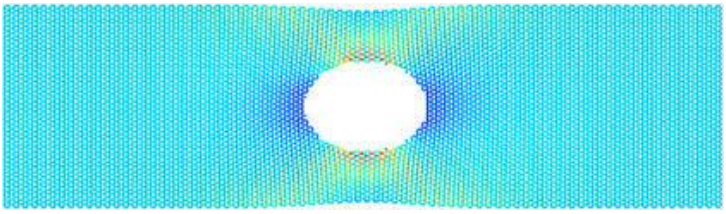
UNIT-2
VARIABLE STRESSES AND JOINT

Topic1-Stress concentration

1. **Stress concentration factor is defined as**



2. **Stress concentration occurs due to abrupt change in cross-section**

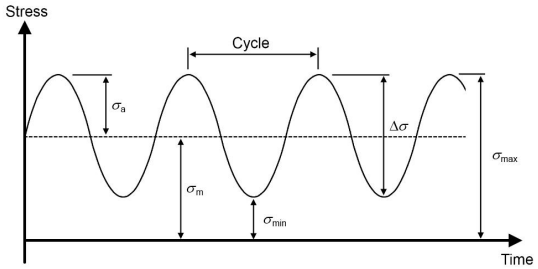
True	
False	

3. **Stress concentration occurs at the contact between**
   a) meshing teeth of driving and driven gears
   b) cam and follower
   c) balls and races in ball bearing
   d) meshing teeth of driving and driven gears,cam and follower,balls and races in ball bearing

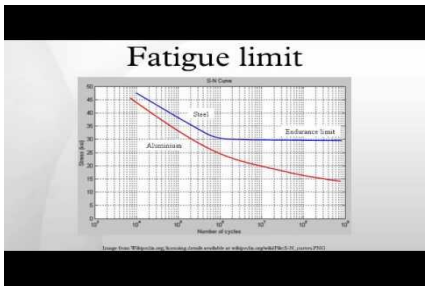
Topics 2- Design for variable loading

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

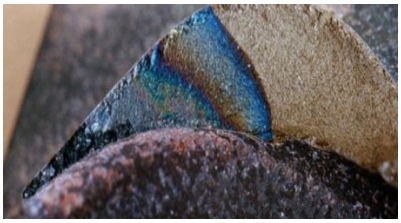
   a) 2
   b) 3
   c) 2.5
   d) 1



5. **What are factors affecting endurance (Fatigue) Strength / endurance limit?**

