Design of Machine Elements

1. Introduction to Design

1. The unit of engineering stress is

(a) N/mm^2

(b) N/mm^3

(c) N/mm

(d) N/m

2. Hooke's law holds good up to

(a) breaking point (b) yield point

(c) elastic limit d) plastic limit

3. The ratio of tensile stress to tensile strain within elastic limit is called

(a) bulk modulus (b) Poisson's ratio

(c) modulus of rigidity **(d) modulus of elasticity**

4. The ratio of shear stress to shear strain is called

(a) bulk modulus (b) Poisson's ratio

(c) modulus of rigidity (d) modulus of elasticity

5. Within elastic limit, the stress is

(a) equal to strain

(b) inversely proportional to strain

(c) directly proportional to strain

(d) directly proportional to the square of strain

6. The bending stress induced in a beam is

(a) Maximum at the farthest fiber from neutral axis and zero at the neutral axis

(b) Uniform throughout the cross-section

(c) zero at the farthest fiber from neutral axis and maximum at the neutral axis

(d) zero at the neutral axis and zero at the farthest fiber and maximum at the mean distance

7. Rankine's theory of failure is applicable to

(a) ductile materials (b) elastic materials

(c) brittle materials (d) plastic materials

8. Distortion energy theory of failure is applicable to

(a) components made of plain carbon steel

(b) components made of composites

(c) components made of cast iron

(d) components made of non-metals

9. In cyclic loading, the effect of stress concentration is more serious in case of

(a) components made of brittle materials

(b) components made of ductile materials

(c) components made of brittle as well as ductile materials

(d) components made of soft materials

10. The criterion of failure for machine parts subjected to fluctuating stresses is

(a) ultimate tensile strength (b) yield strength

(c) endurance limit (d) modulus of elasticity

11. The notch sensitivity factor (q) is given by

(a) $q = \frac{K_f - 1}{K_t - 1}$ (b) $q = \frac{K_t - 1}{K_f - 1}$

(c) $q = \frac{K_f + 1}{K_t + 1}$ (d) $q = \frac{K_t + 1}{K_f + 1}$

12. Load which is applied gradually which do not change in magnitude and direction or a point of application with respect to time is called as...

a) Dead or Steady load
b) Variable of fluctuating load
c) Impact load
d) Shock load

13. The maximum stress in stress strain diagram occurs on .....

a) Breaking point
b) Upper yield point
c) Lower yield point
d) Plastic region point

14. Three plates joined by one rivet joint when it is shared off, so how many times of shear occurs?

a) Three
b) Two
c) One
d) Zero

15. Localized compressive stress at the surface of contact between two members of machine part which have relative motion between them is called as....

a) Crushing stress
b) Compressive stress
c) Bearing stress
d) Tosional Shear stress

16 The height of letter or number on indicators should be equal to or more than,

(a) $\left(\frac{\text{reading distance}}{10}\right)$ (b) $\left(\frac{\text{reading distance}}{20}\right)$

(c) $\left(\frac{\text{reading distance}}{100}\right)$  (d) $\left(\frac{\text{reading distance}}{200}\right)$

17. Which one of the following is correct

a) Factor of safety is the ratio of of maximum stress to the ultimate stress.
b) Factor of safety is the ratio of ultimate stress to the maximum stress
c) Safety is the ratio of engineering stress to the ultimate stress.
d) Factor of safety is the ratio of maximum stress to the working stress.

18. Which of the following is not a method of reducing stress concentration

a) By fillets, undercutting and notches
b) Reducing the irregularity of shape
c) Reducing the shank diameter of threaded portion
d) Increasing the diameter of body

