PNS SCHOOL OF ENGINEERING & TECHNOLOGY

INTERNAL ASSESSMENT EXAMINATION -2022(3rd SEMESTER)

SUB: TH-1 (STRUCTURAL MECHANICS)

BRANCH : CIVIL ENGINEERING

Prepared by Er Soudagar Behera

No-1 Answer the following questions (2*5)

a)What is stress ?

Ans-The stress is the pressure per unit area of the material, and the resulting strain is the deformation that occurs as a result of this stress. Strain and stress are strongly intertwined because strain occurs solely as a result of stress.

Stress is defined as the total force applied per unit area. In units, stress is exactly the same as pressure (Newton's per meter).

b)what is strain ?

Strain is the deformation of a material from stress. It is simply a ratio of the change in length to the original length. Deformations that are applied perpendicular to the cross section are normal strains, while deformations applied parallel to the cross section are shear strains.

c) what is young's modulus of elasticity ?

The Young's Modulus (or Elastic Modulus) is in essence the stiffness of a material. In other words, it is how easily it is bended or stretched. To be more exact, the physics and numerical values are worked out like this: Young's Modulus = Stress / Strain.

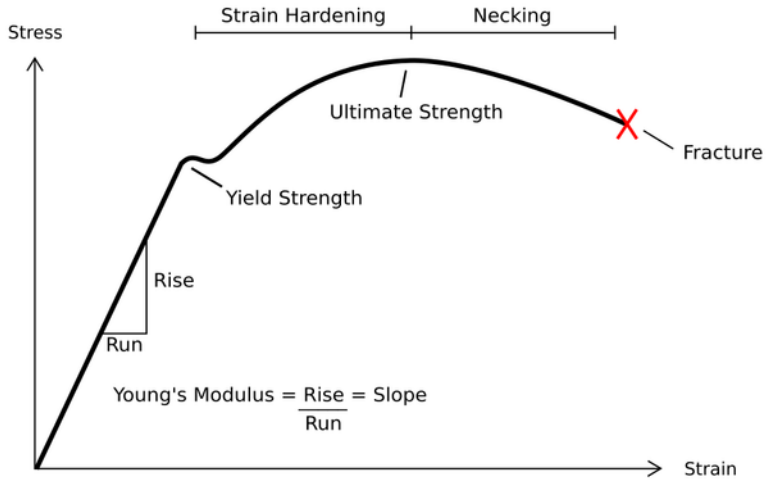
d)) what is young's modulus of rigidity ?

Ans- Shear modulus, also known as Modulus of rigidity, is the measure of the rigidity of the body, given by b the ratio of shear stress to shear strain. It is often denoted by G sometimes by S or μ.

Modulus of rigidity helps in calculating the deformation of an object when the deforming force is applied at right angles to the surface. While modulus of elasticity helps in calculating the deformations of an object when the deforming force is applied parallel to the surface.

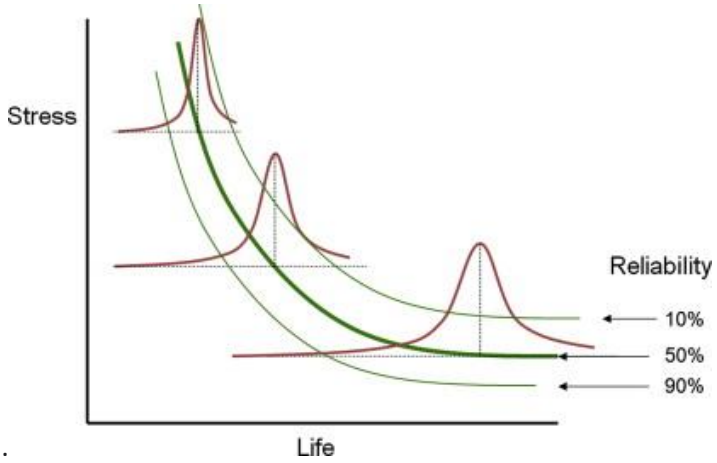
e)what is ductility of the material ?

Ductility is the ability of a material to be drawn or plastically deformed without fracture. It is therefore an indication of how 'soft' or malleable the material is. The ductility of steels varies depending on the types and levels of alloying elements present.



f)what is fatigue ?

Ans-Fatigue is defined as a process of progressive localized plastic deformation occurring in a material subjected to cyclic stresses and strains at high stress concentration locations that may culminate in cracks or complete fracture after a sufficient number of fluctuations.



g)What is tensile stress ?

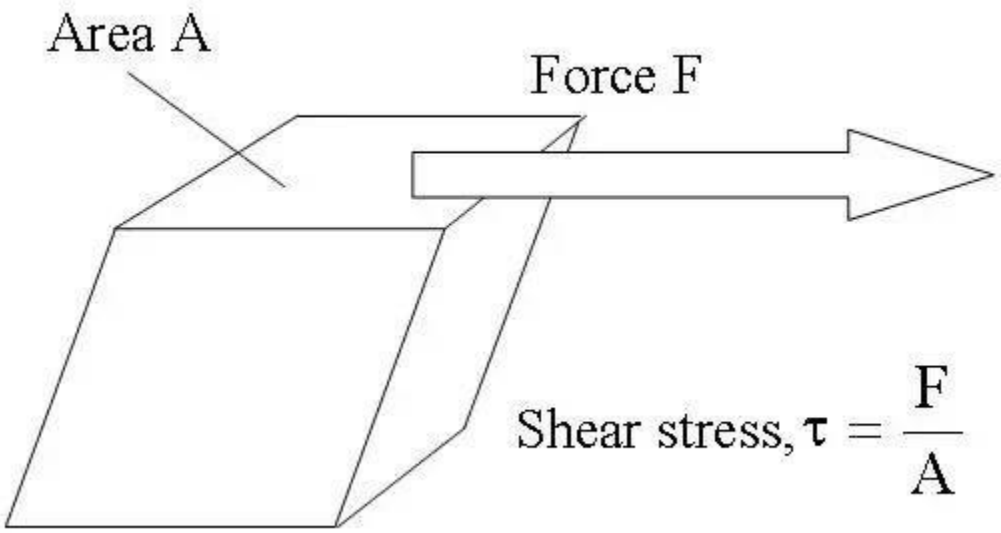
Ans-When the material is under tension, it is known as tensile. The forces that are acting along the axis of force are responsible for the stretching of the material. The external force per unit area of the material resulting in the stretch of the material is known as tensile stress.

h) what is compressive stresses ?

Compressive stress is the force that is responsible for the deformation of the material such that the volume of the material reduces. It is the stress experienced by a material which leads to a smaller volume.

i)what is shear strain ?

Ans-Shear strain occurs when a sideways force is exerted on a medium. A shear force wave may be generated that travels perpendicularly to the direction of the applied force. Particle motion of a shear wave is perpendicular to the direction of propagation.



j) what is Poisson's ratio ?

Poisson's ratio is defined as the ratio of the change in the width per unit width of a material, to the change in its length per unit length, as a result of strain.

Long questions

2.a) write down the different properties of material ?

Ans-

Conductivity.

Corrosion Resistance.

Density.

Ductility / Malleability.

Elasticity / Stiffness.

Fracture Toughness.

Hardness.

Plasticity

B)Describe hook’s law and its application .

Hooke's law, law of elasticity discovered by the English scientist Robert Hooke in 1660, which states that, for relatively small deformations of an object, the displacement or size of the deformation is directly proportional to the deforming force or load.

Mathematically, Hooke's law states that the applied force F equals a constant k times the displacement or change in length x, or F = kx. The value of k depends not only on the kind of elastic material under consideration but also on its dimensions and s