SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : SM-1(15A01303) **Course & Branch**: B.Tech - CE

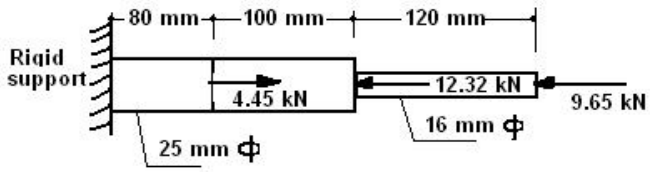
Year & Sem: II-B.Tech & I-Sem **Regulation:** R15

UNIT –I

SIMPLE STRESSES AND STRAINS

1. a) Derive the relation between E and K.
   b) Determine poisons ratio and bulk modulus of the material for which E=1.2X10^5 N/mm^2 and G is 4.8X10^4 N/mm^2.
2. a) Derive the relation between E and C.
   b) A bar of 30mm dia is subjected to a pull of 60KN. The measurement extension on guage length of 200mm is 0.1mm and change in dia is 0.004mm. calculate E, poisons ratio and K.
3. The following data refer to a mild steel specimen tested in a laboratory:
   Diameter of the specimen = 30 mm
   Length of the specimen = 250 mm
   Extension under a load of 15 kN = 0.055 mm
   Load at yield point = 125 Kn
   Maximum load = 240 kN
   Length of the specimen after failure = 410 mm & Neck diameter = 18 mm.
   Determine: (i) Young's modulus. (ii) Yield point. (iii) Ultimate stress.
   (iv) Percentage of elongation. (v) Percentage reduction in area.
   (vi) Safe stress adopting a factorof safety of 2.
4. Three bars made of copper; zinc and aluminum are of equal length and have cross section 500, 700, and 1000 mm^2 respectively. They are rigidly connected at their ends. Of this compound member is subjected to a longitudinal pull of 250KN, estimate the proportional of the load carried on each rod and the induced stresses. Take the values of E for copper =1.3 x 10^{5}N/mm^2 and for zinc=1.0x10^{5}N/mm2 and for aluminum=0.8 x 10^{5}N/mm^2.
5. A metallic bar 300 mm x 100 mm x 50 mm is subjected to a force of 6 kN (tensile), 8 kN (tensile) and 5 kN(tensile) along x, y and z direction respectively. Determine the change in the volume of the block. Take E = 2 x 10^5 N/mm^2 and Poisson's ratio = 0.25.

6. (a) Define stress and strain and specify the units for both. Write two examples for each of the ductile material and brittle material.
(b) A circular stepped bar carries a series of loads as shown in figure. Compute the stress in each segment of the bar. All loads act along the central axis of the bar.

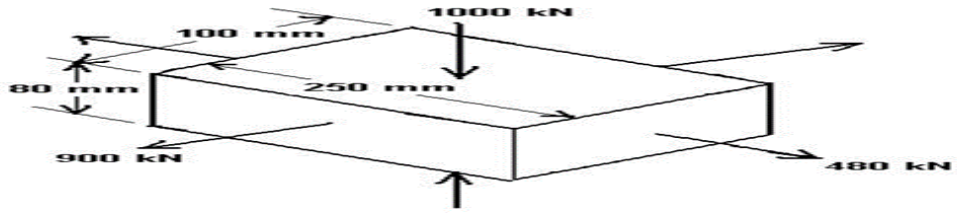


Bar carrying axial loads

7. Derive the relation between the three elastic constants

8. A steel rod of 20mm dia causes centrally through a copper tube of 50mm external dia and 40 mm internal dia. The tube is closed at each end by rigid plates of negligible thickness. The nuits are tightened lightly home on the projecting parts the rod. If the temp of assembly is raised by 50^0c cal the stresses developed in copper and steel. Take E for steel and copper as 200 GPa and 100 GPa and co.of linear expansion for steel and copper $12X10^{-6\,0}C$ and $18X10^{-6\,0}C$.

