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## Unit 4 - Unit 2 - Week 2

### Course outline

How to access the portal

Pre-requisite Assignment

Unit 1 - Week 1

Unit 2 - Week 2

- Visual Appreciation of Field Information - Part - 4
- Visual Appreciation of Field Information - Part - 5
- Completeness of a Numerical Solution
- Principle of Strain Gauges
- Overview of Strain Gauge Measurements
- Elegance of Photoelasticity
- Introduction to Photoelasticity
- Different Polariscopes
- Quiz : Assignment 2
- Week 2 - Feedback - Experimental Stress Analysis-An Overview

Unit 3 - Week 3

Unit 4 - Week 4

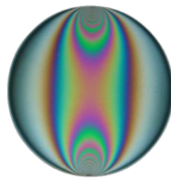
VIDEO DOWNLOAD

### Assignment 2

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) The following fringe patterns are obtained for a disc under diametral compression. The patterns represent contours of **1 point**



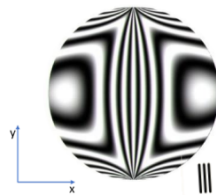
- $\sigma_1 + \sigma_2$
- $\sigma_1 - \sigma_2$
- Maximums shear stress
- Principal stresses

No, the answer is incorrect. Score: 0

Accepted Answers:

$\sigma_1 - \sigma_2$

2) For a disc under diametral compression the fringe pattern shown in figure is obtained using Moiré technique. The patterns represent the contours of **1 point**



- v displacement
- out of plane displacement
- u displacement
- strain

No, the answer is incorrect. Score: 0

Accepted Answers:

u displacement

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A project of



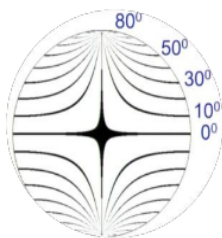
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Funded by



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- Orientation of the normal stresses
- Orientation of the principal stress difference
- Orientation of the shear stresses
- Orientation of the principal stresses

No, the answer is incorrect.

Score: 0

Accepted Answers:

Orientation of the principal stresses

4) For a clamped circular plate under central load, the out of plane displacement fringe contours are

1 point

- Parallel lines
- Perpendicular lines
- Concentric circles
- Overlapping circles

No, the answer is incorrect.

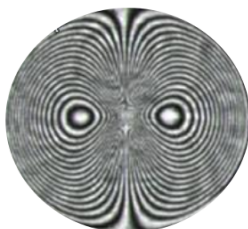
Score: 0

Accepted Answers:

Concentric circles

5) The following fringe patterns are obtained using shearing interferometry. The patterns represent contours of

1 point



- Slope for a circular plate with central load
- out of plane displacement for circular plate with central load
- $u/v$  displacement for circular disc under diametral compression
- slope for circular disc under diametral compression

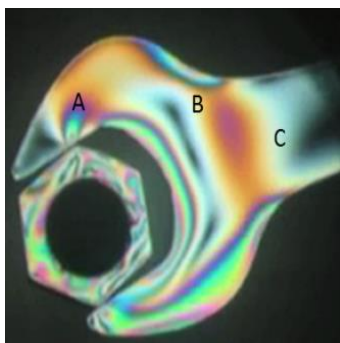
No, the answer is incorrect.

Score: 0

Accepted Answers:

Slope for a circular plate with central load

6) The photoelastic fringe patterns for a spanner tightening a nut is shown in the figure. There are three points in the spanner indicated by alphabets A, B and C. Identify the point where there is maximum stress concentration. Indicate the point using alphabet A, B or C. (Answer A, B or C)




No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: String) A

1 point

7) For the problem of spanner tightening a nut which of the following approaches can be considered for getting whole field stress/strain information.

1 point

- Strength of Materials
- Theory of elasticity
- Numerical methods
- Experimental methods

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Numerical methods  
Experimental methods

8) A numerical solution of a model using a commercial Finite Element software can be used to visualize

1 point

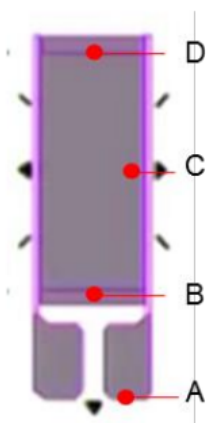
- Stress field
- displacement field
- strain field
- all of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
all of these

9) The gauge length of the strain gauge shown in figure is the distance from the points

1 point



- A to D
- B to C

- C to D
- B to D

No, the answer is incorrect.

