Electrical and Electronics Measurement Mcq Pdf

1. Deflection methods of direct measurements are most widely used as these are

(a) most simple.

(b) most accurate.

(c) least time consuming.

(d) most simple and least time consuming.

Answer: (d) most simple and least time consuming.

2. Comparison methods are used

(a) because these are most simple.

(b) because these are inexpensive.

(c) because these take least time in measurement.

(d) when a high accuracy of measurement is required.

Answer: (d) when a high accuracy of measurement is required.

3. The main advantage of the null balance technique of measurement is that

(a) it does not load the medium.

(b) it gives a centre zero value at its input.

(c) it gives quick measurement.

(d) it is not affected by temperature variation.

Answer: (a) it does not load the medium.

4. Consider the following statements in connection with deflection and null type instruments:

1. Null type instrument is more accurate than the deflection type one.

2. Null type of instrument can be highly sensitive as compared with deflection type instrument.

3. Under dynamic conditions, null type instrument is not preferred to deflection type instrument.

4. Response is faster in null type instrument as compared to deflection type instrument.

Which of these statements are correct?

(a) 1, 2 and 3 only.

(b) 1, 2 and 4 only.

(c) 2, 3 and 4 only.

(d) 1, 2, 3 and 4.

Answer: (a) 1, 2 and 3 only.

5. The region between the limits within which a quantity is measured received or transmitted, expressed by stating the lower and upper limits is called the

(a) range.

(b) span.

(c) range limit.

(d) none of these.

Answer: (a) range.

6. The span of a zero-centered voltmeter having a scale from -10 V to + 10 V is

(a) 0 V

(b) - 10 V

(c) 10 V

(d) 20 V

Answer: (d) 20 V

7. If two meters X and Y require 40 mA and 50 mA respectively, to give full scale deflection, then

(a) X is more sensitive.

(b) Y is more sensitive.

(c) both X and Y are equally sensitive.

(d) it would not be possible to assess the sensitivity on the basis of the given data.

Answer: (a) X is more sensitive.

8. A meter having a sensitivity of 2 kΩ/V is used for the measurement of voltage across a circuit having an output resistance of 1 KΩ and an open circuit voltage of 8 V. What is the reading of the meter at its 10 V scale ?

(a) 5.72 V

(b) 6.51 V

(c) 7.62 V

(d) 7.91 V

Answer: (c) 7.62 V

9. The smallest change in a measured variable to which an instrument will respond is

(a) accuracy.

(b) resolution.

(c) precision.

(d) sensitivity.

Answer: (b) resolution.

10. Resolution of an instrument is

(a) the minimum quantity it can measure.

(b) the maximum quantity it can measure.

(c) the maximum nonlinearity.

(d) ability to distinguish polarity.

Answer: (a) the minimum quantity it can measure.

11. Hysteresis in an instrument means

(a) the change in same reading when input is first increased and then reduced.

(b) the reliability of the instrument.

(c) the repeatability of the instrument.

(d) the inaccuracy due to change in temperature.

Answer: (a) the change in same reading when input is first increased and then reduced.

12. The static error band of an instrument implies the

(a) accuracy of the instrument.

(b) irrepeatability of the instrument.

(c) error caused when the pen is stopped at some deflection.

(d) error introduced in low varying inputs.

Answer: (c) error caused when the pen is stopped at some deflection.

13. The static error band of an instrument does not include

(a) nonlinearity.

(b) electrical drift.

(c) hysteresis in the instrument.

(d) none of the above.

Answer: (b) electrical drift.

14. The fact as to how closely the instrument reading follows the measured variables is called the

(a) accuracy.

(b) precision.

(c) fidelity.

(d) sensitivity.

Answer: (c) fidelity.

15. An higher scale ammeter is used to measure too low current. The measurement would have low

(a) precision.

(b) accuracy.

(c) resolution.

(d) all of these.

Answer: (d) all of these.

16. Thermal zero-shift in an instrument refers to

(a) maximum variation in pen zero due to temperature variation.

(b) inaccuracy in measurement due to temperature variation.

(c) shift in zero adjustment due to expansion of springs due to temperature variation.