9. A rectangular block 250 x 100 x 80 mm is subjected to axial loads as shown in figure. Assuming Poisson's ratio as 0.25, find the strains in the direction of each force. Find the modulus of rigidity, bulk modulus of the material and change in volume of the block. Take $E_s = 2.0 \times 10^5$ N/mm^2.



10. Define the following terms

A) Stress & strains

B) Elasticity & Plasticity

C) hooks law & factor of safety

D) Lateral & longitudinal strains

E) Strain energy & resilience

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QUESTION BANK (OBJECTIVE)

Subject with Code : SM-1(13A01301) **Course & Branch**: B.Tech - CE

Year & Sem: II-B.Tech & I-Sem **Regulation:** R13

UNIT –1

SIMPLE STRESS AND STRAINS

1) Stress is [ ]

a) External force b) Internal resistive force

c) Axial force d) Radial force

2) Following are the basic types of stress except [ ]

a) Tensile stress b) Compressive stress

c) Shear stress d) volumetric stress

3) When tensile stress is applied axially on a circular rod its [ ]

a) Diameter decreases b) length decreases

c) Volume does not change d) All of the above

4) When compressive stress is applied axially on a circular rod its [ ]

a) Diameter decreases b) length decreases

c) Volume does not change d) All of the above

5) Tensile Strain is [ ]

a) Increase in length / original length b) Decrease in length / original length

c) Change in volume / original volume d) All of the above

6) Compressive Strain is [ ]

a) Increase in length / original length b) Decrease in length / original length

c) Change in volume / original volume d) All of the above

7) Volumetric Strain is [ ]

a) Increase in length / original length b) Decrease in length / original length

c) Change in volume / original volume d) All of the above

8) Hooke's law is applicable within [ ]

a) Elastic limit b) Plastic limit

c) Fracture point d) Ultimate strength

9) Young's Modulus of elasticity is [ ]

a) Tensile stress / Tensile strain b) Shear stress / Shear strain

c) Tensile stress / Shear strain d) Shear stress / Tensile strain

10) Modulus of rigidity is [ ]

a) Tensile stress / Tensile strain b) Shear stress / Shear strain

c) Tensile stress / Shear strain d) Shear stress / Tensile strain

11) Bulk modulus of elasticity is [ ]

a) Tensile stress / Tensile strain b) Shear stress / Shear strain

c) Tensile stress / Shear strain d) Normal stress on each face of cube / Volumetric strain

12) Factor of safety is [ ]

a) Tensile stress / Permissible stress b) Compressive stress / Ultimate stress

c) Ultimate stress / Permissible stress d) Ultimate stress / Shear stress

13) Poisson's ratio is [ ]

a) Lateral strain / Longitudinal strain b) Shear strain / Lateral strain

c) Longitudinal strain / Lateral strain d) Lateral strain / Volumetric strain

14) The total extension in a bar, consists of 3 bars of same material, of varying sections is[ ]

a) P/E(L1/A1+L2/A2+L3/A3) b) P/E(L1A1+L2A2+L3A3)

c) PE(L1/A1+L2/A2+L3/A3) d) PE(L1/A1+L2/A2+L3/A3)

15) The relationship between Young's modulus (E), Bulk modulus (K) and Poisson's ratio (μ) is given by [ ]

a) E=2K(1-2μ) b) E=3K(1-2μ) c) E=2K(1-2μ) d) E=2K(1-3μ)

16) The relationship between Young's modulus (E), Modulus of rigidity (C) and Bulk modulus (K) is given by [ ]

a) E=9CK/(C+3K) b) E=9CK/(2C+3K)

c) E=9CK/(3C+K) d) E=9CK/(C-3K)

17) The total extension of a taper rod of length 'L' and end diameters 'D1' and 'D2', subjected to a load (P), is given of [ ]

a) 4PL/ΠE. D1D2 b) 3PL/ΠE. D1D2

c) 2PL/ΠE. D1D2 d) PL/ΠE.D1D2

18) The deformation per unit length is called [ ]

a) tensile stress b) compressive stress c) shear stress d) strain

19) The maximum energy stored at elastic limit of a material is called [ ]

