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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
A

M.Sc (Electronics) Third Semester, Examination, February/March-2022
ELC-304(N)
Electronic Instrumentation and Measurements

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

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1. Precision of an instrument is defined as:
   (A) Closeness of output to the true value
   (B) Change in output for every change in input
   (C) Degree of freedom from random errors
   (D) Both (A) and (B)
2. An instrument with high precision implies:
   (A) High accuracy
   (B) Low accuracy
   (C) Does not imply anything about measurement accuracy
   (D) None of these
3. Low accuracy measurements from a high precision instrument are normally caused by:
   (A) Bias in the measurement
   (B) Human errors
   (C) Instrumental defect
   (D) Low temperature
4. For an instrument the degree of repeatability or reproducibility in measurements is an alternative way of expressing its:
   (A) Precision
   (B) Accuracy
   (C) Sensitivity
   (D) Linearity
5. Range of an instrument defines:
   (A) Minimum value of quantity that the instrument is designed to measure
   (B) Maximum value of quantity that the instrument is designed to measure
   (C) Both minimum and maximum value of quantity that the instrument is designed to measure
   (D) None of these

6. A voltmeter of 0 to 250 V has an error of $\pm 1\%$ of full scale deflection. If the true voltage of voltmeter is 25 V then the range of its reading is:

(A) 22.5 V – 27.5 V

(B) 27.5 V – 29.5 V

(C) 24 V – 26 V

(D) 25.5 V – 26.5 V

7. Considering cost of instruments, which is a better choice, active or passive?

(A) Active instruments

(B) Passive instruments

(C) Cost of both active and passive instruments are approximately same

(D) None of these

8. In dead weight gauge, weights are added on the top of piston until the piston reaches a datum level. The datum level is known as:

(A) Null point, where the downward force balances the fluid pressure

(B) Lowest point of the container

(C) Highest level of fluid in the container

(D) None of these

9. The accuracy of the deflection type instruments and of the null type instruments depends on:

(A) Linearity, calibration or spring

(B) Calibration of spring, Linearity and calibration of weights

(C) Linearity and calibration of spring, calibration of weights

(D) Both depends on calibration of weight

10. In terms of usage, deflection type instruments are:

(A) More convenient than null type instrument

(B) Less convenient than null type instruments

(C) Both are equally convenient

(D) None of these

11. The output of an analogue instrument varies:

(A) Continuously and can have an infinite number of values within its range of instruments

(B) In discrete steps and can have an infinite number of values within its range of instruments

(C) Continuously and can have an finite number of values within its range of instruments

(D) In discrete steps and can have an infinite number of values within its range of instruments

12. To read and record a measurement, the indicating type instrument:

(A) Always requires human intervention

(B) Does not requires human intervention

(C) Requires human intervention only when the instrument consist of a rotating pointer moving against a scale

(D) Requires human intervention only when the instrument consists of a rotating scale moving against a pointer

13. Accuracy of a measuring instrument indicates the:

(A) Closeness of the output reading to the true value

(B) Ratio of output value to the input value

(C) Change in output with each change in input

(D) Degree of freedom from random errors

14. If a pressure gauge of range 0-10 bar has a quoted inaccuracy of $\pm 1.0\%$ of full scale reading, then it means.

(A) Minimum expected error in any reading is 0.1 bar

(B) Maximum expected error in any reading is 0.1 bar

(C) Maximum expected error in any reading is 1 bar

(D) Minimum expected error in any reading is 1 bar

15. Accuracy of DVM is specified as:

(A) Percentage of the actual reading.

(B) Percentage of the full-scale reading.

(C) Number of least significant digits

(D) All of these.

16. The following statements are related to a DVM. Which of them in true?

(A) Common mode rejection is the same for ac and dc voltage.

(B) Its accuracy depends on source impedance.

(C) It does not have series mode error.

(D) Use of shunts for dc current measurements increases its accuracy.

17. The circuit generally used in digital instruments to convert sine waves into rectangular pulses is a:

(A) Sawtooth generator

(B) Differential amplifier

(C) Sample and hold circuit

(D) Schmitt trigger

18. Which one of the following decides the precision of integrating digital voltmeter?

(A) Reference voltage of analog comparator.

(B) Slope of the generated ramp

(C) Width of the generated pulses.

(D) Electronic counter.

