

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

<u>UNIT –I</u>

SIMPLE STRESSES AND STRAINS

- a) Derive the relation between E and K. 1. b) Determine poisons ratio and bulk modulus of the material for which $E=1.2X10^5$ N/mm² and G is 4.8×10^4 N/mm². 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 mmLength of the specimen = 250 mmExtension under a load of 15 kN = 0.055 mmLoad at yield point = 125 KnMaximum load = 240 kNLength 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 factor of safety of 2. Three bars made of copper; zinc and aluminum are of equal length and have cross section 500, 4. 700, and 1000 mm² 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 = 1.3×10^{5} N/mm² and for zinc= 1.0×10^5 N/mm2 and for aluminum= 0.8×10^5 N/mm². 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 $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.25.

Name of the Subject

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° c 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 $12X10^{-6}$ C and $18X10^{-6}$ 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 $E_s = 2.0 \times 10^5 \text{ N/mm}^2$.



- 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

Prepared by: K.ESWARAMMMA

Name of the Subject

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SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR

Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (OBJECTIVE)

Subject with Code : SM-1(13A01301)

Course & Branch: B.Tech - CE

Year & Sem: II-B.Tech & I-Sem

Regulation: R13

<u>UNIT –1</u>

SIMPLE STRESS AND STRAINS

1) Stress is			[]
a) External force	b) Internal res	istive force		
c) Axial force	d) Radial forc	e		
2) Following are the basic types	s of stress excep	pt	[]
a) Tensile stress	b) Compressiv	ve stress		
c) Shear stress	d) volumetric	stress		
3) When tensile stress is applied	axially on a c	ircular rod its	[]
a) Diameter decreases	b) length decr	eases		
c) Volume does not change	d) All of the a	bove		
4) When compressive stress is a	pplied axially	on a circular rod its	[]
a) Diameter decreases	b) length decr	eases		
c) Volume does not change	d) All of the a	bove		
5) Tensile Strain is			[]
a) Increase in length / original length /	ength	b) Decrease in length / original len	ıgth	
c) Change in volume / original	volume	d) All of the above		
6) Compressive Strain is			[]
a) Increase in length / original length /	ength	b) Decrease in length / original len	ıgth	
c) Change in volume / original	volume	d) All of the above		
7) Volumetric Strain is			[]
a) Increase in length / original length /	ength	b) Decrease in length / original len	ıgth	
c) Change in volume / original	volume	d) All of the above		
8) Hooke's law is applicable wi	thin		[]
a) Elastic limit	b) Plastic limi	t		
c) Fracture point	d) Ultimate st	rength		

