1) For a component subjected to complex loading, the dimensions obtained from different theories of failures are arranged in descending order. Which of the following statements is true?

a)Von Mises > Tresca (or Guest) > Rankine
b) Tresca (or Guest > Von Mises > Rankine
c) Rankine > Von Mises > Tresca (or Guest)
d) Von Mises > Rankine > Tresca (or Guest)

2) The type of stresses developed in the key is/are

(a) shear stress alone
(b) bearing stress alone
(c) both shear and bearing stresses
(d) shearing, bearing and bending stresses

3) A shaft is subjected to a maximum bending stress of 80N/mm2 and maximum shearing stress equal to 30N/mm2 at a particular section. If the yield point in tension of the material is 280N/mm2 and the maximum shear stress theory of the failure is used ,then the factor of safety obtained will be

a) 2.5
b) 2.8
c) 3.0
d) 3.5

4) The working area should be illuminated _____ their surroundings.

a) More than
b) Less than
c) Equal to
d) Depends upon type of job performed

5) The size of letters or numbers on the indicator for proper display should be ____

a) Reading distance> Height of letter or number/150
b) Height of letter or number >=Reading distance/200
c) Reading distance> Height of letter or number/200
d) Height of letter or number<=Reading distance/150

6) Guest's theory is used for

Brittle materials
Ductile materials
Elastic materials
Plastic materials

7) In static loading stress concentration is more serious in

Brittle materials
Ductile materials
Elastic materials
Plastic materials

8) A shaft is subjected to fluctuating loads for which the normal torque(T) and bending moment (M) are 1000N-Mm and 5000 N-m resp, If the combined shock and fatigue factor for bending is 1.5 and combined shock and fatigue factor for torsion is 2, then the equivalent twisting moment for the shaft is

2000N-m
2050N-m
2100N-m
2136N-m

9) coiled helical compression spring A of mean diameter 50mm is subjected to an axial load W. Another spring B of mean diameter 25mm is similar to spring A in all respects .The deflection of spring B will be _____ as compared to spring A

One-eight
One-fourth
One –half
Double

10) A screw is said to be overhauling screw if its efficiency is

a) Less than 50%
b) More than 50%
c) Equal to 50%
d) There is no overhauling effect

11) In a flange coupling the keys are staggered at _____ along the circumference of the shafts in order to divide the weakling effect caused by key ways

a) 900
b) 1350
c) 1600
d) 1800

12) The draw of cotter should not be more than

a) 3mm
b) 6 mm
c) 8 mm
d) 12 mm

13) The maximum shear stress developed in a beam of rectangular section is ..... the average shear stress.

(a) equal to
(b) 4/3 times
(c) 1.5 times
d) 2 times

14) In transverse fillet welded joint, the size of weld is equal to

(a) 0.5 × Throat of weld
(b) Throat of weld
(c) 2 × Throat of weld
(d) 2 × Throat of weld

15) Ergonomics principle suggests that

a)Monitoring displays should be placed outside peripheral limitations
b)Glow-in-the dark dials made of reflective substances are good for viewing in the nights
c) Visual systems should be preferred over auditory systems in noisy locations
d) Presence or absence of some specific object

16) which of the following is not a mode of failure

a) failure by elastic deflection;
b) failure by cutting
c) failure by general yielding
d)failure by fracture

17) what is diameter of the rod in a knuckle joint used to connect two circular rods subjected to an axial tensile force of 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression

a) 49.2
b) 50.4
c) 53.33
d) 48.66

18) which of the following is not true about curved beams
a) neutral axis in unloaded condition is curved instead of straight.
b) Plane sections perpendicular to the axis of the beam remain plane after bending.
c) The moduli of elasticity in tension and compression are equal.
d)The material is heterogeneous and doesn't obeys Hooke's law

19) what is the the value of minimum ultimate strength by soderberg relation if a machine component is subjected to a flexural stress which fluctuates between + 300 MN/m2 and – 150 MN/m2.
a) 1172.72 MN/m2
b) 1750.85 MN/m2
c) 1000.23 MN/m2
d) 1027.66 MN/m2

