

# FUNDAMENTAL OF MECHANICAL ENGINEERING AND MECHATRONICS (KME-201T)

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## Unit IV

### Measurements and Control System

#### **OBJECTIVE TYPE QUESTIONS**

1. .... can also be defined as the maximum amount by which the result differs from the true value or as the nearness of the measured value.
  - a. Precision
  - b. Accuracy
  - c. Resolution
  - d. Error
2. .... is the degree of repetitiveness of the measuring process.
  - a. Precision
  - b. Accuracy
  - c. Resolution
  - d. Error
3. .... is the smallest change that can be measured with the instrument.
  - a. Precision
  - b. Accuracy
  - c. Resolution
  - d. Error
4. The difference between the true value and the mean value of the set of readings on the same component is termed as an
  - a. Precision
  - b. Accuracy
  - c. Resolution
  - d. Error
5. If measured value is 12 mm and true value is 10 mm then what is % error in measurement?
  - a. 10
  - b. 20
  - c. 30
  - d. 40

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6. ....is a means of achieving traceability.
  - a. Precision
  - b. Accuracy
  - c. Resolution
  - d. Calibration
7. .... can be defined as the magnitude of permissible variation of a dimension or other measured value.
  - a. Tolerance
  - b. Allowance
  - c. Error
  - d. Fit
8. Limit system accepts the variations with permissible values.
  - a) True
  - b) False
9. The relation between mating parts is called \_\_\_\_\_.
  - a) Connection
  - b) Fits
  - c) Joints
  - d) Link
10. The difference between the maximum and minimum permissible limits of the sizes is called \_\_\_\_\_.
  - a) Deviation
  - b) Allowance
  - c) Tolerance
  - d) Actual deviation
11. Minimum clearance is the difference between \_\_\_\_\_ size of the hole and the \_\_\_\_\_ size of the shaft.
  - a) minimum, maximum
  - b) minimum, minimum

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- c) maximum, maximum
  - d) maximum, minimum
12. If the allowance is positive, which of the following is true between the mating parts?
- a) Minimum clearance
  - b) Maximum clearance
  - c) Minimum interference
  - d) Maximum interference
13. If the allowance of 0.05 mm for **clearance** is given and the shaft diameter is 30mm, then the design size is \_\_\_\_\_
- a) 30.05 mm
  - b) 29.05 mm
  - c) 29.95 mm
  - d) 30.95 mm
14. In .....basis system, the size of the hole is kept constant and the shaft size is varied to give various types of fits.
- a. Hole
  - b. Shaft
  - c. Both hole and shaft
  - d. Neither hole nor shaft
15. The system in which the dimension of the shaft is kept constant and the hole size is varied to obtain various types of fits is referred to as ..... basis system.
- a. Hole
  - b. Shaft
  - c. Both hole and shaft
  - d. Neither hole nor shaft
16. Which of the following is not a fit?
- a. Clearance fit
  - b. Interference fit
  - c. Transition fit
  - d. Bore fit

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17. Tight fit is a type of
- Clearance fit
  - Interference fit
  - Transition fit
  - Bore fit
18. Slide fit is a type of
- Clearance fit
  - Interference fit
  - Transition fit
  - Bore fit
19. Feedback system is associated in
- Open loop control system
  - Closed loop control system
  - Both above
  - None
20. Unmonitored control system is related to
- Open loop control system
  - Closed loop control system
  - Both above
  - None
21. The largest permissible diameter of the shaft is smaller than the diameter of the smallest hole. This type of fit is called
- Clearance fit
  - Interference fit
  - Transition fit
  - None
22. The minimum permissible diameter of the shaft exceeds the maximum allowable diameter of the hole. This type of fit is called
- Clearance fit
  - Interference fit

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- c. Transition fit
- d. None

23. When the tolerance distribution is only on one side of the basic size, it is known as ..... tolerance.

- a. Unilateral
- b. Bilateral
- c. Multilateral
- d. None

24. The dimension of the part is allowed to vary on both sides of the basic size but may not be necessarily equally disposed about it is called..... tolerance.