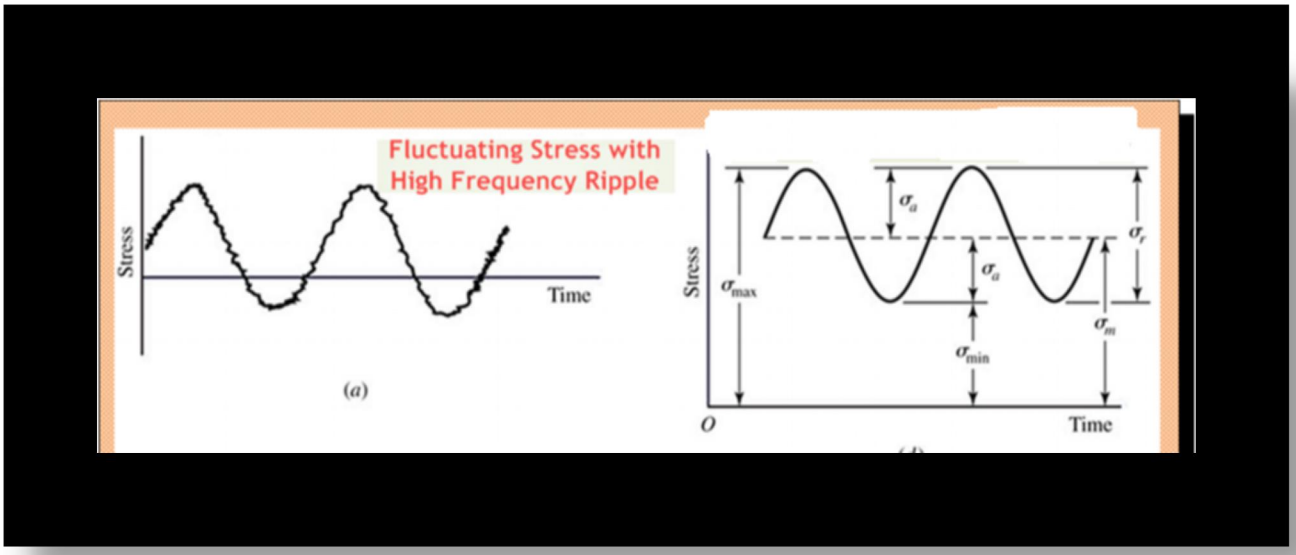


6. **What are the different failure modes of machine components?**

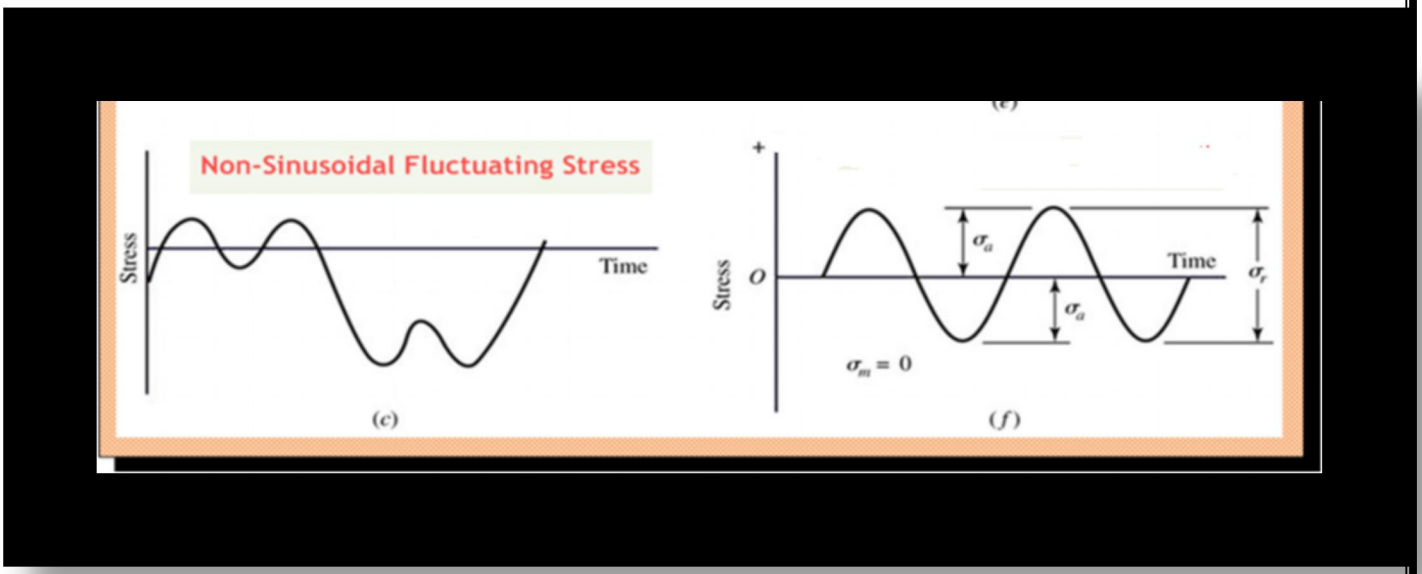


7. **Differentiate between sudden and impact loads**

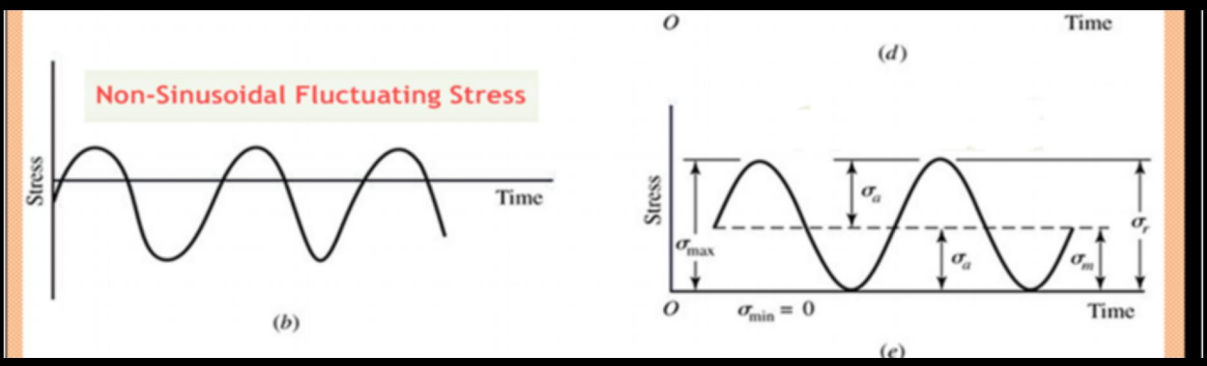
8. Name the type of Stress for the following Picture