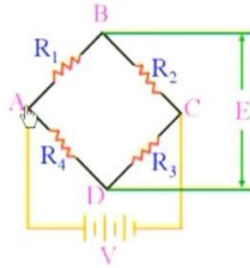
Score: 0

Accepted Answers:

B to D

10) A Wheatstone bridge circuit is shown in the figure. The resistances are indicated by  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$ . One is provided with two equal resistance strain gauges  $S_1$  and  $S_2$  which measures the same value of strain, one of which is tensile ( $S_1$ ) and the other compressive ( $S_2$ ). By replacing which of the resistance with strain gauges, one would get correct measurement of strain?

1 point



- $R_1$  with  $S_1$  and  $R_3$  with  $S_2$
- $R_1$  with  $S_1$  and  $R_2$  with  $S_2$
- $R_4$  with  $S_1$  and  $R_2$  with  $S_2$
- $R_2$  with  $S_2$  and  $R_4$  with  $S_1$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$R_1$  with  $S_1$  and  $R_2$  with  $S_2$

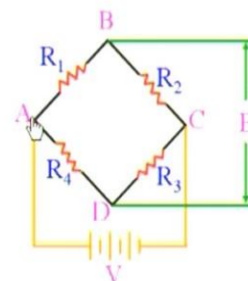
11)

1 point

Two  $120\Omega$  strain gauges (1 and 2) shown in figure (a) each measuring  $100\ \mu\epsilon$  are replaced with the resistance  $R_1$  and  $R_3$  of the Wheatstone bridge shown in figure (b). What value of strain measured,



(a)



(b)

- $100\ \mu\epsilon$
- 0
- $200\ \mu\epsilon$
- Cannot find with the given data

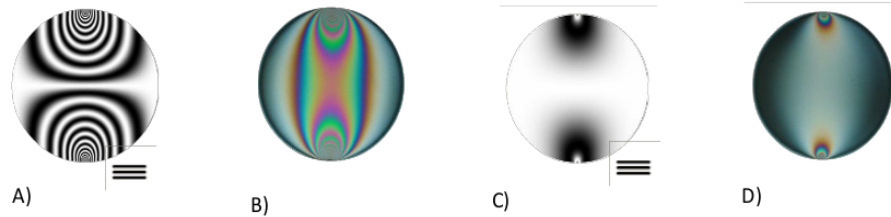
No, the answer is incorrect.

Score: 0

Accepted Answers:

0

12) Match the fringes obtained in a circular disc under diametral compression with the corresponding information obtainable. 2 points



i) u-displacement    ii) v- displacement    iii)  $\sigma_1 - \sigma_2$     iv)  $\sigma_1 + \sigma_2$

- A-ii, B-iii, C-ii, D-iii
- A-i, B-iii, C-i, D-iii
- A-iv, B-iv, C-ii, D-i
- A-i, B-iv, C-iv, D-i

No, the answer is incorrect.

Score: 0

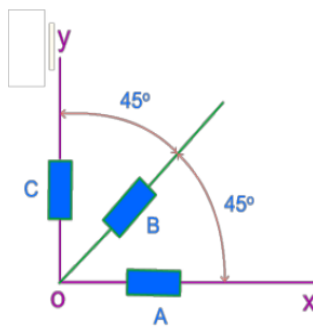
Accepted Answers:

A-ii, B-iii, C-ii, D-iii

13)

2 points

Strain rosette shown in the figure measures, strains  $25 \mu\epsilon$ ,  $50 \mu\epsilon$ ,  $80 \mu\epsilon$  in strain gauges and C respectively. Find out the components of the strain tensor at point O.



- $\epsilon_{xx} = 80 \mu\epsilon$ ;  $\epsilon_{yy} = 25 \mu\epsilon$ ;  $\gamma_{xy} = -5 \mu\epsilon$ ;
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- $\epsilon_{xx} = 25 \mu\epsilon$ ;  $\epsilon_{yy} = -5 \mu\epsilon$ ;  $\gamma_{xy} = 25 \mu\epsilon$ ;

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\epsilon_{xx} = 25 \mu\epsilon$ ;  $\epsilon_{yy} = 80 \mu\epsilon$ ;  $\gamma_{xy} = -5 \mu\epsilon$ ;

14)

An epoxy disc is subjected to diametral compression (diameter = 60 mm,  $F_\sigma = 12$  N/mm/Fringe, Load = 800 N, thickness = 6mm). Fringe order ( $N$ ) and isoclinic angle ( $\theta$ ) at a point in the disc are found to be 2 and  $30^\circ$ . Find out

$(\sigma_1 - \sigma_2)$  in MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 3.5,4.5

2 points

<sup>15)</sup>  $(\sigma_x - \sigma_y)$  in MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 1.5,2.5

2 points

<sup>16)</sup>  $\tau_{xy}$  in MPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 1.5,2

2 points

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