(d) none of the above.

Answer: (a) maximum variation in pen zero due to temperature variation.

17. In which part of the scale does the pointer indicate most accurately?

(a) In the first third of the scale.

(b) In the first half of the scale.

(c) In about middle of the scale.

(d) In the last third of the scale.

Answer: (c) In about middle of the scale.

18. When reading is taken at half scale in the instrument, the error is

(a) exactly equal to half of full-scale error.

(b) equal to full-scale error.

(c) less than full-scale error.

(d) more than full-scale error.

Answer: (c) less than full-scale error.

19. The reliability of a measuring instrument means

(a) the life of the instrument.

(b) the extent over which the characteristics remain linear.

(c) degree to which repeatability continues to remain within specified limits.

(d) all of these.

Answer: (b) the extent over which the characteristics remain linear.

20. Undesirable characteristics of a measurement system are

(a) accuracy and repeatability.

(b) static error.

(c) drift and dead zone.

(d) both (b) and (c).

Answer: (d) both (b) and (c).

21. The efficiency of an instrument is defined as the ratio of the measured quantity at full scale to the power taken by the instrument at

(a) one-fourth scale.

(c) three-fourth scale.

(b) half scale.

(d) full scale.

Answer: (d) full scale.

22. Dead time of the instrument is

(a) the time required by an instrument to begin to respond to a change in the measurand.

(b) the time required by an instrument to warm up initially.

(c) the largest change of input quantity for which there is no output of the instrument.

(d) none of the above.

Answer: (a) the time required by an instrument to begin to respond to a change in the measurand.

23. Dead zone of an instrument is

(a) the time required by an instrument to warm up initially.

(b) the largest change of input quantity for which there is no output of the instrument.

(c) the time required by an instrument to begin to respond to a change in measurand.

(d) the unmeasured quantity which exceeds the maximum range of the instrument.

(e) none of the above.

Answer: (b) the largest change of input quantity for which there is no output of the instrument.

24. Torque/weight ratio of an instrument indicates

(a) selectivity.

(b) accuracy.

(c) fidelity

(d) sensitivity.

Answer: (d) sensitivity.

25. Which of the following statements is true for a measuring instrument ?

(a) If it is precise, it is accurate.

(b) If it is linear, it is sensitive.

(c) If it has a digital display, it is accurate.

(d) If it uses null balance technique, it has a high input impedance.

Answer: (d) If it uses null balance technique, it has a high input impedance.

26. A first order instrument is characterized by

(a) time constant only.

(b) static sensitivity and time constant.

(c) static sensitivity and damping coefficient.

(d) static sensitivity, damping coefficient and natural frequency of oscillations.

Answer: (b) static sensitivity and time constant.

27. An indicating instrument is more sensitive if its torque to weight ratio is

(a) much larger than unity.

(b) of the order of unity.

(c) much less than unity.

(d) made deflection dependent.

Answer: (a) much larger than unity.

28. Which one of the following decides the time of response of an indicating instrument ?

(a) Deflecting system.

(b) Controlling system.

(c) Damping system.

(d) Pivot and jewel bearings.

Answer: (c) Damping system.

29. The difference between the indicated value and the true value of a quantity is

(a) gross error.

(b) absolute error.

(c) dynamic error.

(d) relative error.

Answer: (b) absolute error.

30. The errors introduced by an instrument fall in which category ?

(a) Systematic errors.

(b) Random errors.

(c) Gross errors.

(d) Environmental errors.

Answer: (a) Systematic errors.

31. To measure 5 volts, if one selects a 0 - 100 V range voltmeter which is accurate within ±1%, then the error in this measurement may be up to

(a) ±1.5%

(b) ±2.5%

(c) ±7.5%

(d) ±20%

Answer: (d) ±20%

32. A 0 - 100 V voltmeter has an accuracy of 1 per cent at full-scale reading. What will be the error if it reads 50 V?

(a) 1 per cent.

(b) 2 per cent.

(c) 0.5 per cent.

(d) 4 per cent.

Answer: (b) 2 per cent.