- a. Unilateral
- b. Bilateral
- c. Multilateral
- d. None

25. Force can be measured by ..... method.

- a. Direct
- b. Indirect
- c. Both direct and indirect
- d. None of these

26. If tolerance for hole and shaft is given as below. What will be basic size in mm?

- $\begin{matrix} +0.02 & & -0.05 \\ \text{Hole} = 50^{+0.00} \text{ mm} & \text{and shaft} = 50^{-0.08} \text{ mm} \end{matrix}$
- a. 50.02
  - b. 50.05
  - c. 50.00
  - d. 49.95

27. If tolerance for hole and shaft is given as below. What will be higher limit of shaft in mm?

- $\begin{matrix} +0.02 & & -0.05 \\ \text{Hole} = 50^{+0.00} \text{ mm} & \text{and shaft} = 50^{-0.08} \text{ mm} \end{matrix}$
- a. 50.02
  - b. 50.05
  - c. 50.00
  - d. 49.95

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28. In above question what will be tolerance on hole in mm?

- a. 0.03
- b. 0.02
- c. 0.01
- d. 0.05

29. In above question what will be tolerance on shaft in mm?

- a. 0.03
- b. 0.02
- c. 0.01
- d. 0.05

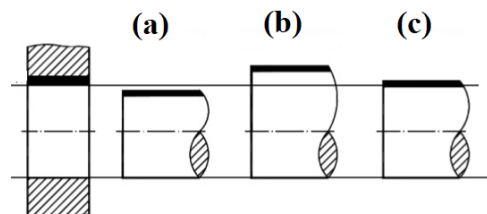
30. In above question, tolerance system on hole is

- a. Unilateral
- b. Bilateral
- c. Multilateral
- d. None

31. In above question, tolerance system on shaft is

- a. Unilateral
- b. Bilateral
- c. Multilateral
- d. None

32. Consider the following hole basis system:



In above system, (a) represents.....fit.

- a. Clearance fit
- b. Interference fit
- c. Transition fit

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- d. None
- 33. In above system, (b) represents.....fit.
  - a. Clearance fit
  - b. Interference fit
  - c. Transition fit
  - d. None
- 34. In above system, (c) represents.....fit.
  - a. Clearance fit
  - b. Interference fit
  - c. Transition fit
  - d. None
- 35. In above system, dimension of hole
  - a. Varies
  - b. Constant
  - c. May vary
  - d. None of these
- 36. Feedback control systems are referred to as closed loop systems.
  - a) True
  - b) False
- 37. Which of the following is not the element of control system?
  - a. Input
  - b. Output
  - c. Feedback
  - d. Switch
- 38. 'A system will be error free if we remove all systematic error'.
  - a) True
  - b) False
- 39. Which of the following error is caused by poor calibration of the instrument?
  - a) Random error
  - b) Gross error

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- c) Systematic error
  - d) Precision error
40. Closeness of measured value to true value is \_\_\_\_\_
- a) Accuracy
  - b) Precision
  - c) Correction
  - d) Uncertainty
41. Science of precise and accurate measurement of various physical quantities is termed as \_\_\_\_\_
- a) Metrology
  - b) Meteorology
  - c) Pedology
  - d) Mineralogy
42. In a measurement, what is the term used to specify the closeness of two or more measurements?
- a) Precision
  - b) Accuracy
  - c) Fidelity
  - d) Threshold
43. A 10 mm diameter shaft is to be measured from a device which measured 12 mm every time when it was measured 10 times. This device is said to be
- a. Accurate and precise
  - b. Inaccurate and precise
  - c. Accurate and not precise
  - d. Inaccurate and not precise
44. A 10 mm diameter shaft is to be measured from a device which measured 12 mm, 10 mm, 13 mm, 9 mm and 11 mm when it was measured 5 times. This device is said to be
- a. Accurate and precise
  - b. Inaccurate and precise
  - c. Accurate and not precise
  - d. Inaccurate and not precise



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45. The ability of the measuring instrument to repeat the same results during the act of measurements for the same quantity is known as
- Repeatability
  - Resolution
  - Transmittivity
  - Calibration
46. Consider the following situation of measurement and answer the following questions-

