

TE Mechanical Sem VI

Subject: - Metrology and Quality Control

Question Bank

1. Error of measurement is equal to
 - A. True value – Measured value
 - B. Precision – True value
 - C. Measured value – Precision
 - D. Accuracy– Precision

2. The ability by which a measuring device can detect small differences in the quantity being measured by it, is called its.
 - A. Damping
 - B. Sensitivity
 - C. Accuracy
 - D. Variation

3. One yard _____ inch.
 - A. 36
 - B. 38
 - C. 40
 - D. 42

4. The following is a line standard of measurement.
 - A. Measuring tape
 - B. Slip gauge
 - C. Micrometer
 - D. End bars

5. The angle gauge by Dr. Tomlison consists of a set of.
- A. 10 gauges
 - B. 12 gauges
 - C. 14 gauges
 - D. 16 gauges
6. 1 Angstrom (\AA) _____
- A. 10^{-6} m
 - B. 10^{-8} m
 - C. 10^{-10} m
 - D. 10^{-12} m
7. Following is the theoretical size which is common to both the parts of a mating pair
- A. Normal size
 - B. Actual size
 - C. Base size
 - D. Maximum size
8. _____ is equal to the differences of the two limits of size of the part
- A. Tolerance
 - B. Low limit
 - C. High limit
 - D. Design size
9. The amount by which the actual size of a shaft is less than the actual size of mating hole in an assembly is known as
- A. Clearance
 - B. Interference
 - C. Allowance
 - D. Fit

10. The amount by which the actual size of a shaft is more than the actual size of mating hole in an assembly is known as

- A. Clearance
- B. Interference
- C. Allowance
- D. Fit

11. A shaft rotating in a bushed bearing is good example of

- A. Sliding fit
- B. Running fit
- C. Push fit
- D. Driving fit

12. Fitting of rim on a locomotive wheel is done by

- A. Keying fit
- B. Driving fit
- C. Force fit
- D. Easy sliding fit

13. The following is used to check the diameters of holes

- A. Plug gauge
- B. Ring gauge
- C. Slip gauge
- D. Standard screw pitch gauge

14. To check external diameter of hole, we use

- A. Plug gauge
- B. Ring gauge
- C. Slip gauge
- D. Standard screw pitch gauge

15. 'GO' and 'NO GO' gauge is a type of

- A. Plug gauge
- B. Slip gauge
- C. Ring gauge
- D. Limit gauge

16. The following is not a type of comparator

- A. Electrical
- B. Pneumatic
- C. Optical
- D. Hydraulic

17. 'Electrolimit' gauge block comparator and 'Talyman' Electrical comparator work on the principle of

- A. Kirchoff's law
- B. Wheatstone bridge
- C. Faraday's law
- D. Lenz's law

18. The following is not used to measure angles

- A. Bevel protectors
- B. Calibrated levels
- C. Clinometers
- D. Optical flats

19. In v-shape method, the minor diameter of thread is given by

- A. $D \pm (d2 - d1)$
- B. $D \pm (d1 - d2)$
- C. $D \pm (d2 + d1)$
- D. $D \pm (d2 \times d1)$

20. The following is not a method to find effective thread diameter

- A. Thread micrometer
- B. Two wire method
- C. Three wire method
- D. The V-piece method

21. The effective diameter (E) in three wire method is given by

- A. $E = M - C$
- B. $E = M + C$
- C. $E = M / C$
- D. $E = M \times C$

22. The degree of closeness of the measured value of a certain quantity with its true value is known as

- A. Accuracy
- B. Precision
- C. Standard
- D. Sensitivity

23. What are the upper and lower limits of the shaft represented by 60 f8?

Use the following data:

Diameter 60 lies in the diameter step of 50 -80mm.

