Question **1**

Incorrect

Mark 0.00 out of 1.00

Assertion(A): The total fringe order (N) is always positive in photoelasticity.

Reason(R): Principal stress difference as taken in photoelasticity is invariably positive.

a. Statement A is true but statement R is false ✖

b. Both statements are true but R is not the correct explanation for A

c. Both statements are false

d. Both statements are true and R is the correct explanation for A

Your answer is incorrect.

The correct answer is:

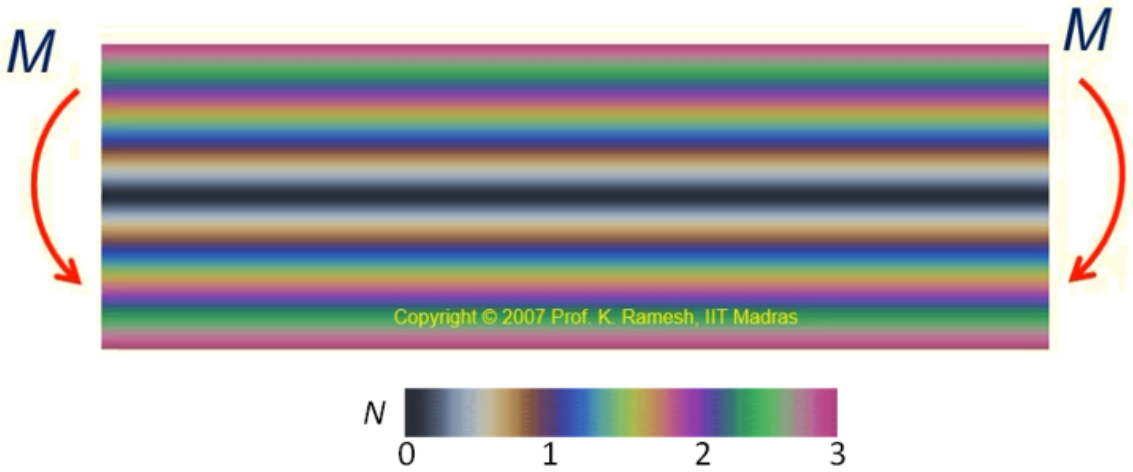
Both statements are true and R is the correct explanation for A

Question **2**

Incorrect

Mark 0.00 out of 2.00

The photoelastic fringes for a beam under pure bending are as shown:



Select the conclusion(s) that can be drawn from the above:

- [x] a. Photoelastic fringes can differentiate between tensile stress and compressive stress ✖
- [ ] b. The distance between the parallel fringes is same
- [ ] c. The zeroth fringe order horizontally divides the beam equally
- [x] d. The variation of the stress is non-linear along the beam depth ✖

Your answer is incorrect.

The correct answers are:

The distance between the parallel fringes is same

The zeroth fringe order horizontally divides the beam equally

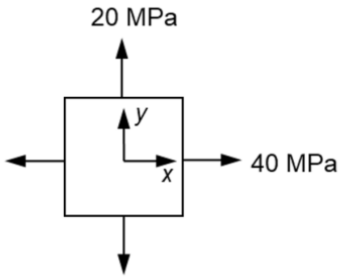
Question **3**

Partially correct

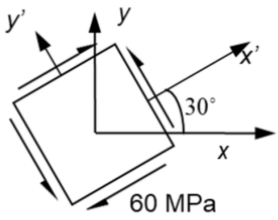
Mark 2.00 out of 10.00

At a point, loading L_1 leads to a stress state shown in case (a) and loading L_2 leads to a stress state shown in case (b).

It is further known that both the loadings are occurring simultaneously. Answer the following questions for this combined loading case.



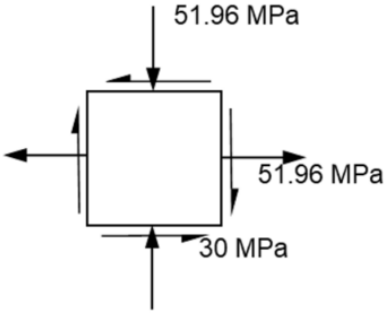
Case (a)



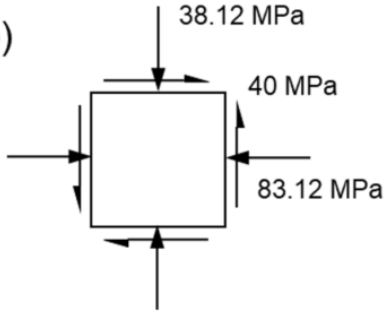
Case (b)

Identify the correct state of stress for the combined loading.

