

Unit III - Form Measurement

49. Name the various types of pitch errors found in screw?

- (i) Progressive error
- (ii) Drunken error
- (iii) Periodic error
- (iv) Irregular errors.

50. Name the various methods of measuring the minor diameter of the thread.

- (i) Using taper parallels.
- (ii) Using rollers and slip gauges.

51. Name the various methods used for measuring the major diameter

- (i) Ordinary micrometer
- (ii) Bench micro meter

52. Name the various methods for measuring effective diameter.

- (i) One wire method
- (ii) Two wire method
- (iii) Three wire method.

53. Name the various methods for measuring pitch diameter.

- (i) Pitch measuring machine
- (ii) Tool maker microscope
- (iii) Screw pitch gauge.

54. Name the two corrections are to be applied in the measurement of effective diameter.

- (i) Rake corrections
- (ii) Compression correction,

55. What is best size of wire?

Best size of wire is a wire of such diameter that it makes contact with the flanks of the thread on the pitch line.

56. Define drunken thread

This is one, having erratic pitch, in which the advance Of the helix is irregular in one complete revolution of thread.

57. What is the effect of flank angle error?

Errors in the flank cause a virtual increase in the effective diameter of a bolt and decrease in that, of nut.

58. What are the applications of toolmaker's microscope?

- (i) Linear measurement
- (ii) Measurement of pitch of the screw
- (iii) Measurement of thread angle.

59. Define: Periodic error.

The periodic error repeats itself at equal intervals along the thread.

60. What are the commonly used forms of gear teeth?

- (1) Involute
- (ii) Cycloidal

61. What are the types of gears?

- (i) Spur
- (ii) Helical
- (iii) Bevel
- (iv) Worm and Worm wheel
- (v) Rack and pinion.

62. Define module

Module = $\text{pitch circle diameter} / \text{number of teeth}$

63. Define lead angle

It is the angle between the tangent to the helix and plane perpendicular to the axis of cylinder.

64. What are the various methods used for measuring the gear tooth thickness?

- (i) Gear tooth vernier
- (ii) Constant chord method
- (iii) Base tangent method
- (iv) Measurement over pins.

65. Name four gear errors.

- (i) Pitch error
- (ii) Composite error
- (iii) Alignment error

(iv) Thickness error

66. Name the method used for checking the pitch of the gear.

- (i) Step by step method
- (ii) Direct angular measurement.

67. What are the direct angular measurements methods?

- 1. Profile checking
 - a) Optical projection method
 - b) Involute measuring method.
- 2. Thickness measurement:
 - a) Chordal thickness method
 - b) Constant chord method.

68. Define constant chord

Constant chord is the chord joining those points, or opposite Addendum Circles of the tooth.

69. Give the formula for measuring radius of circle.

$$R = \frac{I^2 - d^2}{4d}$$

Where, R=Radius of the job I = Distance between the balls d = Diameter of pins.

70. What are the two methods used in measuring radius of concave surface.

- a) Edges are well defined.
- b) Edges are rounded up.

71. What are the factors affecting surface roughness?

- a) Vibrations
- b) Material of the work piece
- c) Tool
- d) Machining type

72. What are the methods used for evaluating the surface finish?

- a) Peak to valley height method.
- b) The average roughness method.
- c) Form factor method.

73. Define fullness and emptiness in form factor.

Degree of fullness (K) = Area of metal / Area of enveloping rectangle

Degree of emptiness = 1 - K

74 What are the methods used for measuring surface roughness?

- a) Inspection by comparison
- b) Direct instrument measurements.

75. What are the stylus probe instruments?

- a) Profilo meter
- b) Taylor Hobson Talysurf
- c) Tomlinson surface meter

76. Define: Straightness of a line in two planes.

A line is said to be straight over a given length, if the variation of the distance of its points from two planes perpendicular to each other and parallel to the direction of a line remaining within the specified tolerance limits.

77. Define roundness. Name the four measurement of roundness.

It is a surface of revolution where all the surfaces intersected 'by any plane perpendicular to a common axis in case of, cylinder and cone.

- a. Heart square circle.
- b. Minimum radial separation circle.
- c. Maximum inscribed circle.
- d. Minimum circumscribed circle.

78. Name the devices used for measurement of roundness.

- 1. Diametral
- 2. Circumferential confining gauge.
- 3. Rotating on center.
- 4. V-Block
- 5. Three point probe
- 6. Accurate spindle.

79. Define lay

Lay is defined as direction of the 'predominate surface pattern'. Types: horizontal, vertical, radial and circular lay

80. What is gear run out?

Total range of reading of a fixed indicator or with the contact points applied to a Surface rotated, without axial movement, about 3 fixed axis.

16 MARKS

- 1) How to measure the pitch of the screw thread by using the tool maker's microscope?
Discuss in detail.
- 2) Describe the method of inspecting the profile of spur gear by using involute measuring machine.
- 3) How to check the composite errors of the gear by using Parkinson gear testing machine?
Explain it in detail?
- 4) Briefly describe major, minor and effective diameter of thread?
- 5) Describe the two wire method of finding the effective diameter of screw threads.
- 6) Describe the chordal thickness method using gear tooth vernier caliper.
- 7) Explain one method of assessing the straightness of a straight-edge.
- 8) Write notes on the types of irregularities of a circular part and mention its causes.
- 9) What is the 'best wire size'? Derive an expression for the same in terms of the pitch and angle of the thread,
- 10) Describe a gear tooth vernier caliper and explain its use for checking tooth thickness and depth of tooth.
- 11) Explain the principle of checking the involute profile of gear tooth.
- 12) Explain the principle of measuring gear tooth thickness by base tangent method. What is the span length over 5 teeth of gear having 45 teeth module 4mm and pressure angle 20°
- 13) Derive the formula for measuring the effective diameter of thread by 3-wire method
- 14) Draw the set up and explain the measurement of effective diameter of a screw thread using three wires.
- 15) Describe a thread pitch measuring machine.
- 16) With the aid of sketch describe the principle of operation of a rolling gear testing machine.
- 17) Describe a method for inspecting the involute profile of a spur gear tooth.
- 18) What are the various methods used for measuring tooth thickness of a Spur gear. Explain the principle involved with neat sketches. Under what circumstance each method is used.
- 19) How is the involute profile of gear tooth measured?