33. A 0 - 250 V voltmeter has a guaranteed accuracy of 2 per cent of full-scale reading. The voltage measured by this voltmeter is 150 volts. The limiting error in percentage is

(a) 2.5%

(b) 0.05%

(c) 3.33%

(d) 5.0%

Answer: (c) 3.33%

34. A 0 - 25 Amp ammeter has a guaranteed accuracy of 1 per cent of full-scale reading. The current measured by this ammeter is 10 Amp. The limiting error in percentage for this instrument is

(a) 2.5%

(b) 0.5%

(c) 0.25%

(d) 0.025%

Answer: (a) 2.5%

35. A 0 to 300 V voltmeter has an error of ±2% of full scale deflection. What is the range of readings if true voltage is 30 V?

(a) 24 V - 36 V

(b) 20 V - 40 V

(c) 29.4 V - 30.6 V

(d) 20 V - 30 V

Answer: (a) 24 V - 36 V

36. The pressure in a tank varies from 20 psi to 100 psi. Further pressure in the tank is desired to be kept at 50 psi. The full-scale error when pressure inside the tank is 30 psi, is given by

(a) - 62.5%

(b) 25%

(c) 80%

(d) - 2.5%

Answer: (a) - 62.5%

37. The measured value of a capacitor is 205.5 pF whereas its true value is 202.4 pF The relative error is

(a) 1.87%

(b) 1.94%

(c) 1.53%

(d) 1.73%

Answer: (c) 1.53%

38. A standard cell of 1.085 volts used with a simple potentiometer balances at 50 cm. The percentage error in the voltmeter which balances at 60 cm when reading **1.2 V is**

(a) 1.8 % low.

(b) 3.6 % low.

(c) 1.8 % high.

(d) 3.6 % high.

Answer: (a) 1.8 % low.

39. A 150 V moving iron voltmeter of accuracy class 1.0 reads 75 V when used in a circuit under standard conditions. The maximum possible percentage error in the reading is

(a) 0.5.

(b) 1.0.

(c) 2.0.

(d) 4.0.

Answer: (c) 2.0.

40. A thermometer is calibrated from 150° to 200°C. The accuracy specified is ± 0.25%. The maximum static error in measurement is

(a) ± 0.5°C.

(b) 0.375°C.

(c) ± 0.125°C.

(d) ± 0.0125°C.

Answer: (c) ± 0.125°C.

41. A. Wheatstone bridge requires a change of 6 Ω in the unknown arm of the bridge to produce a change in deflection of 3 mm of the galvanometer. The sensitivity of the instrument is

(a) 0.5%

(b) 2%

(c) 0.5 mm /Ω

(d) 2 Ω/mm

Answer: (c) 0.5 mm /Ω

42. Threshold of sensitivity in reference to instruments is

(a) the smallest signal that causes detectable output.

(b) the largest signal which can be measured.

(c) the value of sensitivity on the highest scale.

(d) the value of sensitivity on the lowest scale.

Answer: (a) the smallest signal that causes detectable output.

43. Sensitivity in accuracy of a recording instrument means the

(a) degree to which the instrument is not sensitive enough to repeat readings.

(b) maximum error in sensitivity displayed by a pen.

(c) smallest signal required to give detectable output.

(d) amount of input needed to give unit pen deflection.

Answer: (b) maximum error in sensitivity displayed by a pen.

44. Sensitivity of a voltmeter is given as

(a) Ω/V

(b) reciprocal of full-scale deflection current.

(c) both (a) and (b).

(d) none of these.

Answer: (c) both (a) and (b).

45. Accuracy is defined as the

(a) measure of the consistency or reproducibility of the measurement.

(b) closeness with which an instrument reading approaches the true value of the quantity being measured.

(c) smallest measurable input change.

(d) ratio of the change in output signal of an instrument to a change in the input.

Answer: (b) closeness with which an instrument reading approaches the true value of the quantity being measured.

46. The degree of reproducibility among several independent measurements of same true value under reference conditions is known as

(a) accuracy.

(b) precision.

(c) linearity.

(d) calibration.

Answer: (b) precision.

47. Which one of the following statements is not correct ?

(a) It is not possible to have precise measurements which are not accurate.