Answer:



Answer:



Answer:

9. The factor of safety for machine parts subjected to reversed stresses is

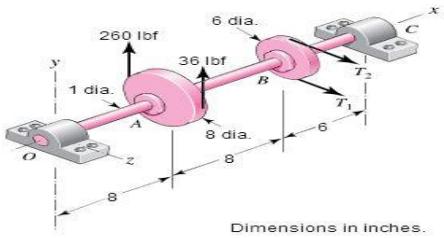
a) ratio of yield strength to maximum stress
b) ratio of endurance limit to amplitude stress
c) ratio of ultimate tensile strength to maximum stress
d) ratio of endurance limit to mean stress

10. **Match the Following**

Completely Reversed Loading – Gears, Chain
Repeated Loading – Shafts carrying pulleys
Fluctuating Loading – IC engine connecting rods
Alternating Loading – Vehicle springs, Engine valve springs

11. Name the Type of Variable Stress for give Transmission Element

Answer:



Answer:

Answer:

Answer:

12. **In some situations, third principle stress being zero must be taken into calculation of maximum shear stress. Why?**

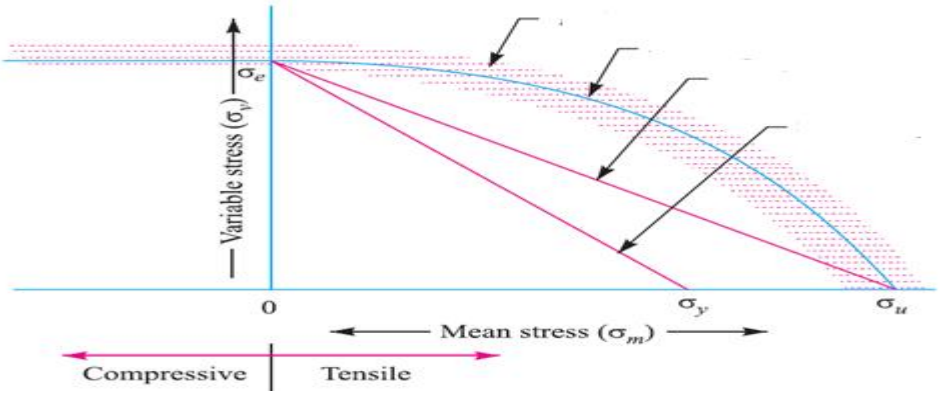
13. As the size of the component increases, the endurance limit of the component