19. The external appearance is important in

(a) consumer durables like refrigerators and audiovisual equipment

(b) industrial products like cranes and hoists

(c) machine elements like gearbox, coupling or pressure vessel

(d) elevators, jigs and fixtures

20. The job of industrial designer is

(a) to carry out detailed stress analysis of the product

(b) to design industrial products like cranes and hoists

(c) to create aesthetically forms and shapes for the products

(d) to design the object on paper

21. The meaning of blue colour is

(a) the component is hot

(b) the component is cold

(c) the component is safe

(d) there is possible danger

22. The meaning of orange colour is

(a) the component is hot

(b) the component is cold

(c) the component is safe

(d) there is possible danger

23. Ergonomic deals with

(a) Design of controls and design of displays

(b) External look

(c) Appearance

(d) Working method

24. Speedometer is a

(a) display giving quantitative measurements

(b) display giving state of affair

(c) display indicating predetermined settings

(d) display having various setting

25. Moving scale or moving dial is used for

(a) display giving quantitative measurements

(b) display giving state of affair

(c) display indicating predetermined settings

(d) display the quality

26. When a component is subjected to a constant stress at high temperature over a long period of time it will undergo a slow and permanent deformation is called as.....

a) Fatigue
b) Creep
c) Notch sensitivity
d) Endurance

27. When large force is required to operate, the type of control used is

(a) knobs and switches

(b) levers

(c) push buttons

(d) wheels

28. Material used for machine tool bed is

(a) cast iron (b) mild steel

(c) high carbon steel (d) alloy steel

29. A cast iron designated by FG300 is,

(a) grey cast iron with carbon content of 3%

(b) grey cast iron with ultimate tensile strength of 300 N/mm2

(c) grey cast iron with ultimate compressive strength of 300 N/mm2

(d) grey cast iron with tensile yield strength of 300 N/mm2

30. A cast iron designated by BM350 is,

(a) blackheart malleable cast iron with carbon content of 3.5%

(b) blackheart malleable cast iron with ultimate tensile strength of 350 N/mm2

(c) blackheart malleable cast iron with ultimate compressive strength of 350 N/mm2

(d) blackheart malleable cast iron with tensile yield strength of 350 N/mm2

Design of Machine Elements

2. Design of joints, Levers and Offset Links

1. The joints which is temporarily fastening purpose and used to connect two coaxial rod or bar which are subjected to axial tensile and compressive forces.
   a) Knuckle joint
   b) Cotter joint
   c) Link joint
   d) Turn buckle

2. Which of the following is not the feature of cotter joint

   a) Quick assemble and dismantle
   b) The joint is simple to design
   c) The joint is easy to manufacture
   d) **It is the adjustable screw joint**

3. In the quarter is tight in socket and spigot it is subjected to ..... How to win it become loose bonding occurs

   a) Compressive stress
   b) Tensile stress
   c) **shear stress**
   d) Bearing stress

4. How much clearance is provided between the slots and cotter in cotter joint

a) 1 to 2 mm
b) 2 to 3 mm
c) 3 to 5 mm
d) 5 to 7 mm

5. Which joint is used to connect two circular rod which are under the action of tensile load

a) Cotter joint
b) **Knuckle Joint**
c) turnbuckle
d) Riveted joint

6. Knuckle joint knuckle pin is subjected to

a) Shear stress
b) Tensile stress
c) Bearing stress
d) Bending stress

7. Which joint is used to connect two round tie rod

a) Knuckle joint
b) cotter joint
c) turnbuckle
d) Reveting joint

8. Ratio of load lifted to the effort applied is called as

a) Velocity ratio
b) **mechanical advantage**
c) modulus of elasticity
d) Modular ratio

9. Which of the following is not the application of hand lever or foot lever

a) Handle of hand pump
b) handle of punching machine
c) lever of loaded safety valve.
d) **Automobiles steering system**

10. When the load is not act coincide with the centroidal axis of machine part is known as

a) Bending load
b) **Eccentric load**
c) Axial load
d) Coxial load

11. In the Lever safety valve the controlling force for the valve is provided by

a) Spring
b) **Dead weight**
c) Extra force
d) Balancing load

12. The lever whose two arms of the lever are at right angle to each other and which is used in railway signalling and hartnell governor is .....

a) Foot lever
b) Hand lever
c) **Bell crank lever**
d) Lever safty valve

13. The distance between centroidal axis and eccentric load is called as

a) Line of action
b) Symmetrical axis
c) Centricity
d) **Eccentricity**

14. Cotter joint is used to connect rod which are in

a) Compression only
b) **Tension and compression only**
c) Shear only
d) Tension only

15. In a turnbuckle one of the rod has left hand threads then other rod will have

a) **Right hand thread**
b) left hand thread
c) multiple thread
d) pointed thread