(b) Correctness in measurements requires both accuracy and precision.

(c) Reproducibility and consistency are expressions that best describe precision in measurements.

(d) An instrument with 2% accuracy is better than another with 5% accuracy.

Answer: (a) It is not possible to have precise measurements which are not accurate.

48. A resistance of 105 ohms is specified using significant figures as indicated below :

1. 105 ohms

2. 105.0 ohms

3. 0.000105 MΩ

Among these

(a) 1 represents greater precision than 2 and 3.

(b) 2 represents greater precision but 1 and 3 represent same precision.

(c) 2 and 3 represent greater precision than 1.

(d) 1, 2 and 3 represent same precision.

Answer: (b) 2 represents greater precision but 1 and 3 represent same precision.

49. A resistance of 108 Ω is specified using significant figures as indicated below:

1. 108 Ω

2. 108.0 Ω

3. 0.000108 MΩ

Among these

(a) 1 represents greater precision than 2 and 3.

(b) 2 represents greater precision but 1 and 3 represent same precision.

(c) 2 and 3 represent greater precision than 1.

(d) 1, 2 and 3 represent the same precision.

Answer: (b) 2 represents greater precision but 1 and 3 represent same precision.

50. The value of a quantity and its uncertainty are given as 26455 ± 3754 without rounding off. Only two significant digits are relevant for error. Value of error rounded off to two significant figures is

(a) 26500 ± 3800

(b) 26400 ± 3800

(c) 26460 ± 3750

(d) 26400 ± 3700

Answer: (a) 26500 ± 3800

51. Which one of the following statements is correct ? The application of the instrument in wrong manner in the procedure of measurement results in a/an

(a) systematic error.

(b) random error.

(c) gross error.

(d) instrument error.

Answer: (c) gross error.

52. What are the causes of gross error in the instruments?

1. Misreading of instruments.

2. Incorrect adjustment of instruments.

3. Errors due to defective instrument.

4. Errors due to effect of environment on the instrument.

(a) 1 and 2.

(b) 2 and 3.

(c) 3 and 1.

(d) 2 and 1.

Answer: (a) 1 and 2.

53. Systematic errors are

(a) instrumental errors.

(b) environmental errors.

(c) observational errors.

(d) all of the above.

Answer: (d) all of the above.

54. Consider the following:

1. Human errors.

2. Improper application of instruments.

3. Error due to worn parts of an instrument.

4. Errors due to effects of environment.

Which of the above come under the type of systematic errors?

(a) 1 and 2.

(b) 2 and 3.

(c) 3 and 4.

(d) 1 and 4.

Answer: (c) 3 and 4.

55. Which of the following types of errors come under systematic errors?

1. Irregular spring tension.

2. Improper readings of an instrument.

3. Loading effects.

4. Error due to the presence of electric field or magnetic field.

(a) 1 and 2.

(b) 2 and 3.

(c) 3 and 1.

(d) 4 and 1.

Answer: (c) 3 and 1.

56. Which one of the following statements correctly represents the systematic error ?

(a) These errors can be calculated from the details of the instruments.

(b) These are the residual errors.

(c) These errors may occur under controlled conditions. (d) These are the errors committed by the experimenters.

Answer: (a) These errors can be calculated from the details of the instruments.

57. A set of observations has a wide range so it has

(a) low accuracy.

(b) low precision.

(c) high accuracy but low precision.

(d) high precision but low accuracy.

Answer: (b) low precision.

58. Two capacitances, $C_1 = 150 \pm 2.4\ \mu F$ and $C_2 = 120 \pm 1.5\ \mu F$ are connected in parallel. What is the limiting error of the resultant capacitance C ?

(a) 0.9 µF

(b) 1.95 µF

(c) 3.9 µF

(d) 4.8 µF

Answer: (c) 3.9 µF

59. A zero mean random signal is uniformly distributed between limits -a and +a and its mean square value is equal to its variance. Then the rms value of the signal is

(a) a÷√3

(b) a÷√2

(c) a√2

(d) a√3

Answer: (a) a÷√3

60. The voltage of a standard cell is monitored daily over a period of one year. The mean value of voltage for every month shows a standard deviation of 0.1 mV. The standard deviation of the set constituted by the monthly mean values will be

(a) zero

(b) 0.1/12

(c) 0.1/√12

(d) 0.1

Answer: (c) 0.1/√12

61. The units whose size cannot be chosen independently are called

(a) absolute unit.