20) Failure of a material is called fatigue when it fails
(a) at the elastic limit
(b) below the elastic limit
(c) at the yield point
(d) below the yield point

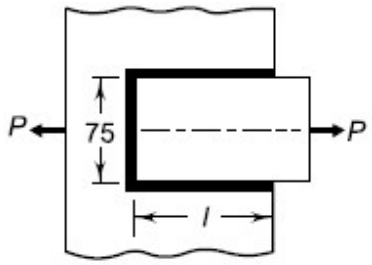
21) The load cup of a screw jack is made separate from the head of the spindle to
(a) enhance the load carrying capacity of the jack
(b) reduce the effort needed for lifting the working load
(c) reduce the value of frictional torque required to be countered for lifting the load
(d) prevent the rotation of load being lifted

22) A bolt of M 24 × 2 means that
(a) the pitch of the thread is 24 mm and depth is 2 mm
(b) the cross-sectional area of the threads is 24 mm2
(c) the nominal diameter of bolt is 24 mm and the pitch is 2 mm
(d) the effective diameter of the bolt is 24 mm and there are two threads per cm

23) what diameter of shaft to be used in a flange coupling transmitting 90 kW at 250 r.p.m. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1° in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa.
a) 78mm
b) 80mm
c) 90mm
d) 76mm

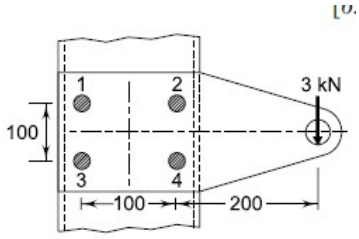
24) A hydraulic press has a maximum capacity of 1000 kN. The piston diameter is 250 mm. what is the wall thickness if the cylinder is made of material for which the permissible strength may be taken as 80 MPa. This material may be assumed as a brittle material.
a) 40mm
b) 48 mm
c) 37mm
d) 52 mm

25) A plate, 75 mm wide and 10 mm thick, is joined with another steel plate by means of single transverse and double parallel fillet welds, as shown in Fig. The joint is subjected to a maximum tensile force of 55 kN. The permissible tensile and shear stresses in the weld material are 70 and 50 N/mm2 respectively. Determine the required length of each parallel fillet weld.



a) 29mm
b) 45mm
c) 80mm
d) 10mm

26) A steel plate subjected to a force of 3 kN and fixed to a vertical channel by means of four identical bolts is shown in Fig. The bolts are made of plain carbon steel 45C8 (Syt = 380 N/mm2) and the factor of safety is 2. What is the diameter of the shank



a) 6.58 mm
b) 5.89 mm
c) 10.55 mm
d) 6.11 mm

27) If nominal diameter of screw thread=50mm and pitch=10mm then the mean diameter of the screw thread will be?
a) 40mm
b) 45mm
c) 60mm
d) 55mm

28) Find the shear stress in the spring wire used to design a helical compression sprig if a load of 1200N is applied on the spring. Spring index is 6, and wire diameter 7mm.
a) 452.2N/mm²
b) 468.6N/mm²
c) 512.2N/mm²
d) 621.2N/mm²

29) If a body is subjected to stresses in xy plane with stresses of 60N/mm² and 80N/mm² acting along x and y axes respectively. Also the shear stress acting is 20N/mm²Find the maximum amount of shear stress to which the body is subjected.
a) 22.4mm
b) 25mm

c) 26.3mm
d) 27.2mm

30) A flat plate 30mm wide and “t”mm wide is subjected to a tensile force of 5kN. The plate has a circular hole of diameter 15mm with the centre coinciding with the diagonal intersection point of the rectangle. If stress concentration factor=2.16, find the thickness of the plate if maximum allowable tensile stress is $80N/mm^2$.
a) 8mm
b) 9mm
c) 10mm
d) 12mm