16. Joint is used to connect two ..... Rod

a) **Co-axial**
b) perpendicular
c) parallel
d) Eccentric

17. The diameter of knuckle pin in knuckle joint is usually taken as

a) 0.5d.
b) 0.8d
c) **d**
d) 1.2d

18. A cotter joint is used to transmit

(a) axial tensile force only

(b) axial tensile or compressive force

(c) axial compressive force only

(d) combined bending and torsional moment

19. The taper on cotter is usually

(a) 1 in 24 (b) 1 in 8 (c) 1 in 100 (d) 1 in 48

20. A taper is provided for cotter, which of the following is wrong

(a) to ensure tightness in operating condition

(b) to provide wedge action

(c) to ease the removal of cotter during dismantling

(d) to support the joint

21. The joint between the piston rod and the cross head of steam engine is

(a) Knuckle joint (b) universal joint

(c) Cotter joint (d) key joint

22. Cotter joint is not used for the joint between

(a) piston rod and crosshead of steam engine

(b) slide spindle and fork of valve mechanism

(c) piston rod and tail rod or pump rod

(d) connecting rod and crank

23. A knuckle joint is used to transmit

(a) axial tensile force only

(b) axial tensile or compressive force

(c) axial compressive force only

(d) combined bending and torsional moment

24. The joint in valve mechanism of reciprocating engine is

(a) knuckle joint (b) universal joint

(c) cotter joint (d) key joint

25. Knuckle joint is not used for the joint between

(a) tie bars in roof trusses (b) links in suspension bridge

(c) fulcrum of lever and support **(d) piston rod and crosshead of steam engine**

26. The pin in knuckle joint is subjected to

(a) double shear stress (b) torsional shear stress

(c) axial tensile stress (d) axial compressive stress

27. In lever terminology, ‘leverage’ is the ratio of

(a) load to effort (b) effort to load

(c) load arm to effort arm **(d) effort arm to load arm**

28. In levers,

(a) mechanical advantage is more than leverage

(b) mechanical advantage is less than leverage

(c) mechanical advantage is equal to leverage

(d) mechanical advantage is one half

29. The cross-section of lever is not available in

(a) rectangular (b) elliptical

(c) I – section **(d) L section**

30. The cross-section of lever is subjected to

(a) torsional moment (b) axial tensile force

(c) bending moment (d) axial compressive force

Design of Machine Elements

3. Design of Shaft, keys and couplings

1. Shaft is subjected to which of the following stresses

a) Bending
b) Torsional
c) Bending and torsional
d) Shear

2. A transmission shaft subjected to pure bending moment should be designed on the basis of

(a) maximum principal stress theory

(b) maximum shear stress theory

(c) distortion energy theory

(d) Goodman or Soderberg diagrams

3. Maximum shear stress theory is used for

(a) cast iron shafts **(b) steel shafts**

(c) flexible shafts (d) plastic shafts

4. Maximum principle stress theory is used for

(a) cast iron shafts (b) steel shafts

(c) Aluminum shafts (d) plastic shafts

5. Which is not function of key

(a) to connect transmission shaft to a rotating machine elements like gears

(b) to transmit torque from shaft to hub and vice versa

(c) to prevent relative rotational motion between the shaft and the connected element

(d) To minimize shear stress

6. The standard taper for sunk key is

(a) 1 in 100 (b) 1 in 50

(c) 1 in 10 (d) 1 in 1000

7. In case of sunk key,

(a) the keyway is cut in the shaft only

(b) the keyway is cut in the hub only

(c) the keyway is cut in both the shaft and the hub

(d) have a spline shape

8. In case of sunk key, power is transmitted by means of,

(a) friction force

(b) shear resistance of key

(c) torsional shear resistance of key

(d) tensile force

9. The standard width for square or flat key in terms of shaft diameter (d) is,

(a) d (b) d/2 **(c) d/4** (d) d/8

10 The standard height for flat key in terms of shaft diameter (d) is,

(a) d (b) d/2 (c) d/4 **(d) d/6**

.11 A transmission shaft is subjected to bending moment (M_b) and torsional moment (M_t). The equivalent torsional moment is given by,