(b) fundamental unit.

(c) derived unit.

(d) auxiliary fundamental unit.

Answer: (c) derived unit.

62. What is the prefix tera equivalent to ?

(a) 10^3

(b) 10^6

(c) 10^9

(d) 10^{12}

Answer: (d) 10^{12}

63. A coherent system of units is to be evolved which has N kinds of quantities to evaluate and M independent physical equations expressing relationship between them, we can independently choose the sizes of

(a) N + M quantities.

(b) N quantities.

(c) M quantities.

(d) N - M quantities.

Answer: (d) N - M quantities.

64. Identify the one which is not a fundamental unit in SI system.

(a) Ampere.

(b) Kelvin.

(c) Metre.

(d) Joule.

Answer: (d) Joule.

65. For defining the standard metre, wavelength of which material is considered ?

(a) Neon.

(b) Krypton.

(c) Helium.

(d) Xenon.

Answer: (b) Krypton.

66. What is the unit of measurement of surface / sheet resistivity ?

(a) ohm / metre.

(b) ohm-metre.

(c) ohm / sq. metre.

(d) ohm.

Answer: (c) ohm / sq. metre.

67. The quantity $1 \div \sqrt{(\varepsilon_o \mu_o)}$ in SI units has the

(a) value of 330 m/s.

(b) value 1.73×10^4.

(c) dimensions LT^{-1}.

(d) None of the above.

Answer: (c) dimensions LT^{-1}.

68. Which of the following does not have the same units as the others? The symbols have their usual meanings.

(a) R÷L

(b) RC

(c) √(LC)

(d) 1÷√(LC)

Answer: (d) 1÷√(LC)

69. If the practical units of voltage and current were each made 20 times as large as they are at present, what would be the consequent alteration in the size of the unit of capacitance ?

(a) 200 times.

(b) 60 times.

(c) 20 times

(d) nil.

Answer: (d) nil.

70. In the SI system, the dimension of emf is

(a) $ML^3T^{-3}I$

(b) $ML^3T^{-3}I^{-1}$

(c) $ML^2T^{-3}I^{-1}$

(d) $M^{-1}L^2T^3I$

Answer: (c) $ML^2T^{-3}I^{-1}$

71. A circuit draws a current of I when a single phase ac voltage V is applied to it. If the power factor is cosφ, then the dimensions of VIcosφ would be

(a) ML^3T^{-2}

(b) ML^2T^3

(c) ML^3T^3

(d) ML^2T^{-3}

Answer: (d) ML^2T^{-3}

72. The dimensional equation of resistance is

(a) $L^2MT^{-2}I^{-4}$

(b) $L^2MT^{-2}I^{-2}$

(c) $L^2M^2T^{-3}I^{-2}$

(d) $L^2MT^{-3}I^{-2}$

Answer: (d) $L^2MT^{-3}I^{-2}$

73. The absolute measurement of resistance involves the measurement of

(a) length and time.

(b) length and mass.

(c) velocity.

(d) acceleration.

(e) either (a) or (c).

Answer: (e) either (a) or (c).

74. Consider the following statements. The absolute value of current can be measured by

1. dynamometer type moving coil ammeters.

2. tangent galvanometers.

3. current balance instruments.

Of these statements

(a) 1, 2 and 3 are correct.

(b) 1 and 2 are correct.

(c) 1 and 3 are correct.

(d) 2 and 3 are correct.

Answer: (d) 2 and 3 are correct.

75. What precaution(s) is/are required for absolute measurement of current by Rayleigh current balance ?

1. Precision balance of special form must be used for the accuracy of measurement.

2. The flexible leads, used for taking current into the moving coil, must not exert appreciable torque upon the moving system.

Select the correct answer using the code given below :

(a) 1 only.

