

[HPSSSC - JE (ME) MACHINE DESIGN]**[SET-I]**

1. Resilience of a material is important when subjected to

- (a) fatigue
- (b) wear and tear
- (c) shock loading
- (d) inertia loading

Ans: (c)

2. Fatigue consideration plays an important role in the design of all the following components, except.

- (a) bridges
- (b) springs
- (c) bearings
- (d) keys

Ans: (d)

3. The endurance limit, i.e., resistance to fatigue of a machine element can be improved by

- (a) heat treatment
- (b) grinding and lapping the surface
- (c) electroplating
- (d) polishing

Ans: (b)

4. Factor of safety is the ratio of

- (a) breaking stress to working stress
- (b) endurance limit to yield stress
- (c) elastic limit to ultimate stress
- (d) yield stress to working stress

Ans: (d)

5. The selection of the factor of safety in design is not dependent upon:

- (a) service conditions
- (b) nature of load
- (c) size of component
- (d) material of component

Ans: (c)

6. Residual stresses are present in

- (a) cold rolled shafts
- (b) hot rolled shafts

(c) cast shafts

(d) forged shafts

Ans: (d)

7. For steel, the ultimate strength of steel in tension and shear strength conform to the ratio

- (a) 3 : 1
- (b) 3 : 2
- (c) 5 : 3
- (d) 2 : 1

Ans: (b)

8. Compared to steel, the compressive strength of wood is nearly

- (a) 1/7
- (b) 1/35
- (c) 1/80
- (d) 1/44

Ans: (a)

9. When a material is subjected to fatigue loading, the ratio of the endurance limit to the ultimate tensile stress is nearly equal to

- (a) 0.25
- (b) 0.35
- (c) 0.5
- (d) 0.7

Ans: (d)

10. The localized compressive stress at the area of contact between two mating members is the

- (a) bending stress
- (b) tensile stress
- (c) shearing stress
- (d) bearing stress

Ans: (d)

11. The design of aluminium members is usually based on

- (a) elastic limit stress
- (b) yield stress
- (c) shearing stress
- (d) bearing

Ans: (b)

12. Under axial load, each section of a close-coiled spring is subjected to

- (a) tensile stress and shear stress due to load
- (b) compressive stress and shear stress due to torque

(c) tensile stress and shear stress due to torque

(d) torsional and direct shear stresses

Ans: (d)

13. A closed coil helical spring is subjected to torque about its axis. The spring wire would experience

(a) bending stress

(b) direct shear stress

(c) torsional shearing stress

(d) direct tensile stress of uniform intensity at its cross-section

Ans: (a)

14. According to maximum stress theory of failure, permissible twisting moment in a circular shaft is T . The permissible twisting moment in the same shaft as per the maximum principle stress theory will be

(a) $\frac{T}{2}$ (b) T

(c) $\sqrt{2}T$ (d) $2T$

Ans: (b)

15. Who postulated the maximum distortion energy theory?

(a) Tresca (b) Rankine

(c) St. Venant (d) Mises- Henky

Ans: (d)

17. A static load mounted at the centre of a shaft rotating at uniform angular velocity. This shaft will be designed for

(a) the maximum compressive stress (static)

(b) the maximum tensile stress (static)

(c) the maximum bending moment (static)

(d) fatigue loading

Ans: (d)

18. According to Guest's theory, the failure occurs at a point in a member when the maximum shear stress in a bi-axial stress system

reaches the shear stress at elastic limit in simple tension test. The Guest's theory is applicable to:

(a) tough materials

(b) plastic materials

(c) ductile materials

(d) brittle materials

Ans: (c)

19. The maximum distortion energy theory of failure is suitable to predict the failure of which one of the following type of materials?

(a) brittle (b) ductile

(c) composite (d) plastics

Ans: (b)

20. Rankine's theory of failure is used for which type of the following materials?

(a) brittle (b) ductile

(c) plastic (d) tough

Ans: (a)

21. The basic hole system in one whose

(a) lower deviation is zero

(b) upper deviation is zero

(c) both the lower and upper deviations are zero

(d) lower and upper deviations are within prescribed limits

Ans: (a)

22. Which of the followings is not true in relation to a particular dimension specified as (100 ± 0.1) mm?

(a) maximum allowable size is 100.1 mm

(b) minimum allowable size is 99.9 mm

(c) tolerance is 0.2 mm

(d) system is unilateral in character

Ans: (d)

23. The algebraic difference between the actual size and the corresponding basic size is known as

(a) deviation

(b) tolerance

- (c) allowance
- (d) clearance

Ans: (a)

24. The basic shaft system is one whose

- (a) lower deviation is zero
- (b) upper deviation is zero
- (c) both the upper and lower deviations are zero
- (d) lower and upper deviations are within prescribed limits

Ans: (d)

25. The algebraic difference between the minimum limit of size and the corresponding basic size is

- (a) clearance
- (b) allowance
- (c) lower deviation
- (d) interference

Ans: (b)