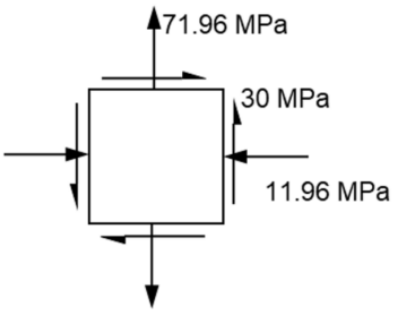
(a)



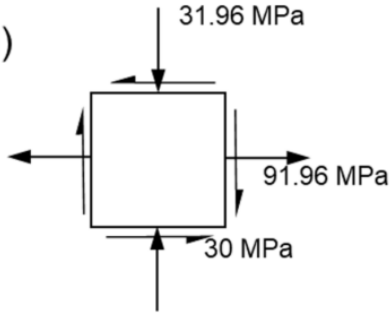
(b)



(c)



(d)



- a
- b
- c ✔
- d

Mark 2.00 out of 2.00

The correct answer is: c

II. What is the value of major principal stress in MPa?

157.50

✖

III. What is the value of minor principal stress in MPa?

-97.50

✖

IV. If this point is free of stress in z-direction, the maximum shear stress experienced at this point in 'MPa' is.

127.5

✖

V. Determine the direction of major principal stress with respect to the $+x$-direction in degrees. (Report the acute angle).

25.83

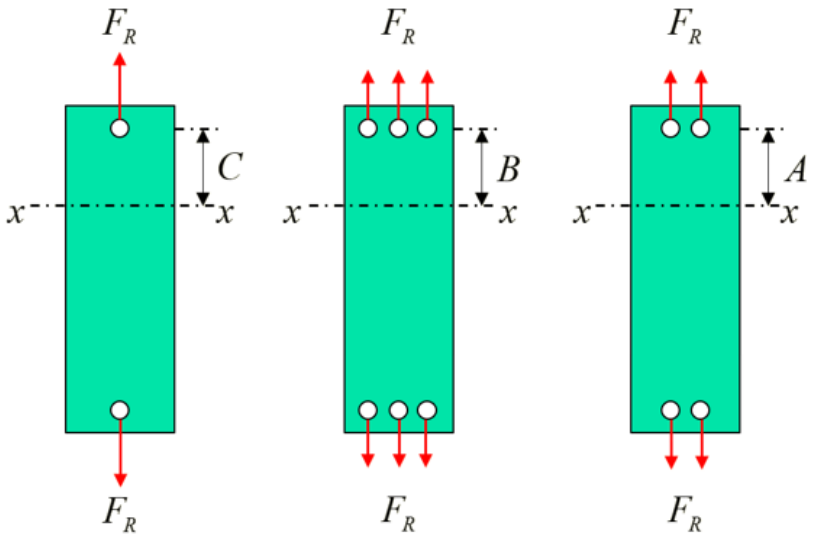
✖

Question **4**

Correct

Mark 1.00 out of 1.00

For a uniaxial tension specimen subjected to a resultant force F_R, section x - x represents the plane where stress distribution becomes uniform. Identify the correct relation for measures A, B and C:



a. $C > A > B$ ✔

b. $A < B < C$

c. $B > C > A$

d. $A > B > C$

Your answer is correct.

The correct answer is:

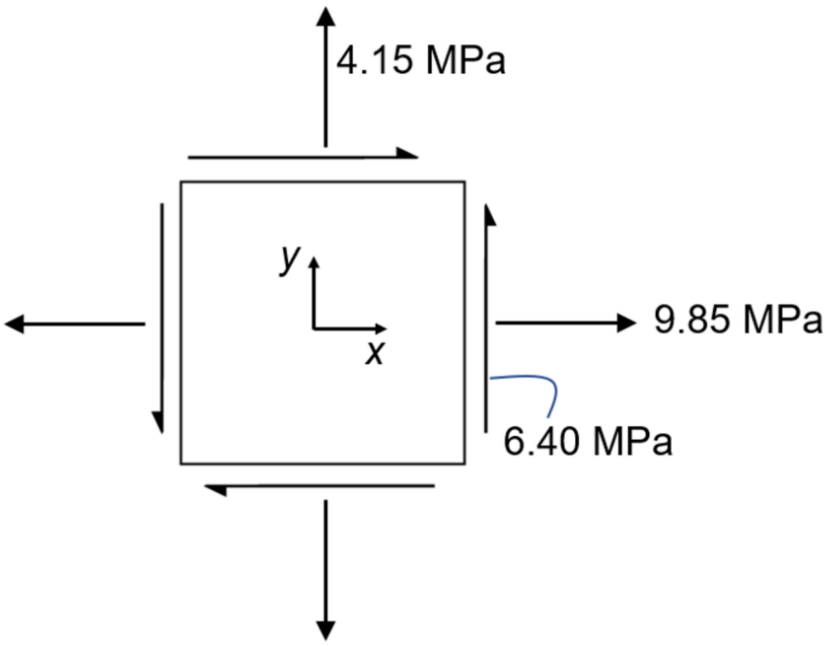
$C > A > B$

Question **5**

Partially correct

Mark 1.50 out of 5.00

The stress state at a point in the *x*-*y* plane is as shown:



Consider a plane whose normal lies in the *x*-*y* plane and makes an angle of +33° with the +*x*-axis.