(b) 2 only.

(c) Both 1 and 2.

(d) Neither 1 nor 2.

Answer: (c) Both 1 and 2.

76. The most stable primary atomic standard for frequency is

(a) hydrogen maser standard.

(b) ceasium beam standard.

(c) quartz standard.

(d) rubidium standard.

Answer: (a) hydrogen maser standard.

77. The modern standard of time is

(a) a second defined as 1/86,400 of a mean solar day.

(b) a second defined as time constant of an RC series circuit having R =2 MΩ, C= 500 pF.

(c) A second which is duration of 9192631770 periods of radiation corresponding to the transition between the two hyperfine levels of the fundamental state of atom cesium 133.

(d) a second defined as 1/31556925.9747 of the time required by the earth to orbit the Sun in the year 1900

Answer: (c) A second which is duration of 9192631770 periods of radiation corresponding to the transition between the two hyperfine levels of the fundamental state of atom cesium 133.

78. For time and frequency, the working standard is

(a) microwave oscillator.

(b) crystal controlled oscillator.

(c) LASER.

(d) a RF oscillator.

Answer: (b) crystal controlled oscillator.

79. Which of the following is/are primary standard(s) for voltage maintained by National Standards Laboratories ?

1 . Zener diode with 1.5 V output at 20°C.

2. Nickel cadmium rechargeable cell of 1.25 V output at 20°C.

Select the correct answer using the code given below

(a) 1 only.

(b) 2 only.

(c) Both 1 and 2.

(d) Neither 1 nor 2.

Answer: (c) Both 1 and 2.

80. Standard cell

(a) will have precise and accurate constant voltage when current drawn from it is few microamperes only.

(b) will have precise and accurate constant voltage when few milliamperes are drawn from it.

(c) will continue to have constant voltage irrespective of loading conditions.

(c) can supply voltages up to 10 V.

Answer: (a) will have precise and accurate constant voltage when current drawn from it is few microamperes only.

81. The emf of a saturated Weston cell drops by increase in temperature at a rate

(a) 40 mV/°C

(b) 4 mV/°C

(c) 40 µV/°C

(d) 4 µV/°C

Answer: (c) 40 µV/°C

82. The internal resistance of a standard Weston cell is of the order of

(a) a few ohms.

(b) a few hundred ohms.

(c) a few thousand of ohms.

(d) a fraction of an ohm.

Answer: (d) a fraction of an ohm.

83. The materials to be used in the manufacture of a standard resistance should be of

(a) high resistivity and low temperature coefficient.

(b) low resistivity.

(c) high temperature coefficient.

(d) low resistivity and high temperature coefficient.

Answer: (a) high resistivity and low temperature coefficient.

84. In resistors two wires side by side in opposite directions are wound in order to

(a) give high mechanical strength.

(b) make it more stable.

(c) reduce the coil inductance.

(d) increase the resistance.

Answer: (c) reduce the coil inductance.

85. Which one of the following techniques reduces the residual inductance of standard resistance ?

(a) Using high resistivity material.

(b) Using material of low temperature coefficient of resistance.

(c) Using proper shielding.

(d) Making a bifilar winding on a card.

Answer: (d) Making a bifilar winding on a card.

86. Wire-wound resistors are unsuitable for use at high frequencies because

(a) they are likely to melt under excessive eddy current.

(b) they exhibit unwanted inductive and capacitive effects.

(c) they create more electrical noise.

(d) they consume more power.

Answer: (b) they exhibit unwanted inductive and capacitive effects.

87. If R, L and C are the parameters of a resistor, what is the condition for the resistor to be non-inductive ?

(a) $L = CR$

(b) $L = CR^2$

(c) $C = LR^2$

(d) $C = R/L$

Answer: (b) $L = CR^2$

88. The resistance element having least resistance temperature coefficient is

(a) nickel.

(b) platinum.

(c) manganese.

(d) alumel.

Answer: (c) manganese.

89. Which one of the following passive components has the most precise and accurate standard ?

(a) Resistance.

(b) Inductance.

(c) Capacitance.

(d) Conductance.

Answer: (a) Resistance.