Fundamental tolerance unit, $i = \text{in } \mu\text{m} = 0.45 D^{1/3} + 0.001 D$, where D is the representative size in mm; tolerance value for IT8 = 25i, Fundamental deviation for 'f' shaft = $-5.5 D^{0.41}$

- A. Lower limit = 59.924mm, Upper Limit = 59.970mm
- B. Lower limit = 59.954mm, Upper Limit = 60.000mm
- C. Lower limit = 59.970mm, Upper Limit = 60.016mm
- D. Lower limit = 60.000mm, Upper Limit = 60.046mm

24. Which one of the following statements is TRUE?
- A. The 'GO' gage controls the upper limit of a hole.
 - B. The 'NO GO' gage controls the lower limit of a shaft.
 - C. The 'GO' gage controls the lower limit of a hole.
 - D. The 'NO GO' gage controls the lower limits of a hole.
25. Cylindrical pins of $25^{+0.020}_{+0.010}$ mm diameter are electroplated in a shop. Thickness of the plating is 30 ± 2.0 micron. Neglecting gauge tolerances, the size of the GO gage in mm to inspect the plated components is.
- A. 25.042
 - B. 25.052
 - C. 25.074
 - D. 25.084
26. Which of the following is not true about effective diameter?
- A. Also known as pitch diameter
 - B. It decides quality of fit between nut and screw
 - C. This is the diameter of minor cylinder
 - D. It is a very important dimension for screw threads
27. What is used to measure the Minor diameter of an external thread?
- A. Bench micrometer
 - B. Thread micrometer
 - C. One wire method
 - D. Vernier Caliper
28. Which of the following chart is used to monitor the non conformities
- A. X bar chart
 - B. C chart
 - C. P chart
 - D. R chart

29. The normal distribution curve changes its shape from narrow to flat. This depends on which measure

- A. Standard deviation
- B. Mode
- C. Average
- D. Median

30. A threaded screw of M12, ISO metric type, having 1.5 mm pitch with a pitch diameter of 14.701 mm is to be checked for its pitch diameter (effective diameter) using two or three number of rollers of following size

- A. Rollers of 2 mm diameter
- B. Rollers of 1.155 mm diameter
- C. Rollers of 3.234 mm diameter
- D. Rollers of 0.546 mm diameter

31. Diameters of 9 pins of a sample selected as 1.8, 1.7, 1.8, 1.9, 2.0, 1.6, 1.8, 1.7 and 1.9 mm. The Median is

- A. 1.8
- B. 1.7
- C. 1.9
- D. 2.0

32. Diameters of 9 pins of a sample selected as 1.8, 1.7, 1.8, 1.9, 2.0, 1.6, 1.8, 1.7 and 1.9 mm. The Mode is

- A. 1.8
- B. 1.7
- C. 1.9
- D. 2.0

33. Effective diameter of thread can be measured by using micrometer

- A. Vernier caliper
- B. Screw pitch gauges
- C. Floating carriage micrometer
- D. Dial Indicator

34. Instrument used to check the tooth thickness of gear is known as

- A. Floating carriage micrometer
- B. Vernier Height gauge
- C. Gear tooth Vernier caliper
- D. Dial gauge

35. Which of the following is the functional parameter of screw thread

- A. Pitch
- B. Measure diameter
- C. Minor diameter
- D. Thread angle

36. The effective diameter of the metric thread is calculated by the formula

- A. $M - 2d + 0.866p$
- B. $M - 3d + 0.866p$
- C. $M + 3d + 0.866p$
- D. $M - 3d + 0.866d$

37. Which of the following is the functional parameter of the gear while meshing

- A. Backlash
- B. Tooth thickness
- C. Tooth profile
- D. Addendum depth

38. The composite error of gear is checked by

- A. Gear tooth Vernier Caliper
- B. Base tangent comparator
- C. Parkinson's gear tester
- D. Involute profile tester

39. Which of the following is the measure of dispersion

- A. Range
- B. Mode
- C. Median
- D. Mean

40. Which of the following is the measure of central tendency

- A. Range
- B. Standard deviation
- C. Median
- D. Variance

41. In \bar{X} control chart the centre line is

- A. \bar{X} double bar
- B. \bar{X} bar
- C. R bar
- D. X

42. For the highest value of the standard deviation the normal distribution curve becomes

- A. Smaller
- B. Narrowed
- C. Flattened
- D. Unchanged

43. The fraction defective values are taken to plot the

- A. \bar{X} bar chart
- B. C chart
- C. R chart
- D. P chart

44. The following data applies to basic shaft system:

Tolerance for hole = 0.002 mm,

Tolerance for shaft = 0.001 mm,

Allowance = 0.003 mm,

Basic size = 50 mm.