I. The normal stress acting on this plane in 'MPa' is:

14.00

✔

The correct answer is: 14

Mark 3.00 out of 3.00

II. The shear stress acting on this plane in 'MPa' is:

14.00

✖

III. If this point is free of stress in *z*-direction, the maximum shear stress experienced at this point in 'MPa' is:

14.00

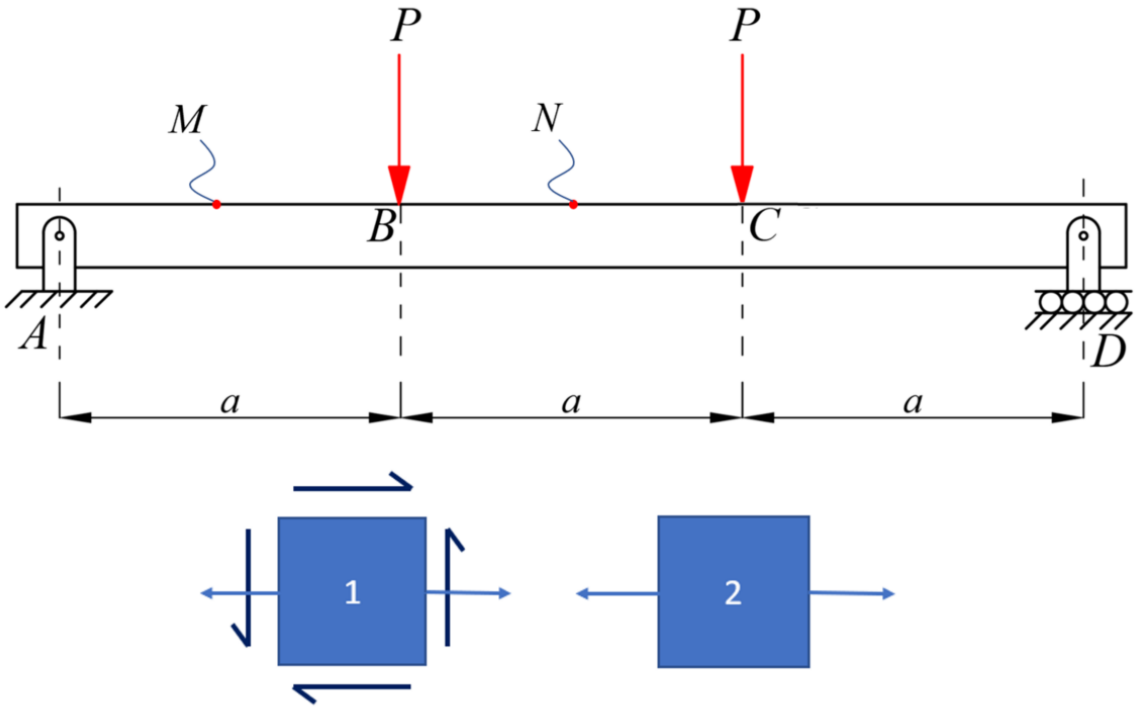
✖

Question **6**

Partially correct

Mark 1.00 out of 2.00

Consider a simply supported beam loaded as shown along with two possible stress states:



Identify the correct stress state for each of the points M and N on the top surface of the beam:

