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NPTEL

Courses » Experimental Stress Analysis-An Overview

Announcements   **Course**   Ask a Question   Progress   Mentor   FAQ

Unit 3 - Unit 1 - Week 1

Course outline

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Pre-requisite Assignment

Unit 1 - Week 1

- Introduction to Stress Analysis – Analytical and Numerical Approaches
- Introduction to Stress Analysis: Experimental Approaches
- Optical Methods Work as Optical Computers
- Basic information provided by various experimental methods
- Visual appreciation of field information: Part-1
- Visual Appreciation of Field

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.   **Due on 2018-09-12, 23:59 IST.**

1) In a complete sense the term stress analysis encompasses the determination of   ***1 point***

- ☐ Stress in the direction of loading
- ☐ Six Stress components
- ☐ Six strain components
- ☐ Three displacement components

No, the answer is incorrect.
Score: 0

Accepted Answers:
Six Stress components
Six strain components
Three displacement components

2) Stress is a   ***1 point***

- ○ Scalar
- ○ Vector
- ○ Tensor
- ○ None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Tensor

3) The rank of stress tensor is   ***1 point***

- ○ 1

Accepted Answers:
2

4) At every point in a specimen if all the parameters can be determined based on positional coordinates, then such a solution is known as   **1 point**

○ Point solution

○ Closed form solution

○ Open form solution

○ None of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
Closed form solution

5) The problem of plate with a hole can be solved using   **1 point**

○ Strength of materials

○ Theory of elasticity

○ Both a and b

No, the answer is incorrect.
Score: 0

Accepted Answers:
Theory of elasticity

6) For a beam under pure bending according to strength of materials solution, which of the following is true   **1 point**

A. The axial stress varies linearly across the depth
B. The axial stress is uniform across the depth
C. There are both tensile and compressive stresses
D. There is only tensile stress.

○ ABCD

○ ACD

○ AD

○ AC

No, the answer is incorrect.
Score: 0

Accepted Answers:
AC

7) Loading jig to get the desired stress distribution in a specimen is obtained by taking into account the principle of   **1 point**

○ St. Venant

○ Timoshenko

○ Newton

○ Euler

No, the answer is incorrect.
Score: 0

Accepted Answers:
St. Venant

8) In the context of direct information provided by experimental methods, which of the following statements are false   **1 point**

A. Majority of optical techniques provide whole field solution
B. Strain gauge is used to obtain a closed form solution
C. A single experimental technique can provide all stress, strain and displacement information
D. Moiré technique provides the stress information

  ○ BCD

  ○ ACD

  ○ DAB

  ○ ABCD

No, the answer is incorrect.
Score: 0

Accepted Answers:
BCD

9) A photoelastic model of a spanner and nut provides a rich information of stresses due to the phenomenon of   **1 point**

  ○ Speckle displacement

  ○ Stress induced birefringence

  ○ Mechanical interference

  ○ Optical interference

No, the answer is incorrect.
Score: 0

Accepted Answers:
Stress induced birefringence

10) Refractive index is the ratio of   **1 point**

  ○ velocity of light in vacuum to velocity of light in specific medium

  ○ velocity of light in specific medium to the velocity of light in vacuum

  ○ velocity of light in air to velocity of light in specific medium

  ○ velocity of light in specific medium to velocity of light in water

No, the answer is incorrect.
Score: 0

Accepted Answers:
velocity of light in vacuum to velocity of light in specific medium

11) Refractive index is a   **1 point**

  ○ Vector

  ○ Scalar

  ○ Number

  ○ Tensor

No, the answer is incorrect.
Score: 0

Accepted Answers:
Tensor

12) The rank of refractive index is   *1 point*

- ○ 1
- ○ 2
- ○ 3
- ○ 4

No, the answer is incorrect.
Score: 0

Accepted Answers:
2

13) Photoelasticity can provide which of the following information directly   *1 point*
A. Principal stress difference
B. Principal stress orientation
C. Principal strain difference
D. Principal strain orientation
E. Principal stresses/strains
F. Maximum shear stresses contours

- ○ ADEF
- ○ ABCDF
- ○ ABCDE
- ○ BCDE

No, the answer is incorrect.
Score: 0

Accepted Answers:
ABCDF

14) The variation of stress components as a function of orientation of the plane in which it is acting is viewed using   *1 point*

- ○ Euler's circle
- ○ St. Venant's principal
- ○ Mohr's circle
- ○ Stress/strain diagram

No, the answer is incorrect.
Score: 0

Accepted Answers:
Mohr's circle

15) For a beam under pure bending, the stress tensor is given by   *1 point*

- ○ $\begin{pmatrix} \sigma_x & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

- ○ $\begin{pmatrix} \sigma_x & 0 & 0 \\ 0 & \sigma_y & 0 \\ 0 & 0 & 0 \end{pmatrix}$

$$\begin{pmatrix} \sigma_x & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & \sigma_z \end{pmatrix}$$

○

$$\begin{pmatrix} \sigma_x & 0 & 0 \\ 0 & \sigma_y & 0 \\ 0 & 0 & \sigma_z \end{pmatrix}$$

○

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\begin{pmatrix} \sigma_x & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

16) For a beam under pure bending, the strain tensor is given by   *1 point*

$$\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}$$

○

$$\begin{pmatrix} \varepsilon_x & 0 & 0 \\ 0 & \varepsilon_y & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

○

$$\begin{pmatrix} \varepsilon_x & 0 & 0 \\ 0 & \varepsilon_y & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}$$

○

$$\begin{pmatrix} \varepsilon_x & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}$$

○

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\begin{pmatrix} \varepsilon_x & 0 & 0 \\ 0 & \varepsilon_y & 0 \\ 0 & 0 & \varepsilon_z \end{pmatrix}$$

17) Match appropriately   *2 points*

A. Photoelasticity	i.	Principal stress direction
B. Geometric Moiré	ii.	Slope and curvature
C. Moiré Interferometry	iii.	In and out of plane displacement
D. Holography	iv.	In plane displacement
E. Brittle Coating	v.	Principal stress/strain difference
	vi.	Component of strain
	vii.	Out of plane displacement

○ A-iii, B-v, C-iv, D-vii, E-i

○ A-v, B-iii, C-iv, D-vii, E-i

○ A-v, B-iii, C-i, D-vii, E-iv

○ A-iv, B-iii, C-v, D-vii, E-vi

No, the answer is incorrect.
Score: 0

Accepted Answers:
A-v, B-iii, C-iv, D-vii, E-i

18) Match appropriately   **2 points**

A. Speckle Interferometry	i. Component of strain
B. Digital image correlation	ii. Slope and curvature
C. Shearography	iii. In and out of plane displacement
D. Thermoelastic stress analysis	iv. Principal stress direction
E. Strain gauge	v. In plane normal stress gradients
	vi. Principal stress/strain difference
	vii. Change in sum of principal stress/strain

○ A-iii, B-iii, C-ii, D-vii, E-i

○ A-iii, B-ii, C-iv, D-v, E-i

○ A-iii, B-iv, C-ii, D-vii, E-i

○ A-ii, B-iii, C-ii, D-vii, E-i

No, the answer is incorrect.
Score: 0

Accepted Answers:
A-iii, B-iii, C-ii, D-vii, E-i

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