o o

(Increase/Decrease**)**

Topic 3- Soderberg, Goodman and Gerber relations

14. Name the Region theories of Fatique failure for the given given graph



15. Write Soderberg's equation and state its application to different type of loadings.

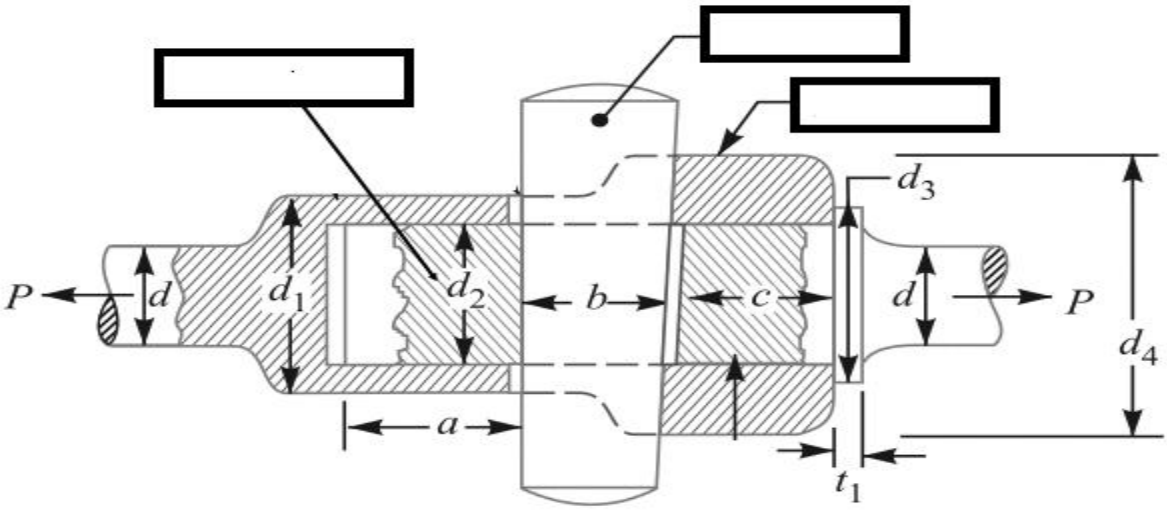
16. Write the design equation for Finite Life.

17. 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

Topic 4-Cotter joints

18.Name the part for the given Cotter joint



19.A cotter joint is used to transmit

a) axial tensile or compressive force
b) axial tensile force only
c) axial compressive force only
d) combined bending and torsional moment

20.**Cotter joint is used for the joint between**

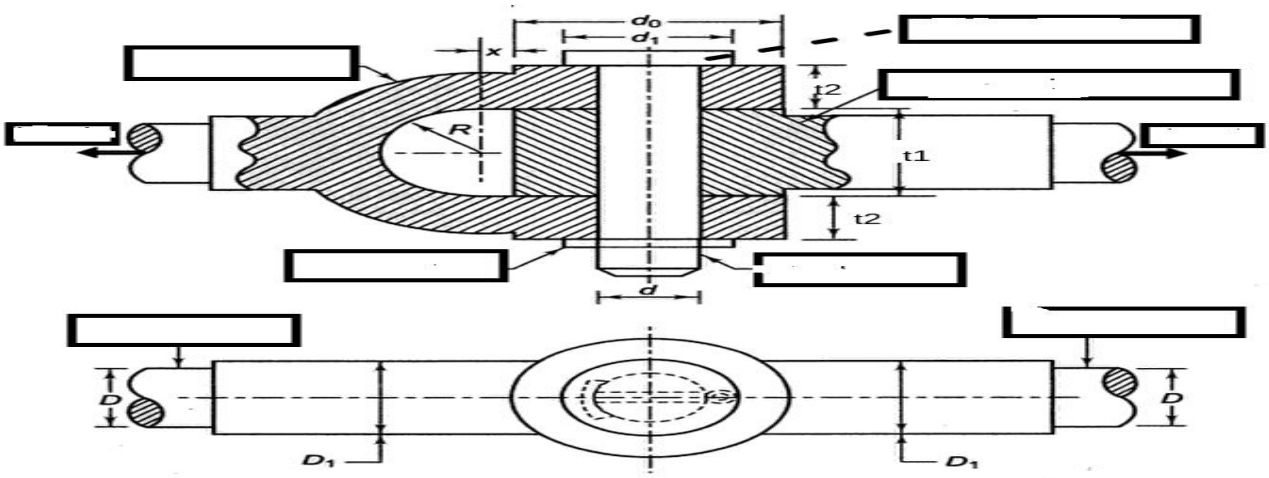
a) piston rod and crosshead of steam engine
b) slide spindle and fork of valve mechanism
c) piston rod and tail rod or pump rod