(a) $\sqrt{(M_b + M_t)}$ (b) $\sqrt{(M_b)^2 + (M_t)^2}$

(c) $[M_b + M_t]$ (d) $M_b + \sqrt{(M_b)^2 + (M_t)^2}$

.12 A transmission shaft is subjected to bending moment (M_b) and torsional moment (M_t). The equivalent bending moment is given by,

(a) $\sqrt{(M_b + M_t)}$ (b) $\sqrt{(M_b)^2 + (M_t)^2}$

(c) $[M_b + M_t]$ (d) $M_b + \sqrt{(M_b)^2 + (M_t)^2}$

13. Splines are used if,

(a) the power to be transmitted is high

(b) the torque to be transmitted is high

(c) the speed is high

(d) there is relative motion between shaft and hub

14. Splines are commonly used in

(a) machine tool gear box

(b) automobile gear box

(c) hoist and crane gear box

(d) bicycle

15. A flange coupling is used

(a) for intersecting shafts

(b) for collinear shafts

(c) for small shafts rotating at slow speeds

(d) for parallel shafts

16. While designing a flange coupling, care is taken so that

(a) shaft is the weakest component

(b) bolts are the weakest component

(c) key is the weakest component

(d) the flange is the weakest component

17. A bushed-pin type flange coupling is used

(a) for intersecting shafts

(b) when the shafts are not in exact alignment

(c) for small shafts rotating at slow speeds

(d) for parallel shafts

18. A muff coupling is

(a) Rigid coupling

(b) flexible coupling

(c) shock absorbing coupling

(d) pin type coupling

19. When the axes of two shafts are parallel, use

(a) crossed helical gears (b) bevel

(c) worm gears **(d) spur or helical gears**

20. When the axes of two shafts are perpendicular and intersecting, use

(a) spur gears **(b) bevel gears**

(c) worm gears (d) helical gears

21. When the axes of two shafts are perpendicular and non-intersecting, use

(a) spur gears (b) bevel gears

(c) worm gears (d) helical gears

22. Which of the following type of gears are used for noiseless operation?

(a) spur gears (b) bevel gears

(c) worm gears **(d) helical gears**

23. Which of the following type of gears provide maximum velocity ratio?

(a) spur gears (b) bevel gears

(c) worm gears (d) helical gears

24. In metric system, the size of the gear tooth is specified by,

(a) circular pitch (b) diametral pitch

(c) module (d) pitch circle diameter

25. Backlash is

(a) sum of the clearances of pinion and gear teeth

(b) the amount by which the width of a tooth space exceeds the thickness of meshing tooth on pitch circle