19. Which one of the following is not true of digital instruments?

(A) Loading of the circuit under measurement is less.

(B) Accuracy is better.

(C) Free from observational errors.

(D) Can present the reading in overall context of range.

20. The conversion of a voltage value to a time interval is carried out by comparing the unknown voltage with a voltage ramp in a:

(A) Ramp type DVM.

(B) Integrating type DVM.

(C) Continuous type DVM.

(D) Successive approximation type DVM.

21. An integrating DVM measures:

(A) Peak value of input voltage.

(B) Rms value of input voltage.

(C) True average of the input voltage.

(D) Variance of the input voltage.

22. The precision of a ramp type digital voltmeter depends on:

(A) Frequency of the generator and slope of the ramp.

(B) Frequency of the generator

(C) Slope of the ramp.

(D) Switching time of the gate.

23. Which one of the following digital voltmeters is most suitable to eliminate the effect of period noise?

(A) Ramp type digital voltmeter.

(B) Integrating type digital voltmeter.

(C) Successive approximation type digital voltmeter.

(D) Servo type digital voltmeter.

24. A DVM has:

(A) No auto ranging facility and no overload protection.

(B) A resolution of 1 part in 10^6.

(C) An input resistance of 1 MΩ and an input capacitance of 1μF

(D) An accuracy of about $\pm$ 2%

25. To eliminate 50 Hz pick-up in a dual slope DVM, the minimum period of integration of the input signal is:

(A) 1 ms

(B) 20 ms

(C) 1 s

(D) 100 s

26. In a digital voltmeter, 'over-ranging' implies that:

(A) The next four digits are switched- on.

(B) ½ digit is switched off.

(C) ½ digit is switched on.

(D) An over-range indicator starts glowing.

27. Deflection methods of direct measurement are most widely used as these are:

(A) Most simple

(B) Most accurate

(C) Least time consuming.

(D) Most simple and least time consuming.

28. 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.

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

(A) It does not load the medium.

(B) It gives a center zero value as its input.

(C) Ig gives quick measurement.

(D) It is not affected by temperature variation.

30. 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

31. 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

32. 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.

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

(A) Accuracy

(B) Resolution.

(C) Precision.

(D) Sensitivity.

34. 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.

35. 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

36. 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.

37. 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.

38. 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.

39. 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.

40. 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 continue to remain within specified limits.

(D) All of these.

41. What is the main advantage of using a digital storage oscilloscope?

(A) Uses digital storage

(B) Uses analog storage

(C) Uses mixed mode storage

(D) Uses disc storage

42. Q meter works on the principle of:

(A) Barkhausen criterion

(B) Piezoelectric effect

(C) Parallel resonance

(D) Series resonance

43. Which of the following resistive transducer has highest sensitivity:

(A) Thermistor

(B) Potentiometer

(C) Resistance thermometer

(D) Strain gauge

44. In LVDT, the frequency applied to the primary carrier should be at least _____that of the highest frequency components to be measured:

(A) 20 times

(B) 5 times

(C) 10 times

(D) 2 times

45. Thermistor is a transducer. Its temperature coefficient is:
    (A) Negative
    (B) Positive
    (C) Zero
    (D) None of these
46. _____Instrument measure the total quantity of electricity delivered at a particular time.
    (A) Absolute
    (B) Indicating
    (C) Recording
    (D) Integrating
47. What is a Q meter?
    (A) Quality meter
    (B) Quantity meter
    (C) Instrument
    (D) Detector
48. A digital storage oscilloscope has:
    (A) 3 modes
    (B) 2 modes
    (C) 4 modes
    (D) 5 modes
49. N type thermocouple is:
    (A) Iron/constantan
    (B) Chromel/Alumel
    (C) Nicrosil/Nisil
    (D) Chromel/Constantan
50. Best insulating material for insulating the lead wires in bonded strain gauge for temperature between 65 degree to 75 degree:
    (A) Viny1
    (B) Teflon
    (C) Nylon
    (D) Polythene