21.The Purpose taper is provided for cotter is _____

22.Why Soderberg relation is called the most conservative design equation

Topic 5- Knuckle joints

23.Name the part for the given Knuckle joint

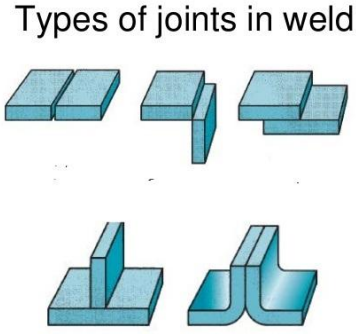


24.Knuckle joint is used for the joint between

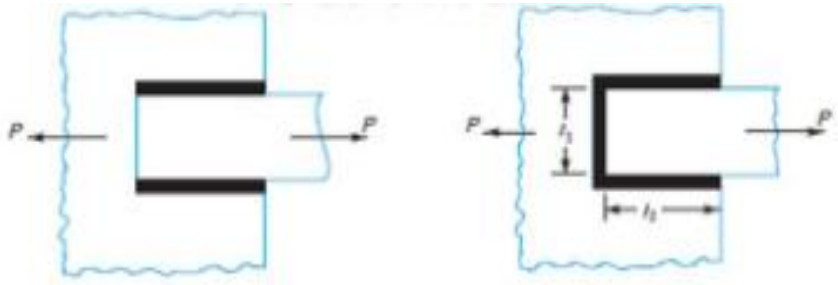
a) tie bars in roof trusses
b) links in suspension bridge
c)fulcrum of lever and support
d)all three applications

Topic-7 Welded Joints

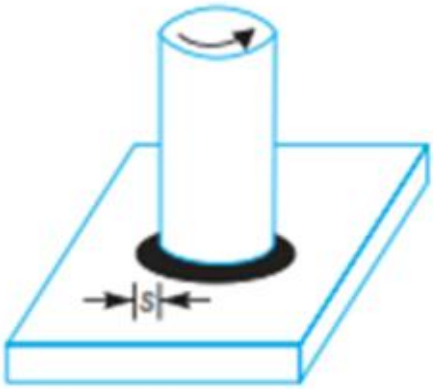
25.Identify the type of welded joint for the given welded joints



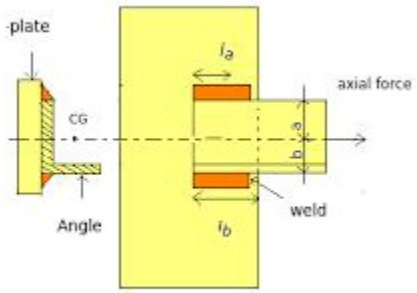
26.Identify the type of weld for the given weled joints based on loading condition



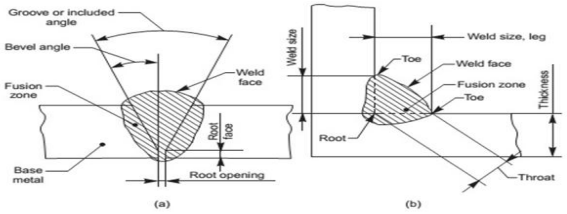
27.A 65 mm diameter solid shaft is to be welded to a flat plate by a fillet weld around the circumference of the shaft. Determine the size of the weld if the torque on the shaft is 3 KN-m. The allowable shear stress in the weld is 70 MPa



28.Identify the Type of weld for the given welded Joints



29.What are the assumptions made in the design of welded joint?



30.A circular rod 50mm in diameter and 200 mm long is welded to a plate by fillet welding all around the circumference as shown in figure. The size of the weld is 15mm. The section modulus of the weld is 22000mm3. Determine the resultant in the weld.

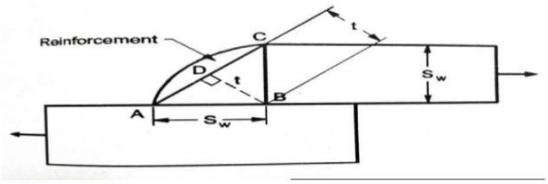
31.Two plates of the same metal having equal thickness are to be butt welded with electric arc.When the plate thickness changes, welding is achieved by

a) adjusting the current
b) adjusting the duration of current
c) changing the electrode size

32.Derive the Relationship between Size of the weld and Throat thickness.

Strength of Transverse Fillet Welded Joint:-

- Consider a single transverse fillet weld.



ΔABC is a right angle isosceles triangle
Let, t=BD=Throat thick. In mm
Sw=AB=BC=size of weld
Lw=Length of weld in mm
<BAC=<BCA=45^0

33. The transverse fillet welds are designed for

a)Tensile Stress

b)Shear Stress

c)Bending Stress

d)Compressive Stress

34. The relationship between endurance limit of component subjected the fluctuating torsional shear stresses (Sse) to endurance limit in revered bending (Se) is