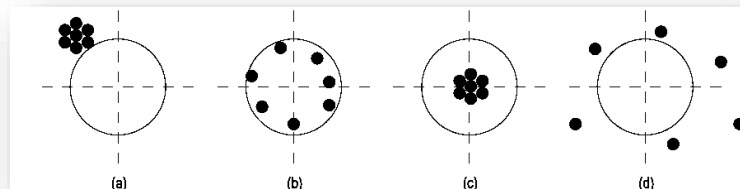


Figure (a) denotes

- Precise but not accurate
  - Accurate but not precise
  - Precise and accurate
  - Not precise and not accurate
47. In above question figure (b) denotes-
- Precise but not accurate
  - Accurate but not precise
  - Precise and accurate
  - Not precise and not accurate
48. In above question figure (b) denotes-
- Precise but not accurate
  - Accurate but not precise
  - Precise and accurate
  - Not precise and not accurate
49. In above question figure (b) denotes-
- Precise but not accurate
  - Accurate but not precise

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- c. Precise and accurate
  - d. Not precise and not accurate
50. In open loop control system
- a. Output is independent of control input
  - b. Output is dependent of control input
  - c. Only system parameters have effect on the control output
  - d. None of the above
51. In open loop control system
- a. The control action depends on the size of the system
  - b. The control action depends on system variables
  - c. The control action depends on the input signal
  - d. The control action is independent of the output
52. An automatic toaster is a .....loop control system
- a. Open
  - b. Closed
  - c. Partially closed
  - d. Any of the above
53. A good control system has all the following features except
- a. Good stability
  - b. Slow response
  - c. Good accuracy
  - d. Sufficient power handling capacity
54. A control system in which the control action is somehow dependent on the output is known as
- a. Closed loop system
  - b. Semi closed loop system
  - c. Open system
  - d. None of the above
55. An allowance is provided
- a. to help the operator
  - b. to aid in production

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- c. intentionally
- d. as permissive tolerance

56. which of the following is not the electrical pressure transducer?

- a. Resistance-type transducer
- b. Potentiometer devices
- c. Inductive-type transducer
- d. Spring type transducer

57. Bourdon gauge is used to measure

- a. Temperature
- b. Pressure
- c. Strain
- d. Force

58. Thermocouple is used to measure

- a. Temperature
- b. Pressure
- c. Strain
- d. Force

59. Strain gauges can be used to measure

- a. Forces
- b. Extension
- c. Both a and b
- d. None of these

60. Dynamometers are used to measure

- a. Strain
- b. Pressure
- c. Torque
- d. Temperature

61. Which of the following is non-contact type thermometer?

- a. Thermocouple
- b. Mercury thermometer

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- c. Pressure thermometer
- d. Optical pyrometer

62. Which of the following is used to measure strain?

- a. Mechanical strain gauge
- b. Electrical strain gauge
- c. Both a and b
- d. None of these

63. Which of the following is not the systematic error?

- a. Calibration errors
- b. Ambient conditions
- c. Deformation of workpiece
- d. Positional error

64. Consider the following

- i. Systematic errors
- ii. Random errors

Which of the above is/are error in measurement?

- a. i only
- b. ii only
- c. i and ii
- d. Neither i nor ii

65. Which of the following is not the random error?

- a. Error due to friction
- b. Positional error
- c. Error in reading
- d. Parallax error

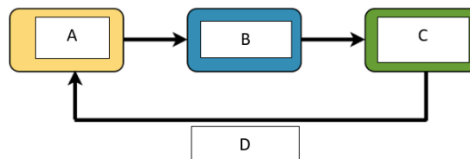
66. Operator's inability to note the readings because of fluctuations during measurement is ..... error.