51. Which of the following is caused by careless handling?

(A) Systematic error

(B) Gross error

(C) Random error

(D) None of the mentioned

52. The error which is repetitive in nature:

(A) Observational error

(B) Environmental error

(C) Random error

(D) Systematic error

53. LVDT, used for displacement measurement:

(A) An external power operated transducer

(B) A self-generating passive transducer

(C) A capacitive transducer

(D) A digital transducer

54. A solar cell is:

(A) Photo voltaic transducer

(C) Photo emmisive transducer

(C) Photo conductive transducer

(D) Photo resitive transducer

55. Which material out of the following has got the property of generating emf when subjected to mechanical strain?

(A) Strain gauge material

(B) Piezo-electric material

(C) Steel conductor

(D) Thermosetting plastic

56. Name the instrument for angular measurement:

(A) Tachometer

(B) Strobometer

(C) Shaft encoder

(D) LVDT

57. Galvanometer type recorder uses:

(A) Ballistic galvanometer

(B) D'Arsonval galvanometer

(C) Tangent galvanometer

(D) Electrodynamic type galvanometer

58. Bimetallic strips made of two different material s bends during the rise in temperatureon account of:

(A) Difference in coefficient of linear expansion

(B) Difference in elastic properties

(C) Difference in thermal conductivities

(D) None of the above

59. Thermistors are:

(A) IC chips whose voltage output is directly proportional to temperature

(B) Semiconductor which generally have negative coefficient of resistance

(C) Non-contact type of temperature sensor

(D) Thin film metallic sensor

60. Which of the following thermocouple has the lowest measuring range?

(A) Iron constantan

(B) Chromel alumel

(C) Copper constantan

(D) Chromel constantan

61. Which following software is best used as virtual instrumentation?

(A) NI-multisim

(B) Labview

(C) MATLAB

(D) Pspice

62. A flow meter that is independent of fluid density:

(A) Rotameter

(B) Electromagnetic flow meter

(C) Venturimeter

(D) Orifice meter

63. In a resistance potentiometer, the non-linearity:

(A) Increase with increase of load to potentiometer resistance

(B) Decrease with increase of load to potentiometer resistance

(C) Is not dependent upon load to potentiometer resistance

(D) None of the above

64. A strip chart recordr:

(A) An active transducer

(B) An inverse transducer

(C) An output transducer

(D) (B) and (C)

65. The cantilever is used as a primary sensing element for measurement of force. The measured deflection was 0.5 mm for a particular setup. Suppose each of the dimension i.e. length, width and thickness of the cantilever are doubled with the force and material of the cantilever remain the same, the deflection is:

(A) 1mm

(B) 2 mm

(C) 0.251 mm

(D) 0.125 mm

66. The resistance of a thermometer is 5Ωat 30 degree C and 6.5 Ω at 60 degree C. Using linear approximation, the value of resistance temperature coefficient at 45 degree:

(A) 0.009/degreeC

(B) 0.0087/degreeC

(C) 0.0085/degreeC

(D) 0.01/degreeC

67. Quartz and Rochelle Salt belong to:

(A) Natural group of piezo-electric material

(B) Synthetic group of piezo-electric material

(C) Can belong to natural or synthetic group of piezoelectric material provided properly polarized

(D) All the above

68. Cadmium sulphide cell has the highest response for the light of wavelength of nearly:

(A) 300 nm

(B) 800 nm

(C) 500 nm

(D) 600 nm

69. A 1 mA ammeter has a resistance of 100Ω. It is to be converted to a 1A ammeter. The value of shunt resistance is:

(A) 0.001 Ω

(B) 0.1001 Ω

(C) 100000 Ω

(D) 100 Ω

70. A D'arsonval moment is rated 50μA.Its sensitivity is:

(A) 20000 Ω/V

(B) 200000 Ω/V

(C) 200 Ω/V

(D) None of the above

71. A Wheatstone bridge cannot be used for precision measurement because error are introduced into on account of:

(A) Resistance of connecting leads

(B) Thermoelectric emf

(C) Contact resistance

(D) All of the above

72. In a kelvin double bridge two set of readings are taken when measuring a low resistance, one with the current in one direction and the other with direction of current reversed. This is done to:

