain in terms of differential input capability with high gain common mode rejection.

162. List any four important features of instrumentation amplifier?(May/June 2010)

High gain stability ,lowteamperature co-efficient ,low output impedance, low DC offset output voltage.

163. What are the three basic requirements for a computer operated test system?.(dec-2007)

It must be flexible also the expansion facility for the feature requirement must be provided by it. It must be reliable and should have a down time grater than 0.1%.it must use all the data efficiently to inform the operators about the state of the plant.

164. Give any two applications of micro processor based measurement.(Dec-03)

I/O controllers ,communication interface ,programmable calculators and data acquisition system

165. What are the requirement of an automatic test system?(May/June 2010)

The accuracy and precision required ,number of electronic circuits to be tested over certain time period ,the method of recording the result of test conducted and the electronic circuits.

166. Write any two instrument used in computer controlled instrumentation.

Modified frequency counter, spectrum analyzer ,synthesized signal generator.

167. What are the various instrument used in computer controlled instrumentation?

Remove mechanical element ,increases reliability ,increases the speed of attenuator.

168. What is meant by IEEE 488 system?(Dec-03).(May-04)

Talkers , listeners, controllers

169. Mention the single line message for interface function in IEEE488 bus system.

Interface clear, attention line ,remote enable , service request.

DATA BYTE TRANSFER LINES: data valid , not ready for data, not data accepted

PART – C

(16 MARKS)

170. How signal is transmitted in a microprocessor based measurement.(May-03)

171. Explain in detail the computer controlled measurement system for (Dec-03)

a. testing an radio amplifier.

b. testing a radio receiver

172. Write a note on

c. digital control

d. Microprocessor based instrumentation

173. Explain with block diagram the automatic test system to analyses an audio amplifier and radio receiver.(May-04)(May/June 2010)

174. Explain the sequence of operation in case of IEEE 488 bus Withit's schematic diagram.

175. Mention it's salient features.(Dec-06)

176. What are the objectives of data acquisition system?(May-05)

177. With the help of block diagram explain the basic components in analog and digital acquisition system(Jun-09)

178 . Explain the various management lines and data byte transfer lines of GPIB.(Nov-06)

179. What are the various techniques of multiplexing? Discuss any one in detail?(Dec-06)

180. Explain the generalized block schematic of a Digital Data Acquisition system and list out it's advantages over analog data acquisition system.(Dec-06)

181. Explain the optical time domain reflectometer.(Dec08)(May/June 2010)

182. Howthw frequency counter be modified for operation of IEEE 488 bus

183. Explain the different types of optical encoders. (Dec 07)