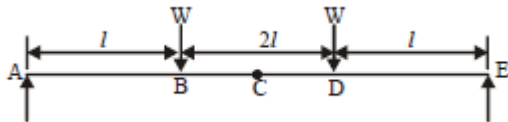


# Mechanical Engineering Quiz 002 (Mixed)

## Quiz Instructions

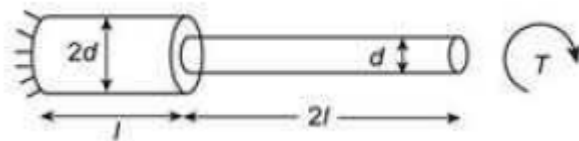
- Before attempting, carefully read the question text.
- Then choose the correct answer.
- Click on “**Submit**” to confirm your answer.
- Use the **Question List** in the upper left corner to jump to a certain question.

1. Consider the loaded beam as shown in the figure below. Determine the portion of the beam which is subjected to pure bending.



- A) DE
- B) CD
- C) BD
- D) AE

2. Calculate the total angle of twist for a stepped shaft which is subjected to the torque ( $T$ ) as shown in the figure below.



- A)  $\frac{Tl}{\pi Gd^4}$
- B)  $\frac{66Tl}{\pi Gd^4}$
- C)  $\frac{Tl}{66Gd^4}$
- D)  $\frac{36Tl}{\pi Gd^4}$

3. A steel rod whose diameter is 2 cm and is 2 m long, experiences heating of temperature  $30^\circ\text{C}$  to  $150^\circ\text{C}$ . The coefficient of thermal expansion is  $\alpha = 12 \times 10^{-6} / ^\circ\text{C}$  and Young's modulus is 200 GPa. If the rod has been restricted to its original position, then the thermal stress (MPa) developed will be \_\_\_\_\_.

- A) 234
- B) 256
- C) 288
- D) 300

4. If the equivalent torque in a shaft is 500 Nm and the bending moment is 300 Nm. Calculate the magnitude of the required torque and the equivalent bending moment.

- A) 500 Nm
- B) 400 Nm
- C) 400 Nm and 400 Nm
- D) 300 Nm and 400 Nm

5. Choose the CORRECT option for the equation of elongation of a uniform rod having length L due to the self weight W.

- A)  $\delta = \frac{WL}{2AE}$
- B)  $\delta = \frac{2WL}{AE}$
- C)  $\delta = \frac{WL}{AE}$
- D) none of these

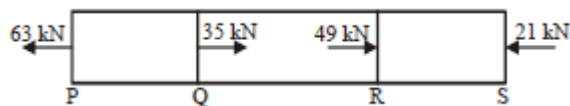
6. The conditions for the thermal stress in a body are given below.

- (A) It is the function of coefficient of thermal expansion.
- (B) It is the function of temperature rise.
- (C) It is the function of modulus of elasticity.

Which of the following is the CORRECT answer?

- A) A and B only
- B) A and C only
- C) B and C only
- D) All option are correct

7. A cross sectional bar of area 700 mm<sup>2</sup> is subjected to an axial load as shown in the figure below. What is the value of stress (MPa) in the section RS?



- A) 30
- B) 40
- C) 50
- D) 60

8. What will be the change in length (mm) of a steel bar having a square cross section of dimension 40 mm x 40 mm, which is subjected to an axial compressive load of 250 kN. If the length of the bar is 4 m and modulus of elasticity is E = 250 GPa?

- A) 2.5

- B) 1.25
- C) 2
- D) 1.5

**9.** If the diameter of the column is reduced by 30%, then what will be the change in the Euler's buckling load (in %)?

- A) 25
- B) 50
- C) 75
- D) 100

**10.** If the stress acting on a point is in the three dimensions, then what is the number of components in a stress tensor required for defining that stress?

- A) 3
- B) 4
- C) 6
- D) 9

# Answer Keys

Question	Answer
1	C
2	D
3	C
4	B
5	A

Question	Answer
6	D
7	A
8	A
9	C
10	D