The maximum hole size is _____ mm

- A. 50.005 mm
- B. 47.995 mm
- C. 52.005 mm
- D. 48.003 mm

45. A circular shaft having diameter $65_{-0.050}^{+0.010}$ mm is manufactured by turning process. A 50 μm thick coating of TiN is deposited on the shaft. Allowed variation in TiN film thickness is $\pm 5 \mu\text{m}$. The minimum hole diameter (in mm) to just provide clearance fit is.

- A. 64.95
- B. 65.12
- C. 65.10
- D. 65.01

46. Calculate CLA value of roughness for a graph, having 100 horizontal magnification and 10000 vertical magnification for a sampling length of 1.2 mm. The areas above the datum line are 100 mm^2 , 120 mm^2 , 140 mm^2 , 40 mm^2 and below the datum line are 80 mm^2 , mm^2 , 90 mm^2 .

- A. 0.6333 micron
- B. 6.333 micron
- C. 0.912 micron
- D. 0.079 micron

47. What is ten point height method?

- A. It is the average sum of ten highest points measured within sampling length
- B. It is the average difference of five highest points and five deepest valleys measured within sampling length
- C. It is the sum of ten highest points divided by sum of ten deepest valleys measured within sampling length
- D. It is the average sum of five highest points and five deepest valleys measured within sampling length

48. On operating characteristics curve, consumers risk is denoted by

- A. α
- B. β
- C. γ
- D. θ

49. Match the following group 1 (charts) with group 2 (use) and select the correct option.

- 1. R chart ----- A. study the number of defects per unit
- 2. C chart ----- B. size of variable is studied
- 3. P chart ----- C. dispersion of measured data
- 4. X chart ----- D. defective units produced per subgroup

- A. 1 – A, 2 – B, 3 – D, 4 - C
- B. 1 – C, 2 – D, 3 – B, 4 - A
- C. 1 – A, 2 – D, 3 – B, 4 - C
- D. 1 – C, 2 – A, 3 – D, 4 – B

50. Nearest deviation between hole and shaft from the basic value is known as

- A. Tolerance
- B. Fundamental deviation
- C. Clearance
- D. Interference

51. For manufacturing of a certain amount of hole, maximum hole size was found to be 50.14 mm and minimum hole size was found to be 49.98. Tolerance in mm will be

- A. 0.12
- B. 0.13
- C. 0.16
- D. 0.20

52. Maximum material limit of shaft is

- A. Maximum diameter of hole
- B. Maximum diameter of shaft
- C. Smallest diameter of hole
- D. Minimum diameter of shaft

53. Allowance of hole and shaft assembly is equal to

- A. Sum of maximum metal limit
- B. Product of Maximum limit
- C. Difference of maximum metal limit
- D. None of the mentioned

54. Repeatability of measuring equipment is

- A. The closeness with which a measurement can be read directly from a measuring instrument
- B. The capability of indicate the same reading again and again for a given measurand.
- C. Difference between measured value and actual value
- D. The smallest change in measurand that can be measured

55. The purpose of ratchet screw in micrometer screw gauge is

- A. To lock a dimension
- B. To impart blow motion
- C. To maintain sufficient and uniform measuring pressure
- D. To take care of wear of screw threads

56. The taper of internal dovetail can be measured with the help of

- A. Sine bar
- B. Combination set
- C. Balls of standard dimensions and slip gauges
- D. Clinometer

57. A sine bar is specified by

- A. Its total length
- B. The centre distance between the two rollers
- C. The size of the rollers
- D. The distance between rollers and upper surface