I. Point M:

- Stress state 1 ✖
- Stress state 2

Mark 0.00 out of 1.00

The correct answer is: Stress state 2

II. Point N:

- Stress state 2 ✔
- Stress state 1

Mark 1.00 out of 1.00

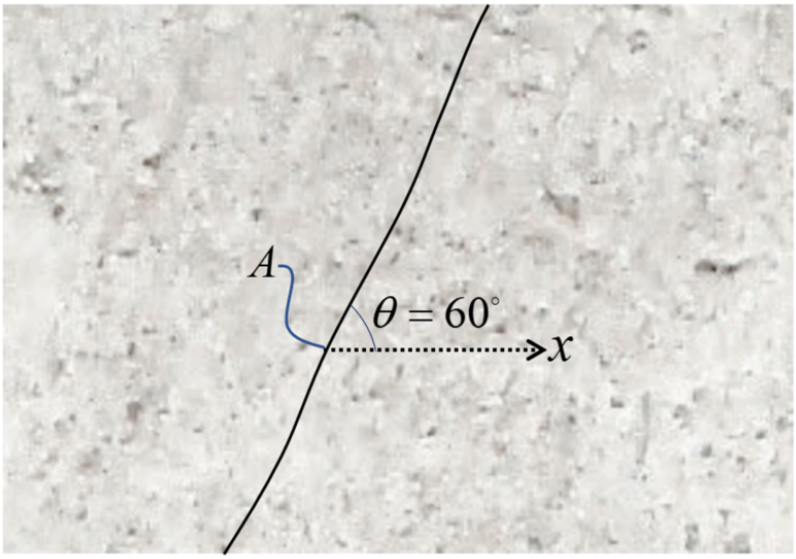
The correct answer is: Stress state 2

Question **7**

Incorrect

Mark 0.00 out of 2.00

A sheet of limestone used to make chalk is found to have cracked at an angle of 60° with respect to the +x-direction at point A as shown due to normal stress.



The absolute value of the acute angle in 'degrees' between the +x-direction and the maximum principal stress direction at point A would have to be:

60

✖

Question **8**

Incorrect

Mark 0.00 out of 1.00

Identify the stress tensor representative of uniaxial tension.

a. $\begin{bmatrix} 10 & 8 \\ 8 & 10 \end{bmatrix}$

b. $\begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ ✖

c. $\begin{bmatrix} 12 & 6 \\ 6 & 3 \end{bmatrix}$

d. $\begin{bmatrix} 0 & 20 \\ 20 & 0 \end{bmatrix}$

Your answer is incorrect.

The correct answer is:

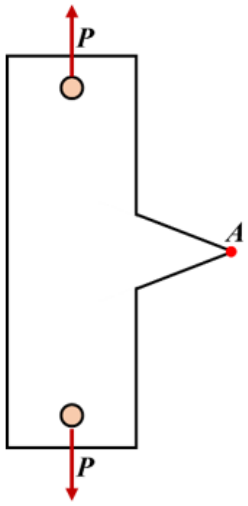
$\begin{bmatrix} 12 & 6 \\ 6 & 3 \end{bmatrix}$

Question **9**

Incorrect

Mark 0.00 out of 1.00

At point A as shown in the given figure,



a. Stress vector is zero but stress tensor is non-zero

b. Both stress tensor and stress vector are non-zero ✖

c. Both stress tensor and stress vector are zero

d. Stress vector is non-zero but stress tensor is zero

Your answer is incorrect.

The correct answer is:

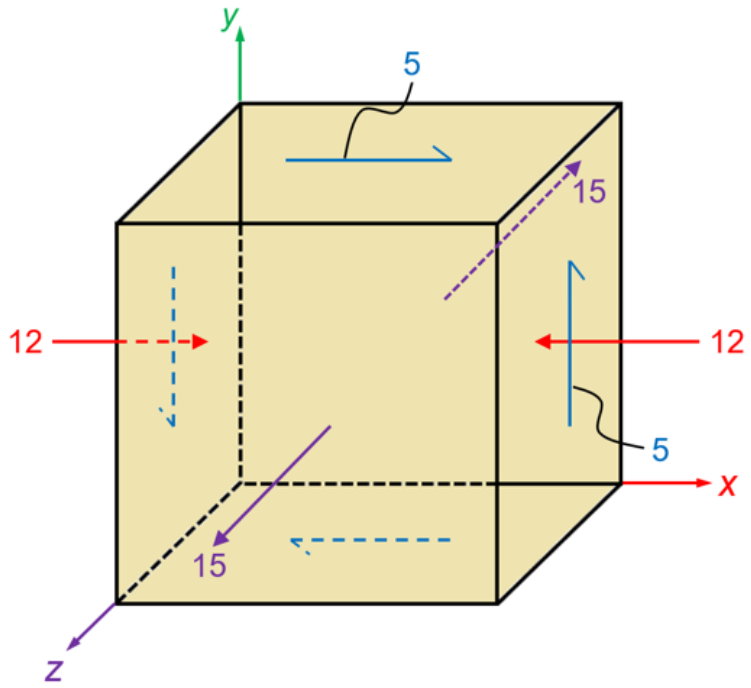
Both stress tensor and stress vector are zero

Question **10**

Not answered

Marked out of 5.00

The 3D state of stress at a point in 'MPa' is as shown. It is further known that two of the three principal stresses are +15 MPa and +1.81 MPa. Answer the following questions based on the given data.



I. The minimum principal stress in 'MPa' is:

II. The value of each diagonal element of the hydrostatic stress tensor for this case in 'MPa' is:

III. If the invariants of the deviatoric stress tensor are represented by J_1, J_2 and J_3, then:

a. The value of J_1 is:

b. The value of J_2 is:

c. The value of J_3 is:

◄ Tutorial 4b - Solutions to selected problems

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Quiz-I Solutions ►