) Young's Modulus of elasticity is) Tensile stress / Tensile strain b) Shear stress / 0) Modulus of rigidity is) Tensile stress / Tensile strain b) Shear stress / 1) Modulus of rigidity is) Tensile stress / Tensile strain b) Shear stress / 1) Bulk modulus of elasticity is) Tensile stress / Shear strain d) Normal stress on eac 2) Factor of safety is) Tensile stress / Permissible stress b) Compressive) Ultimate stress / Permissible stress d) Ultimate stree 3) Poisson's ratio is) Lateral strain / Longitudinal strain b) Shear strain / 1) Longitudinal strain / Lateral strain d) Lateral strain / 1) Ten total extension in a bar, consists of 3 bars of same mate 1) $P/E(L1/A1+L2/A2+L3/A3)$ b) $P/E(L1A1+L2)$ 2) The relationship between Young's modulus (E), Bulk modu iven by 1) $E=2K(1-2\mu)$ b) $E=3K(1-2\mu)$ c) $E=2K(1-2\mu)$ d) H 6) The relationship between Young's modulus (E), Modulus o K) is given by 1) $E=9CK/(C+3K)$ b) $E=9CK/(2C+3K)$ 1) $E=9CK/(C+3K)$ d) $E=9CK/(2-3K)$ 7) The total extension of a taper rod of length 'L' and end diar load (P), is given of 1) $4PL/IIE$. D1D2 b) $3PL/IIE$. D1D2 8) The deformation per unit length is called 1) tensile stress b) compressive stress c) shear 9) The maximum energy stored at elastic limit of a material is	QUESTION BAN	к 20)16
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4) The total extension in a bar, consists of 3 bars of same mate b) $P/E(L1/A1+L2/A2+L3/A3)$ b) $P/E(L1A1+L4)$ c) $PE(L1/A1+L2/A2+L3/A3)$ d) $PE(L1/A1+L4)$ f) The relationship between Young's modulus (E), Bulk modu iven by b) $E=2K(1-2\mu)$ b) $E=3K(1-2\mu)$ c) $E=2K(1-2\mu)$ d) H f) The relationship between Young's modulus (E), Modulus of K) is given by b) $E=9CK/(C+3K)$ b) $E=9CK/(2C+3K)$ c) $E=9CK/(3C+K)$ d) $E=9CK/(C-3K)$ f) The total extension of a taper rod of length 'L' and end diaminational (P), is given of b) $3PL/\Pi E$. D1D2 b) $3PL/\Pi E$. D1D2 c) $2PL/\Pi E$. D1D2 b) $3PL/\Pi E$. D1D2 c) $2PL/\Pi E$. D1D2 c) $PL/\Pi E$. D1D2 c) $2PL/\Pi E$. D1D2 c) $PL/\Pi E$. D1D2 c) $2PL/\Pi E$. D1D2 c) $PL/\Pi E$. D1D2	n / Volumetric strain		
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b) $PE(L1/A1+L2/A2+L3/A3)$ c) $PE(L1/A1+L2/A2+L3/A3)$ d) $PE(L1/A1+L2/A2+L3/A3)$ f) $PE(L1/A1+L2/A2+L3/A3)$ c) $PE(L1/A1+L2/A2+L3/A3)$ f) $PE(L1/A1+L2/A2+L3/A3)$ c) $PE(L1/A1+L3/A3)$ c) $PE(L1/A1+L2/A2+L3/A3)$ c) $PE(L1/A1+L2/A2+L3/A3)$ c) $PE(L1/A1+L3/A3)$ c) $PE(L1/A1+L3/A3)$ c) $PE(L1/A1+L3/A3)$ c) $PE(L1/A1+L3/A3)$ c) $PE(L1/A1+L3/A3)$ c) $PE(L1$	L2A2+L3A3)		
5) The relationship between Young's modulus (E), Bulk moduliven by (iven by) $E = 2K(1-2\mu)$ b) $E = 3K(1-2\mu)$ c) $E = 2K(1-2\mu)$ d) H 6) The relationship between Young's modulus (E), Modulus or K) is given by E = 9CK/(C+3K) b) $E = 9CK/(2C+3K)E = 9CK/(3C+K)$ d) $E = 9CK/(C-3K)7) The total extension of a taper rod of length 'L' and end diamonal load (P), is given ofP = 9CK/(\Pi E) b) 3PL/\Pi E. D1D2P = 9CK/(\Pi E) D1D2$	L2/A2+L3/A3)		
 b) E=2K(1-2µ) b) E=3K(1-2µ) c) E=2K(1-2µ) d) H 6) The relationship between Young's modulus (E), Modulus or K) is given by a) E=9CK/(C+3K) b) E=9CK/(2C+3K) b) E=9CK/(3C+K) d) E=9CK/(C-3K) 7) The total extension of a taper rod of length 'L' and end dian load (P), is given of b) 3PL/ΠΕ. D1D2 b) 3PL/ΠΕ. D1D2 c) 2PL/ΠΕ. D1D2 d) PL/ΠΕ.D1D2 g) The deformation per unit length is called c) tensile stress b) compressive stress c) shear g) The maximum energy stored at elastic limit of a material is 	ulus (K) and Poisson'	s ratio [(µ) is]
 6) The relationship between Young's modulus (E), Modulus o K) is given by) E=9CK/(C+3K)) E=9CK/(3C+K)) E=9CK/(3C+K)) E=9CK/(C-3K) 7) The total extension of a taper rod of length 'L' and end dian load (P), is given of) 4PL/ПЕ. D1D2 b) 3PL/ПЕ. D1D2 c) 3PL/ПЕ. D1D2 c) 3PL/ПЕ. D1D2 c) shear c) tensile stress c) compressive stress c) shear c) The maximum energy stored at elastic limit of a material is 	E=2K(1-3µ)		
 b) E=9CK/(C+3K) c) E=9CK/(3C+K) c) E=9CK/(3C+K) c) E=9CK/(3C+K) c) E=9CK/(C-3K) c) E=9CK/(C-3K) c) E=9CK/(C-3K) c) E=9CK/(C-3K) c) Compressive stress c) Compressive stress c) Shear 	of rigidity (C) and Bu	lk mod	lulus]
 b) E=9CK/(3C+K) c) E=9CK/(C-3K) c) The total extension of a taper rod of length 'L' and end diar load (P), is given of c) 4PL/ПЕ. D1D2 c) 2PL/ПЕ. D1D2 c) 2PL/ПЕ. D1D2 c) PL/ПЕ.D1D2 c) PL/ПЕ.D1D2 c) shear c) the maximum energy stored at elastic limit of a material is 			
 7) The total extension of a taper rod of length 'L' and end diar load (P), is given of) 4PL/ПЕ. D1D2) 2PL/ПЕ. D1D2 d) PL/ПЕ.D1D2 8) The deformation per unit length is called) tensile stress b) compressive stress c) shear 9) The maximum energy stored at elastic limit of a material is 			
 b) 4PL/ПЕ. D1D2 c) 2PL/ПЕ. D1D2 d) PL/ПЕ.D1D2 d) PL/ПЕ.D1D2 ensile stress ensile stress c) shear c) the maximum energy stored at elastic limit of a material is 	meters 'D1' and 'D2'	, subje [cted to
 a) 2PL/ITE. D1D2 b) 2PL/ITE.D1D2 c) shear c) tensile stress c) tensile stress c) shear c) the maximum energy stored at elastic limit of a material is 			
 8) The deformation per unit length is called) tensile stress b) compressive stress c) shear 9) The maximum energy stored at elastic limit of a material is 			
) tensile stressb) compressive stressc) shear9) The maximum energy stored at elastic limit of a material is		[]
9) The maximum energy stored at elastic limit of a material is	stress	d) str	ain
	called	[]
a) resilience (b) proof resilience (c) modulus of resilience	ce (d) bulk resilie	ence	
0) The region in the stress-strain curve extending from origin t	to proportional limit	is calle	ed[