- a. Systematic error
- b. Random error
- c. Both a and b
- d. None of these

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67. Electric pressure transducers are preferred over mechanical devices because of their quick response and low hysteresis.
- True
  - False
68. "An assemblage of devices and components connected or related so as to command direct or regulate itself or another system" is called
- Control system
  - Feedback system
  - Input
  - Output
69. Consider the following diagram of control system-



- In above diagram "A" denotes-
- Output
  - Input
  - Process
  - Feedback
70. In above diagram "B" denotes-
- Output
  - Input
  - Process
  - Feedback
71. In above diagram "C" denotes-
- Output
  - Input
  - Process

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d. Feedback

72. In above diagram “D” denotes-

- a. Output
- b. Input
- c. Process
- d. Feedback

73. An open loop control system is simple in construction

- a. False
- b. True

74. An open loop system needs frequent and careful calibrations for accurate result.

- a. True
- b. False

75. Shaft basis system is preferred over hole basis system

- a. True
- b. False

76. Hole basis system is preferred because manufacturing point of view.

- a. True
- b. False

77. Shaft basis system increases the manufacturing cost.

- a. True
- b. False

78. Which of the following is almost permanent assembly?

- a. Transition fit
- b. Clearance fit
- c. Interference fit
- d. Loose fit

79. In .....components can easily be assembled without the assistance of tools.

- a. Transition fit
- b. Clearance fit
- c. Interference fit

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- d. Loose fit
- 80. Venturi meter is used to measure mass flow rate.
  - a. False
  - b. True
- 81. The instruments used for the measurement of pressure is/are
  - a. Bellows
  - b. Diaphragms
  - c. Fiber optic pressure sensors
  - d. All of these
- 82. Bourdon tube is used for the measurement of gauge pressure of
  - a. Gas
  - b. Liquid fluid
  - c. Solid
  - d. Both (a) and (b)
- 83. If an instrument is precise then it must be accurate.
  - a. True
  - b. False
- 84. .... literally means science of measurements.
  - a. Metrology
  - b. Meteorology
  - c. Precision
  - d. None of these
- 85. If error in measurement is 3 mm and true value is 10 mm. then what will be % error?
  - a. 20
  - b. 30
  - c. 40
  - d. 33
- 86. If  $E$  is absolute error,  $V_m$  is measured value and  $V_t$  is true value then what will be absolute error?
  - a.  $E = V_m + V_t$
  - b.  $E = V_m - V_t$

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c.  $E = V_m / V_t$

d.  $E = V_t \times V_m$

87. The instrument is more accurate if the magnitude of error is.....

- a. High
- b. Twice
- c. Half
- d. Low

88. ....is the procedure used to establish a relationship between the values of the quantities indicated by the measuring instrument and the corresponding values realized by standards under specified conditions.

- a. Calibration
- b. Precision
- c. Accuracy
- d. Measurement

89. The largest permissible diameter of the shaft is smaller than the diameter of the smallest hole. This type of fit is called

- a. Clearance fit
- b. Interference fit
- c. Transition fit
- d. None

90. The minimum permissible diameter of the shaft exceeds the maximum allowable diameter of the hole. This type of fit is called

- a. Clearance fit
- b. Interference fit
- c. Transition fit
- d. None

91. When the tolerance distribution is only on one side of the basic size, it is known as ..... tolerance.

- a. Unilateral
- b. Bilateral
- c. Multilateral



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d. None

92. The dimension of the part is allowed to vary on both sides of the basic size but may not be necessarily equally disposed about it is called..... tolerance.

a. Unilateral

b. Bilateral

c. Multilateral

d. None

93. .... can be defined as the magnitude of permissible variation of a dimension or other measured value.

a. Tolerance

b. Allowance

c. Error

d. Fit

94. Limit system accepts the variations with permissible values.

a) True

b) False

95. The relation between mating parts is called \_\_\_\_\_

a) Connection

b) Fits

c) Joints

d) Link

96. The difference between the maximum and minimum permissible limits of the sizes is called \_\_\_\_\_

a) Deviation

b) Allowance

c) Tolerance

d) Actual deviation

97. Minimum clearance is the difference between \_\_\_\_\_ size of the hole and the \_\_\_\_\_ size of the shaft.

a) minimum, maximum

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- b) minimum, minimum
- c) maximum, maximum
- d) maximum, minimum

98. If the allowance is positive, which of the following is true between the mating parts?

- a) Minimum clearance
- b) Maximum clearance
- c) Minimum interference
- d) Maximum interference

99. 'A system will be error free if we remove all random error'.

- a) True
- b) False

100. Which of the following is non-contact type thermometer?

- a. Thermocouple
- b. Mercury thermometer
- c. Pressure thermometer
- d. Radiation pyrometer