(a) resilience (b) proof resilience (c) modulus of resilience (d) bulk resilience

20) The region in the stress-strain curve extending from origin to proportional limit is called[ ]

(a) plastic range (b) elastic range (c) semi plastic range (d) semi elastic range

21) A rigid body has Poisson's ratio equal to _____ [ ]

a) 0 b) 1 c) less than 1 d) greater than one

22) The ratio of stress and strain is known as _____ [ ]

a. Modulus of elasticity b. Young's modulus

c. Both a. and b. d. None of the above

23) The actual breaking stress in stress-strain diagram is the ratio of _____ [ ]

a. load at breaking point and original cross-sectional area

b. load at breaking point and reduced cross-sectional area

c. maximum load and original cross-sectional area

d. yield load and original cross-sectional area

24) A rectangular bar has volume of 1.5 x 106 mm3. What is the change in volume, if stresses in x, y and z direction are 100 Mpa, 150 Mpa and 160 Mpa respectively. (Assume K = 2 x 105 N/mm2 & μ = 0.3) [ ]

a. 1000 mm3 b. 1230 mm3 c. 1500 mm3 d. 2000 mm3

25) Two parallel, equal and opposite forces acting tangentially to the surface of the body is called as

a. Complementary stress b. Compressive stress [ ]

c. Shear stress d. Tensile stress

26) Modulus of rigidity is the ratio of _____ [ ]

a. Lateral strain and linear strain b. Linear stress and lateral strain

c. Shear stress and shear strain d. Shear strain and shear stress

27) The relation between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus (K) is given as _____ [ ]

a. K+G / (3K+ G) b. 3 KG / (3K+ G) c. 3 KG / (9K+ G) d. 9 KG / (3K+ G)

28) What is the bulk modulus of a material, if a cube of 100 mm changes its volume to 4000 mm3 when subjected to compressive force of 2.5 x 106 N? [ ]

a. 62.5 Gpa b. 65 Gpa c. 67.5 Gpa d. 70 Gpa

29) When a rectangular bar is uniaxially loaded, the volumetric strain (ev) is given as [ ]

a. $\sigma x / E(1- \mu)$ b. $\sigma x / E(1+ \mu)$ c. $\sigma x / E(1- 2\mu)$ d. $\sigma x / E(1+2\mu)$

30) Every material obeys the Hooke's law within [ ]

(a) Elastic limit (b) Plastic limit (c) Limit of proportionality (d) None of these

31) The ability of the material to deform without breaking is called [ ]

(a) Elasticity (b) Plasticity (c) Creep (d) None of these

33) Which of the following material is more elastic? [ ]

(a) Rubber (b) Glass (c) Steel (d) Wood

34) The percentage elongation and the percentage reduction in area depends upon [ ]

(a) Tensile strength of the material (b) Ductility of the material

(c) Toughness of the material (d) None of these

35) The property of a material by which it can be beaten or rolled into thin sheets, is called [ ]

(a) Elasticity (b) Plasticity (c) Ductility (d) Malleability

36) The property of a material by which it can be drawn to a smaller section by applying a tensile load is called [ ]

(a) Elasticity (b) Plasticity (c) Ductility (d) Malleability

37) If a material has identical properties in all directions, it is called [ ]

(a) Elastic (b) Plastic (c) Isotropic (d) Homogeneous

38) If a material has identical properties in all directions, it is called [ ]

(a) Elastic (b) Plastic (c) Isotropic (d) Homogeneous

39) Units of strain [ ]

(a) cm/cm (b) m/m (c) N/cm^2 (d) No unit

40) The ratio of lateral strain to linear strain is called [ ]

(a) Modulus of Elasticity (b) Modulus of Rigidity

(c) Bulk Modulus (d) Poisson's Ratio