58. Profile of a gear tooth can be checked by

- A. Sine bar
- B. Bench micrometer
- C. Optical pyrometer
- D. Optical projector

59. Gear tooth caliper is used to find the chordal thickness of the following type of gear tooth

- A. Spur gears
- B. Helical gears
- C. Worm gears
- D. Bevel gears

60. Standards to be used for reference purposes in laboratories and workshops are referred as

- A. Primary standards
- B. Secondary standards
- C. Tertiary standards
- D. Working standards

61. Optical flat works on the principle of

- A. Refraction
- B. Interference of light.
- C. Dispersion
- D. Polarisation

62. The following micrometer is used to measure



- A. Tooth spacing over 'X' number of teeth
- B. Major diameter of thread
- C. Effective diameter of thread
- D. Diametral pitch of gear

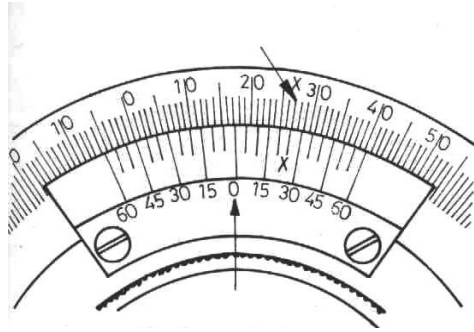
63. Which comparator utilizes the principle of a button spinning on a loop of string

- A. Sigma comparator
- B. Johansson Mikrokator
- C. Optical comparator
- D. Zeiss interferometer

64. Pick out the wrong statement about Taylor's principle of gauging.

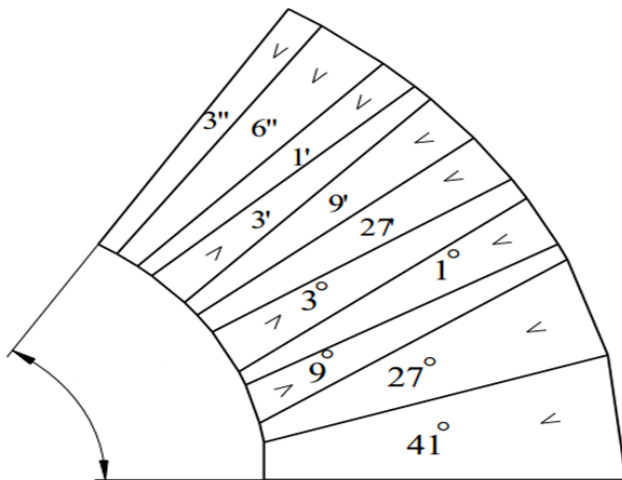
- A. Go gauges should be full form gauges
- B. Go gauges should check all the related dimensions simultaneously
- C. Go gauges should check Minimum metal limit of component
- D. Not Go gauges should check only one dimension at a time

65. The reading of the following Bevel protractor is



- A. $17^{\circ} 15'$
- B. $18^{\circ} 20'$
- C. $17^{\circ} 25'$
- D. $15^{\circ} 15'$

66. The angle value for the following combination of angle gauges is



- A. $57^{\circ} 34' 9''$
- B. $57^{\circ} 35' 9''$
- C. $57^{\circ} 24' 6''$
- D. $57^{\circ} 27' 3''$

67. The angles of angle gauges in the degrees series are

- A. 1,3,9,25,42
- B. 1,3,9,27,81
- C. 1,3,9,27,41
- D. 1,5,10,25,45

68. Which of the following is not the correct method of specifying numerical value of surface roughness mean line.

- A. Centre-line average (CLA) value
- B. Mean-line and envelop line systems
- C. R.m.s value
- D. Peak-to-valley height

69. The secondary texture or waviness, or macro-error on surface results due to

- A. Normal action of the tool in production process
- B. Vibrations and non-uniformity of cutting process
- C. Flaws in material
- D. Dominant direction of tool marks (lay)

70. A sine bar is used to measure

- A. Surface roughness
- B. Gear profiles
- C. Internal tapers
- D. External tapers