(c) difference between the pitch circles of meshing gears

(d) difference between the dedendum and addendum of gear tooth

26. Beam strength of gear tooth is

(a) maximum tangential force that the tooth can transmit without bending failure

(b) maximum bending stress that the tooth can transmit without failure

(c) maximum tangential force that the tooth can transmit without pitting failure

(d) maximum contact stress that the tooth can transmit without failure

27. Lewis equation of gear tooth is based on

(a) maximum crushing stress in gear tooth

(b) maximum bending stress in gear tooth

(c) maximum shear stress in gear tooth

(d) maximum contact stress in gear tooth

28. According to Lewis equation

(a) pinion is always weaker than gear

(b) pinion is weaker than gear if made of same material

(c) gear is weaker than pinion if made of same material

(d) gear is weaker than pinion

29. Module is the reciprocal of …….

(a) Pitch

(b) Addendum

(c) Dimetral pitch

(d) Circular Pitch

30. The difference between tooth space and tooth thickness as measured on the pitch circle is called as ……

a) Pitch

(b) Addendum

(c) Dimetral pitch

(d) Backlash

Design of Machine Elements

Chapter 4th & 6th Design of Power Screw and Threaded Joints

1. Which of the following screw thread is used for jacks, vices and clamps?

(a) square threads (b) trapezoidal threads

(c) buttress threads (d) acme threads

2. Which of the following screw thread is used for transmitting power in either Direction?

(a) square threads (b) trapezoidal threads

(c) Buttress threads **(d) (a) and (b)**

3. Which of the following screw thread is used for transmitting force in one Direction?

(a) square threads (b) trapezoidal threads

(c) Buttress threads (d) V threads

4. Which of the following screw thread is adaptable to split type nut?

(a) square threads **(b) trapezoidal threads**

(c) Buttress threads (d) V threads

5. Which of the following screw thread is stronger than other threads?

(a) square threads (b) trapezoidal threads

(c) Buttress threads (d) V threads

6. Which of the following screw thread is used for lead screw of lathe?

(a) square threads **(b) trapezoidal threads**

(c) Buttress threads (d) V threads

7. Multiple threads are used for

(a) high efficiency (b) high mechanical advantage

(c) low efficiency for self-locking (d) high load carrying capacity

8. Power screws for transmission of power should have

(a) high efficiency (b) low efficiency

(c) self-locking characteristic (d) over hauling characteristic

9. For self locking screw

(a) $\phi > \alpha$ (b)$\alpha > \phi$

(c)$\mu < \tan\alpha$ (d)$\mu = \cos ec\ \alpha$

Where α = helix angle ϕ = friction angle μ = coefficient of friction

10. The efficiency of square threaded power screw is given by,

(a) $\eta = \frac{\tan\alpha}{\tan(\phi + \alpha)}$ (b) $\eta = \frac{\tan\alpha}{\tan(\phi - \alpha)}$

(c) $\eta = \frac{\tan(\phi + \alpha)}{\tan\alpha}$ (d) $\eta = \frac{\tan(\phi - \alpha)}{\tan\alpha}$

11 For over hauling screw

(a) $\phi > \alpha$ **(b)$\alpha > \phi$**

(c) $\phi = \alpha$ (d) none of above

Where α = helix angle ϕ = friction angle μ = coefficient of friction

12 A screw is said to be self-locking if its efficiency is

(a) equal to 50% (b) more than 50%

(c) less than 50% (d) more than 90%

13 A screw is said to be over hauling if its efficiency is

(a) equal to 50% **(b) more than 50%**

(c) less than 50% (d) exact 100%

14. The maximum efficiency of square threaded power is

(a) $\frac{1-\sin\phi}{1+\sin\phi}$ (b) $\frac{1+\sin\phi}{1-\sin\phi}$

(c) $\frac{1-\tan\phi}{1+\tan\phi}$ (d) $\frac{1+\tan\phi}{1-\tan\phi}$

15. The maximum efficiency of square threaded power depends upon

(a) lead angle of screw **(b) friction angle**

(c) pitch of screw (d) nominal diameter of screw

16. The efficiency of square threaded power is not depends upon

(a) mean diameter of screw (b) coefficient of friction

(c) pitch of screw **(d) Length of screw**

17. By using large thread angle in lifting machines

(a) the mechanical advantage is more

(b) the mechanical advantage is less

(c) the load will be sustained in absence of any effort

(d) the load is easily lifted

18. Setscrews are

(a) similar to tap bolts except that a greater variety of shapes of heads are available

(b) slotted for screw driver and generally used with a nut

(c) used to prevent relative motion between parts

(d) similar to studs

19. A self-locking screw has

(a) fine threads

(b) coarse threads

(c) two nuts

(d) coefficient of friction more than tangent of lead angle

20. The designation M 36 x 2 means

(a) metric fine threads of 36 mm outside diameter and 2 mm pitch

(b) metric coarse threads of 36 mm outside diameter and 2 mm pitch

(c) metric threads of 36 mm pitch diameter and 2 mm pitch.