(A) Eliminate the effect of the contact resistance

(B) Eliminate the effect of resistance of lead

(C) Correct for the changes in battery voltage

(D) Eliminate the effect of thermo electric emf

73. In an electrodynamometer type wattmeter:

(A) The current coil is made fixed

(B) The pressure coil is made fixed

(C) Any of the tow coil i.e. current coil or pressure coil can be made fixed

(D) Both the coil should be movable

74. Frequency can be measured by:

(A) Campbell Bridge

(B) Schering Bridge

(C) Wien's Bridge

(D) Hay's Bridge

75. Maxwell's bridge is used to measure the inductance of:

(A) Law Q value

(B) Medium Q value

(C) High Q value

(D) Medium and low Q value

76. In a CRT the focusing anode is located:

(A) Between pre accelerating and accelerating anode

(B) After accelerating anode

(C) Before pre-accelerating anode

(D) None of the above

77. Basis spectrum analyzer work on the principle:

(A) AM receiver

(B) FM receiver

(C) Super heterodyne receiver

(D) None of the above

78. In majority of instrument, damping is provided by _____.

(A) Fluid friction

(B) Spring

(C) Eddy currents

(D) All of the above

79. The dielectric loss of capacitance can be measured by:

(A) Owen bridge

(B) Schering bridge

(C) Wein bridge

(D) Maxwell bridge

80. The harmonic distortion percentage is accurately measured by:

(A) VTVM.

(B) CRO.

(C) Harmonic distortion analyzer

(D) VOM

81. LVDT which is an instrument for the measurement of displacement, works on the principle of:

(A) Linear inductance

(B) Non- linear inductance

(C) Mutual inductance

(D) Linear capacitance

82. The displacement measuring instrument is /are:

(A) Potentiometer

(B) LVDT

(C) RVDT

(D) All of these

83. If the displacement is measured with strain gauge then the number of strain gauge normally required are:

(A) One

(B) Two

(C) Three

(D) Four

84. A capacitive pressure sensor has a typical measurement uncertainty of:

(A) $\pm 0.2\%$

(B) $\pm 0.4\%$

(C) $\pm 0.1\%$

(D) $\pm$ 0.8%

85. Advantage of passive instrument is:

(A) It does not need power supply

(B) Cheap

(C) Sensitive

(D) Accurate

86. For the measurement of flow rate of liquid, the method used to:

(A) Conveyor-based methods

(B) Bourdon tube

(C) Coriolis method

(D) Thermal mass flow measurement

87. For the measurement of flow the cheapest device is:

(A) Venturi

(B) Dall flow tube

(C) Flow nozzle

(D) Pitot static tube

88. In SI system the unit for speed is written as:

(A) Meter

(B) Meter/sec

(C) Meter/hour

(D) km/sec

89. The length of distance which is covered in specific time is called:

(A) Distance

(B) Displacement

(C) Speed

(D) Force

90. In a capacitance bridge, the arms are_____.

(A) Resistive

(B) Capacitive

(C) Inductive

(D) Mixture of resistance, capacitance and inductance

91. How is the bridge balanced?

(A) Using resistance R_1

(B) Using resistance R_3

(C) Through capacitance C_3

(D) Through capacitance C_x

92. Virtual instrumentation is:

(A) Procedural programming

(B) Object Oriented programming

(C) Graphical programming

(D) logic Programming

93. Graphical user interface (GUI), a computer program that enables a person to communicate with a computer through the not use of:

(A) Symbols

(B) Visual metaphor

(C) Pointing device

(D) Hexadecimal codes

94. Which of the following is not present in the spectrum analyzer?

(A) Swept local Oscillator

(B) RF amplifier

(C) Sweep voltage generator

(D) Slotted line

95. Electrical transducers generate:

(A) Biological signals

(B) Chemical signals

(C) Physical signals

(D) Electrical signals

96. Electrical transducers are:

(A) Small and non-portable

(B) Large and non- portable

(C) Small and compact

(D) Large and portable

97. The power needs of electrical transducers is:

(A) Maximum

(B) Minimum

(C) Zero

(D) Infinite

98. Which of the following can be measured by the use of a tacho-generator?

(A) Acceleration

(B) Speed

(C) Speed and acceleration

(D) Displacement

99. Which of the following is correct for a digital transducer?

(A) Measures digital quantity only

(B) Gives digital output

(C) Doesn't measure analog input

(D) None of the above

100. Virtual instruments can:

(A) Interface with real hardwares

(B) Cannot interface with real hardwares

(C) Interface with real hardwares using some special interface devices

(D) None of the above.

******

Rough Work / रफ कार्य

DO NOT OPEN THE QUESTION BOOKLET UNTIL ASKED TO DO SO

1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet **(O.M.R ANSWER SHEET).**Answer marked anywhere else other than the determined place will not be considered valid.
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