	QUESTION BANK	< 201	6	
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. 2	000 mm3	L	1	
25) Two parallel, equal and opposite forces acting tangentially to the su	urface of the body i	s called	l as	
a. Complementary stress b. Compressive stress	j	ſ	1	
c. Shear stress d. Tensile stress		L	1	
26) Modulus of rigidity is the ratio of		ſ	1	
a. Lateral strain and linear strain b. Linear stress and lateral strain		L	1	
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 chang when subjected to compressive force of $2.5 \times 106 \text{ N}$?	es its volume to 40	00 mm [3]	
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. c	5x / E(1+2μ)			
30) Every material obeys the Hooke's law within		[]	
(a) Elastic limit (b) Plastic limit (c) Limit of proportionalit	y (d) None of the	ese		
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				

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34) The percentage elongat	ion and the percentage reduction in area depends upo	n []	
(a) Tensile strength of the r	naterial (b) Ductility of the material			
(c) Toughness of the mater	al (d) None of these			
35) The property of a mater	ial by which it can be beaten or rolled into thin sheets	s, 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				
(a) Electicity (b) Plasticity	y (c) Ductility (d) Malleability	L	J	
37) If a material has identic	al properties in all directions, it is called	[]	
(a) Elastic (b) Plastic	(c) Isotropic (d) Homogeneous	-	-	
38) If a material has identic	al properties in all directions, it is called	[]	
(a) Elastic (b) Plastic	(c) Isotropic (d) Homogeneous			
39) Units of strain		[]	
(a) $\frac{cm/cm}{(b)}$ (b) $\frac{m/m}{(b)}$	(c) $^{N/cm^2}$ (d) No unit			
40) The ratio of lateral strai	n to linear strain is called	[]	
(a) Modulus of Elasticity	(b) Modulus of Rigidity			
(c) Bulk Modulus	(d) Poisson's Ratio			