Assignment 0

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. **Due on 2018-07-31, 23:59 IST.**

1) What is the volumetric strain for an isotropic material with Poisson's ratio of 0.5?  
   - (a) 1  
   - (b) 2  
   - (c) 0.5  
   - (d) 0

No, the answer is incorrect.
Score: 0

**Accepted Answers:**
- (d) 0

2) A element is subjected to following state of stress: 
\[ \sigma_x = 80 \text{ MPa}, \sigma_y = 20 \text{ MPa}, \sigma_z = 0, \tau_{xy} = 2 \times 10^4 \text{ MPa} \]
Assuming the material to be homogenous and isotropic, determine the maximum principal shear strain.

- (a) \(6.25 \times 10^{-5}\)
- (b) \(2.5 \times 10^{-4}\)
- (c) \(6.25 \times 10^{-4}\)
- (d) \(6.87 \times 10^{-4}\)

No, the answer is incorrect.
4) If for a given material, $E=2G$ (E is modulus of elasticity, G is modulus of rigidity), then the bulk modulus $K$ will be

- (a) $E/3$
- (b) $E/2$
- (c) $E/4$
- (d) $E$

No, the answer is incorrect.
Score: 0
Accepted Answers: 
(b) About longitudinal axis

5) Pick the incorrect statement from following:

- (a) On the plane which carries maximum normal stress, the shear stress is zero.
- (b) Principal planes are mutually orthogonal.
- (c) On the plane which carries maximum shear stress, the normal stress is zero.
- (d) The principal stress axis and principal strain axes coincide for an isotropic material.

No, the answer is incorrect.
Score: 0
Accepted Answers: 
(c) On the plane which carries maximum shear stress, the normal stress is zero.

6) In a biaxial strain system $\varepsilon_x$ and $\varepsilon_y$, what is the maximum shearing strain?

- (a) $\varepsilon_x + \varepsilon_y$
- (b) $\varepsilon_x - \varepsilon_y$
- (c) $(\varepsilon_x + \varepsilon_y)/2$
- (d) $(\varepsilon_x - \varepsilon_y)/2$

No, the answer is incorrect.
Score: 0
Accepted Answers: 
(b) $\varepsilon_x - \varepsilon_y$

7) In a shaft subjected to pure twist, the shear stress at any section is maximum at

- (a) Center of section
- (b) Mid radius
- (c) Surface

No, the answer is incorrect.
Score: 0
Accepted Answers: 
(b) Mid radius
8) Which of the following statements is correct  

i. A rectangular section is more economical in bending than I-section of same area and depth.  
ii. Section modulus of I-section is larger than rectangular section.

- (a) i and ii  
- (b) i only  
- (c) ii only  
- (d) None  

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(c) ii only

9) The outside diameter of a hollow shaft is twice the inside diameter. The ratio of its torque carrying capacity to that of a solid shaft of same outside diameter is

- (a) 15/16  
- (b) 3/4  
- (c) 1/2  
- (d) 16/15

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(a) 15/16

10) The assumption that transverse section which are plane and normal before bending remain plane normal after bending results along a cross-section

- (a) Linear variation of stress  
- (b) Linear variation of strain  
- (c) Constant strain  
- (d) Non-linear variation of strain

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(b) Linear variation of strain

11) For a plain strain problem in XY plane, the shear strain $= 12 \times 10^{-6}$ and normal strain in X and Y direction=0. What is the diameter of Mohr's circle of strain?

- (a) $6 \times 10^{-6}$  
- (b) $8 \times 10^{-6}$  
- (c) $12 \times 10^{-6}$
Two bars of similar size but of different materials are subjected to same tensile force. If the ratio of the elongations of the bars is in the ratio of 5:3, what will be the ratio of respective modulus of elasticity of the materials?

- (a) 3:5
- (b) 10:6
- (c) 25:9
- (d) 9:25

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c) $12 \times 10^{-6}$

The state of state of any solid section is given as \[
\begin{bmatrix}
-2 & 2 & -3 \\
2 & 1 & -6 \\
-1 & -2 & 0
\end{bmatrix}
\]
What are the values of the principal stresses?

- (a) 4, 3, -8
- (b) 5, -3, -3
- (c) 4, -2, -5
- (d) -5, 3, 1

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) 5, -3, -3

An important relation between the elastic modulus (E), shear modulus (G) and Poisson's ratio (\(\nu\)) is given by

- (a) \(G = E/2(1 - \nu)\)
- (b) \(G = E/2(1 + \nu)\)
- (c) \(E = G/2(1 - \nu)\)
- (d) \(E = G/2(1 + \nu)\)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) \(G = E/2(1 + \nu)\)

In the case of biaxial state of normal stresses as shown below the shear stress is the maximum on a plane whose angle with reference to the principal plane is

- (a) $24 \times 10^{-6}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c) $12 \times 10^{-6}$
16. Poisson's ratio and modulus of elasticity of a material is given as 0.2 and 80 GPa. What will be the value of bulk modulus and modulus of rigidity of the material?

(a) 60.32 GPa, 50.44 GPa
(b) 44.44 GPa, 33.33 GPa
(c) 90.56 GPa, 70.83 GPa
(d) 80.90 GPa, 30.40 GPa

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) 45°

17. The state of pure shear stress is produced by

(a) Tension in one direction and equal compression in other direction
(b) Equal tension in two directions at right angles
(c) Equal compression in two directions in right angles
(d) None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) Tension in one direction and equal compression in other direction

18. A solid cylinder of diameter 20mm carries an axial compressive load of 50kN. What is the change in diameter of the cylinder due to applied load? Poisson's ratio=0.25, E=200 GPa.

(a) 0.004mm
(b) 0.008mm
(c) 0.4mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) 45°
19) Which of the following statement is correct

- a) In principle of virtual force, problems in statics are solved through geometry
- b) In principle of virtual displacement, problems in geometry are solved through statics
- c) Both (a) and (b)
- d) None of (a) and (b)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) None of (a) and (b)

20) At a strained body carrying two unequal unlike principal stresses $P_1$ and $P_2$ ($P_1 > P_2$), the maximum shear stress is

- (a) $P_1/2$
- (b) $P_2/2$
- (c) $(P_1 - P_2)/2$
- (d) $(P_1 + P_2)/2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) $(P_1 + P_2)/2$