26. The difference between the higher limit and the lower limit of size is known as

- (a) deviation
- (b) tolerance
- (c) allowance
- (d) interference zone

Ans: (b)

27. The difference between the maximum material limits of mating parts is called

- (a) clearance
- (b) deviation
- (c) tolerance
- (d) allowance

Ans: (d)

28. For maximum power economy, the belt speeds should lie between

- (a) 5-10 m/s
- (b) 10-15 m/s
- (c) 15-20 m/s
- (d) 25-30 m/s

Ans: (d)

29. Creep in belt drive is the result of

- (a) Improper crowing
- (b) Plasticity of belt material
- (c) Differential elongation of belt due to difference in tension on two sides of the pulley
- (d) Change in the co-efficient of friction due to over heating while in operation over extended period of time

Ans: (c)

30. The good centre distance between pulleys in belt drive system is

- (a) 4-5 m
- (b) 6-7-5 m
- (c) 8-10 m
- (d) 10-15 m

Ans: (b)

31. Due to various losses, the overall efficiency of belt drive is about

- (a) 80%
- (b) 85%
- (c) 90%
- (d) 95%

Ans: (d)

32. The co-efficient of friction between the belt material and the pulley surface is not affected by

- (a) Material of the belt and pulley surface
- (b) Centre distance between the pulleys
- (c) Belt speed
- (d) Slip in the system

Ans: (d)

33. For leather belts, the initial tension ranges from

- (a) 0.4 – 0.7 N/mm²
- (b) 0.8 – 1.3 N/mm²
- (c) 1.4 – 1.7 N/mm²
- (d) 1.8 – 2.2 N/mm²

Ans: (d)

34. The power transmitted by a belt drive is not affected by

- (a) Difference in belt tensions
- (b) Velocity of the belt
- (c) Centre distance between the pulleys
- (d) Coefficient of friction

Ans: (c)

35. For the transmission of maximum

- (a) $T_1 = \frac{T}{3}$
- (b) $T_1 = \frac{2T}{3}$
- (c) $T_1 = \frac{3T}{4}$
- (d) $T_1 = \frac{3T}{5}$

Ans: (b)

36. It is usual practice to neglect the effect of centrifugal force if the belt speed is upto

- (a) 5 m/s
- (b) 10 m/s
- (c) 15 m/s
- (d) 20 m/s

Ans: (b)

37. Which of the following belt material has maximum density?

- (a) leather
- (b) balata
- (c) canvas
- (d) rubber

Ans: (d)

38. The inclined angle for the V-belt usually lies in the range

- (a) 10-20 degree
- (b) 20-30 degree
- (c) 30-40 degree
- (d) 40-50 degree

Ans: (c)

39. Which category of following chains is not used for power transmission?

- (a) Roller chains
- (b) Bush chains
- (c) Tractive chains
- (d) Inverted tooth chain

Ans: (c)

40. Suggest the chain for high speed ratio

- (a) Silent chain
- (b) Bush chain
- (c) Bush roller chain
- (d) Hooked-link belt chain

Ans: (a)

41. The power capacity of a duplex chain is _____ times the power capacity of a single chain.

- (a) 1.25
- (b) 1.5
- (c) 1.7
- (d) 2.0

Ans: (c)

42. Size of the gear is generally specified by

- (a) Pitch circle diameter
- (b) Working depth
- (c) Module
- (d) Tooth thickness

Ans: (a)

43. Thickness of tooth is measured along

- (a) Root circle
- (b) Pitch circle
- (c) Addendum circle
- (d) Dedendum circle

Ans: (b)

44. The backlash for spur gear depends upon

- (a) Tooth profile
- (b) module
- (c) Pitch line velocity
- (d) Both tooth module and pitch line velocity

Ans: (d)

45. Rack is a gear with

- (a) Infinite number of teeth
- (b) Infinite pitch circle diameter
- (c) Space width equal to thickness of mating tooth
- (d) Working depth equal to tooth thickness

Ans: (d)

46. Lewis equation is applied

- (a) only to gear
- (b) only to pinion
- (c) to weaker of the pinion and gear
- (d) to stranger of the pinion and gear

Ans: (c)

47. To make a worm drive reversible, it is necessary to increase

- (a) centre distance
- (b) worm diameter factor
- (c) number of starts
- (d) reduction ratio

Ans: (c)

48. In a single reduction, a large velocity ratio is required. The best transmission is

- (a) spur gear drive
- (b) helical gear drive
- (c) bevel gear drive
- (d) worm gear drive

Ans: (d)

49. Worm gearing is used to obtain considerable speed reduction between shafts whose axis are

- (a) perpendicular and do not intersect
- (b) Perpendicular and intersect
- (c) Inclined
- (d) Parallel

Ans: (a)

50. In worm gearing system, the angle between the inclined faces in axial plane is _____ the pressure angle.

- (a) half
- (b) equal
- (c) two times
- (d) three times

Ans: (c)