(d) metric threads of 36 mm core diameter and 2 mm pitch

21. The designation M 20 means

(a) metric coarse threads of 20 mm outside diameter

(b) metric fine threads of 20 mm outside diameter

(c) metric threads of 20 mm core diameter

(d) metric threads of 20 mm pitch diameter

22. The largest diameter of external or internal screw thread is called

(a) major diameter (b) minor diameter

(c) pitch diameter (d) dedendum diameter

23. A screw is specified by

(a) major diameter (b) minor diameter

(c) pitch diameter (d) mean diameter

24. A washer is specified by

(a) outer diameter **(b) inner diameter**

(c) thickness (d) mean diameter

25. Machine bolts are

(a) through bolts with rough shank and used with nut

(b) are used to prevent relative motion between two parts

(c) similar to stud

(d) turned into a threaded hole in one of the parts

26. Castle nut is a locking device in which

(a) a smaller nut is tightened against main nut creating friction at the

Contacting surface

(b) a split pin is passed through diametrically opposite slots in nut and a

Hole in bolt and the two ends of split pin are separated and bent back on nut

(c) a slot is cut in the middle of nut along the length and a cap screw is

Provided to tighten the two parts of nut separated by slot

(d) an elastic piece is tightened in the nut by a setscrew

27. The coupler of turnbuckle has

(a) right hand threads on both ends

(b) left hand threads on both ends

(c) left hand threads on one end and right hand threads on other end

(d) no threads

28. Eyebolts are used

(a) to prevent relative motion between two parts

(b) to absorb shocks and vibrations

(c) to lift and transport machines and heavy objects on shop floor

(d) to prevent loosening of threads in bolted assembly

29. A stud is

(a) screw with long threads

(b) screw with circular head

(c) screw with hexagonal head

(d) headless screw with threads on both sides

30. When the shear strength of nut is half the tensile strength of bolt, the height Of nut (h) should be

(a) 5 dc h = 0. **(b) 25 dc h = 0.**

(c) 75 dc h = 0. (d) h = dc

Where dc = core diameter of threads

Design of Machine Element

5. Design of spring

1. Springs are not used for

(a) to absorb shocks and vibrations

(b) to store and release energy

(c) to measure force

(d) for Providing rigid support

2. The type of spring used to absorb shocks and vibrations in vehicles is,

(a) helical extension spring **(b) multi-leaf spring**

(c) spiral spring (d) Bellevile (coned disk) spring

3. The type of spring used to absorb and release energy in mechanical watches is,

(a) helical extension spring (b) multi-leaf spring

(c) spiral spring (d) helical torsion spring

4. The type of spring used in door hinges is,

(a) helical extension spring

(b) multi-leaf spring

(c) spiral spring

(d) helical torsion spring

5. The type of spring used to measure weights in spring balance is,

(a) helical extension spring

(b) multi-leaf spring

(c) spiral spring

(d) helical torsion spring

6. The type of spring used in valve mechanism is,

(a) helical compression spring

(b) multi-leaf spring

(c) spiral spring

(d) helical torsion spring

7. The type of spring used in vehicle clutches is,

(a) helical compression spring

(b) Belleville spring

(c) a and b

(d) helical torsion spring

8. When the helical compression spring is subjected to axial compressive force, the type of stress induced in the spring wire is,

(a) tensile stress

(b) compressive stress

(c) bending stress

(d) torsional shear stress

9. When the helical extension spring is subjected to axial tensile force, the type of stress induced in the spring wire is,

(a) tensile stress

(b) compressive stress

(c) bending stress

(d) torsional shear stress

10. The maximum shear stress in spring wire is induced at

(a) inner surface of the coil

(b) outer surface of the coil

(c) central surface of the coil

(d) end coils

11. When the helical torsion spring is subjected to torque, the type of stress induced in the spring wire is,

(a) tensile stress

(b) compressive stress

(c) bending stress

(d) torsional shear stress

12. The leaves of multi-leaf spring are subjected to

(a) tensile stress

(b) compressive stress

(c) bending stress

(d) torsional shear stress

13. The spring operates

(a) within plastic limit

(b) within elastic limit

(c) within elasto-plastic limit

(d) within visco-elastic limit

14 Wahl factor to account for direct shear stress and stress concentration due to curvature for helical springs is given by,

(a) $\frac{4C-1}{4C-4}+\frac{0.615}{C}$ (b) $\frac{4C-1}{4C+4}+\frac{0.615}{C}$

(c) $\frac{4C+1}{4C-4}+\frac{0.615}{C}$ (d) $\frac{4C+1}{4C+4}+\frac{0.615}{C}$

15 Two springs of stiffness k_1 and k_2 are connected in series, the combined stiffness of the connection is given by,

(a) $\frac{k_1 k_2}{k_1+k_2}$ (b) $\frac{k_1 k_2}{k_1-k_2}$ (c) k_1+k_2 (d) $\frac{k_1+k_2}{k_1 k_2}$