71. Wear allowance is provided on

- A. Go gauge
- B. No Go gauge
- C. Both Go and No Go gauges
- D. When both are combined in one gauge

72. Clinometer is an instrument concerned with

- A. Temperature measurement
- B. Angular measurement.
- C. Linear measurement
- D. Roundness measurement

73. Sine centre is used for measurement of

- A. Included internal angle between two faces
- B. Height of projected parts
- C. Semi-angle of taper of a job
- D. Flatness

74. Control limits for \bar{X} chart is calculated using following formulae

- A. $UCL_{\bar{x}} = \bar{\bar{X}} + A_2 R$ and $LCL_{\bar{x}} = \bar{\bar{X}} - A_2 R$
- B. $UCL_{\bar{x}} = \bar{X} + A_3 R$ and $LCL_{\bar{x}} = \bar{X} - A_3 R$
- C. $UCL_{\bar{x}} = \bar{X} + A_2 R$ and $LCL_{\bar{x}} = \bar{X} - A_2 R$
- D. $UCL_{\bar{x}} = \bar{X} + A_2 \bar{R}$ and $LCL_{\bar{x}} = \bar{X} - A_2 \bar{R}$

75. What type of chart will be used to plot the number of defectives in the output of any process?

- A. \bar{x} bar chart
- B. R chart
- C. c chart
- D. p chart

76. When R chart is out of control, we _____

- A. Eliminate the out-of-control points and recalculate the control limits
- B. Take one more sample and recalculate the control limits
- C. Eliminate the out-of-control points and the nearest two points, and recalculate the control limits
- D. Take no action

77. If β - risk of any process is 0.75, what will be the ARL for that process?

- A. 4
- B. 1.33
- C. 0.86
- D. 2

78. For mean of all sample standard deviations=0.0094 and the sample size= 5, what will be the estimate of process standard deviation? (Given for sample size=5, $c_4=0.94$)

- A. 100
- B. 0.01
- C. 0.0094
- D. 94

79. The center line for any individuals control chart represents the value equal to

- A. The process mean
- B. The moving range
- C. The mean of moving ranges
- D. The process standard deviation

80. The c charts are also called _____

- A. The control chart for nonconformities
- B. Control charts for fraction nonconforming
- C. Control charts for conformities per unit
- D. Control chart for process mean

81. What is the use of feeler gauge?

- A. To find the thickness of work piece
- B. To measure the gap width
- C. To check straightness
- D. To check flatness

82. Which of the following is not related to the drunken thread?

- A. Periodic pitch error
- B. Erratic pitch error
- C. Progressive pitch error
- D. Irregular pitch error

83. What is the magnitude of wear allowance in Go gauges in present British System?

- A. One-fifth of gauge tolerance
- B. One-third of gauge tolerance
- C. One-tenth of gauge tolerance
- D. One-fifteenth of gauge tolerance

84. Where should tolerance zone is placed for Go Gauges in present British System?

- A. Inside work limits
- B. Outside work limits
- C. Equal to work limits
- D. Regardless to work limits

85. If the angle between optical flat and surface to be tested is very small, then what is the difference of separation between optical flat and surface between two similar adjacent fringes?

- A. λ
- B. $\lambda/2$
- C. $\lambda/3$
- D. $3\lambda/2$

86. Which of the following is used to make optical flats?

- A. Toughened glass
- B. Glass wool
- C. Fused quartz
- D. Porous glass

87. How many grades or classes of slip gauges are present?

- A. 3
- B. 5
- C. 6
- D. 4

88. What is the approximate size of slip gauges?

- A. 30mm long and 10mm wide
- B. 45mm long and 15mm wide
- C. 20mm long and 5mm wide
- D. 25mm long and 10mm wide

89. Which of the following is the most suitable for wavelength standard?

- A. Cadmium 114
- B. Krypton 86
- C. Mercury 198
- D. Any monochromatic light

90. What is QA?

- A. It is the measurement of degree to which a product satisfies the need
- B. Any systematic process used to ensure quality in the process
- C. Process of identifying defects
- D. It is a corrective tool