16 Two springs of stiffness k_1 and k_2 are connected in parallel, the combined stiffness of the connection is given by,

(a) $\frac{k_1 k_2}{k_1+k_2}$ (b) $\frac{k_1 k_2}{k_1-k_2}$ (c) k_1+k_2 (d) $\frac{k_1+k_2}{k_1 k_2}$

17. When a helical spring is cut into two halves, the stiffness of each half spring will be,

(a) same as original spring

(b) double of original spring

(c) half of original spring

(d) one fourth of original spring

Vineet Sir

18. When two concentric springs are made of same material, having same free length and compressed equally by axial load, then the load shared by each spring is proportional to.

(a) spring index of each spring

(b) wire diameter of each spring

(c) mean coil diameter of each spring

(d) square of wire diameter of each spring

19. The function of automotive multi-leaf spring is

(a) to measure the force

(b) to store and release energy

(c) to absorb shocks and vibrations

(d) to activate the mechanism

20. The stiffness of spring is,

(a) deflection per unit of axial force

(b) force per unit cross-sectional area of spring

(c) ratio of mean coil diameter to wire diameter

(d) force required to produce unit deflection

21. The spring index is,

(a) ratio of wire diameter to mean coil diameter

(b) force per unit cross-sectional area of spring

(c) ratio of mean coil diameter to wire diameter

(d) force required to produce unit deflection

22. The ends of spring, which are in contact with the seat, are,

(a) active coils

(b) inactive coils

(c) transmit maximum force

(d) do not transmit any force

23. Which is not the property of spring

(a) High elastic limit

(b) High deflection value

(c) Resistance to fatigue and shock

(d) Brittleness

24. The longest leaf in a leaf spring is called ……

a) middle leaf

b) master leaf

c) graduated leaf

d) sleeve leaf

25. If the spring is compressed completely and the adjacent coils touch each other, the length of spring is called as?

a) Solid length

b) Compressed length

c) Free length

d) overall length

26. Find the spring index if the diameter of coil is 8 mm and wire diameter is 2 mm

a) 2

b) 3

c) 4

d) 5

27. **I**n which condition the axial distance between two adjacent coils is called as pitch?

a. Compressed condition

b. uncompressed condition

c. under tension

d. Solid condition

28. Solid length for helical compression springs having square and ground ends is given as _____.

a. (n + 2)d

b. (n + 3)d

c. (n + 1)d

d. (n + 1) + d

29. In spring balances, the spring is used

(a) To apply forces

(b) To absorb shocks

(c) To store strain energy

(d) To measure forces

30. Resilience of spring is

(a) Strain energy per unit length

(b) Strain energy per unit area

(c) Strain energy per unit mass

(d) Energy Stored in it

Design of Machine

7th & 8th. Design of Welded joint And Antifriction Bearing

1. In fusion welding process

(a) only heat is used

(b) only pressure is used

(c) combination of heat and pressure is used

(d) high pressure and low heat is used

2. The principle of applying heat and pressure is used in

(a) spot welding

(b) laser welding

(c) fusion welding

(d) gas welding

3. The size of a fillet weld is given by,

(a) throat of fillet

(b) smaller side of triangle

(c) hypotenuse of triangle

(d) bigger side of triangle

4. The transverse fillet welds are designed for

(a) tensile strength

(b) shear strength

(c) bending strength

(d) compressive strength

5. The parallel fillet welds are designed for

(a) tensile strength

(b) shear strength

(c) bending strength

(d) compressive strength

6. In butt joint, the size of weld is equal to

(a) 0.5 x throat of weld

(b) Throat of weld

(c) 2 x throat of weld

(d) 2 x throat of weld

7. Which type of joint is used if plate thickness is less than 5 mm?

a. Single V butt weld

b. Single U butt weld

c. Square butt weld

d. Double U butt weld

8. A lap joint is always subjected to

(a) bending moment

(b) Torsional moment

(c) Tensile force

(d) Compressive force

9. The advantage of a welded joint over a riveted joint is

(i) Introduce residual stresses

(ii) Requires highly skilled labor and supervision

(iii) Lighter in weight

(iv) Less skilled worker is required

10. In order to avoid starting and stopping the weld run …….. mm should be added to the length of weld

a) 12
b) 12.2
c) 12.5
d) 12.8

11. For single parallel fillet weld

a) W = 0.707 × s .l .τ
b) W = 0.705 × s .l .τ
c) W = 0.707 × s .l .бt
d) W =2 × 0.707 × s .l .бt

12. For double transverse fillet weld

a) W = 2 × 0.707 × s .l .τ
b) W = 2 × 0.705 × s .l .τ
c) W = 0.707 × s .l .бt
d) W = 2 × 0.707 × s .l .бt

13. The stress concentration factor of welded joint for transverse fillet weld and parallel fillet weld are ----------

a) 2.7 and 1.7
b) 2.7 and 1.5
c) 1.5 and 2.7
d) 1.7 and 2.7

14. In radial bearings, the load acts

(a) along the axis of rotation

(b) perpendicular to the axis of rotation

(c) parallel to the axis of rotation

(d) radially

15. In thrust bearings, the load acts

(a) along the axis of rotation

(b) perpendicular to the axis of rotation

(c) parallel to the axis of rotation

(d) radial to bearing

16. Antifriction bearings are

(a) oil lubricated bearings

(b) bush bearings

(c) ball and roller bearings

(d) boundary lubricated bearings

17. Rolling contact bearings as compared to sliding contact bearings have

(a) lower starting torque

(b) require considerable axial space

(c) generate less noise

(d) costly

18. Stress induced in the balls or rollers of rolling contact bearing is

(a) torsional shear stress

(b) tensile stress

(c) crushing stress

(d) contact stress

19. In an application, the bearing is subjected to radial as well as axial loads.

Which type of rolling contact bearings you would suggest?

(a) cylindrical roller bearing

(b) needle roller bearing

(c) thrust ball bearing

(d) taper roller bearing

20. The rolling contact bearing is known as

(a) sleeve bearing

(b) thin film bearing

(c) antifriction bearing

(d) bush bearing

21. The balls of rolling contact bearings are made of

(a) case hardened steel

(b) plain carbon steel

(c) high carbon chromium steel

(d) free cutting steel

22. The rollers of rolling contact bearings are made of

(a) case hardened steel

(b) plain carbon steel

(c) high carbon chromium steel

(d) free cutting steel

23. Taper roller bearing is used to take

(a) only radial load

(b) only axial load

(c) only torque

(d) both axial and radial loads

24. The catalogue life of bearing is

(a) minimum life that 90% of the bearings will reach or exceed

(b) maximum life for 90% of the bearings

(c) average life

(d) median life

25. The last two digits of the bearing designation give the bore diameter of rolling contact bearings when multiplies by,

(a) 10 **(b) 5**

(c) 100 (d) π

26. A bearing number XX10 indicates that the bearing is having

(a) bore diameter of 10 mm

(b) bore diameter of 100 mm

(c) bore diameter of 50 mm

(d) outer diameter of 100 mm

27. A zero film bearing is a bearing

(a) where the surfaces of journal and the bearing are separated by a thick film of lubricant

(b) where the surfaces of journal and the bearing are partially separated by a film of lubricant and there is partial metal to metal contact

(c) where the surfaces of journal and the bearing are separated by a film created by elastic deflection of parts

(d) where there is no lubricant

28. A thin film bearing is a bearing

(a) where the surfaces of journal and the bearing are completely separated by a film of lubricant

(b) where the surfaces of journal and the bearing are partially separated by a film of lubricant and there is partial metal to metal contact

(c) where the surfaces of journal and the bearing are separated by a film created by elastic deflection of parts

(d) where there is no lubricant

29. In hydrodynamic bearing,

(a) the axis of journal is eccentric with respect to axis of bearing

(b) the axis of journal is concentric with respect to axis of bearing

(c) the axis can be either eccentric or concentric depending upon speed

(d) the axis of journal is parallel with respect to axis of bearing

30. In hydrostatic bearing,

(a) the axis of journal is eccentric with respect to axis of bearing

(b) the axis of journal is concentric with respect to axis of bearing

(c) the axis can be either eccentric or concentric depending upon speed

(d) the axis of journal is parallel with respect to axis of bearing