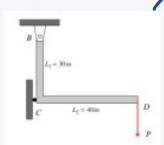
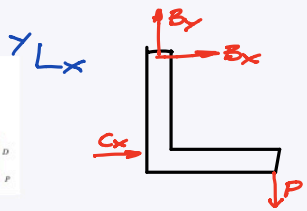
Quiz 5 solutions

Q1
2 Points





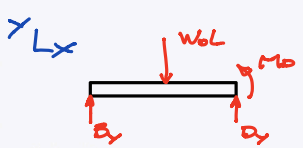
The number of *redundant* reactions for this problem is:

- ◉ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ none of the above

$\Sigma F_x = 0$
$\Sigma F_y = 0$
$\Sigma M_B = 0$
} 3 eqns / 3 unknowns

$\Rightarrow$ zero redundant loads

Q2
2 Points



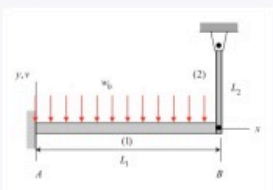
The number of *redundant* reactions for this problem is:

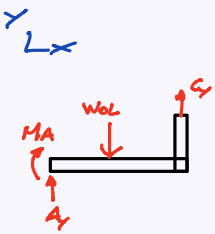
- ○ 0
- ◉ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ none of the above

$\Sigma F_y = 0$
$\Sigma M_B = 0$
} 2 eqns / 3 unknowns

$\Rightarrow$ 1 redundant load

Q3
2 Points





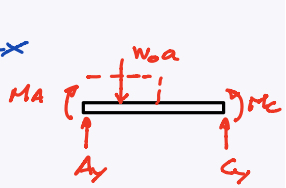
The number of *redundant* reactions for this problem is:

- ○ 0
- ◉ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ none of the above

$\Sigma F_y = 0$
$\Sigma M_A = 0$
} 2 eqns / 3 unknowns

$\Rightarrow$ 1 redundant load

Q4
4 Points



Q4.1
2 Points

The number of *redundant* reactions for this problem is:

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- none of the above

$\Sigma F_y = 0$ } 2 eqns/
$\Sigma M_A = 0$ } 4 unknowns
$\Rightarrow$ 2 redundant loads

Q4.2
2 Points

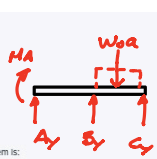
Castigliano's Theorem is to be used to determine the transverse displacement of the beam at point B.

TRUE or FALSE: A dummy load is needed in this case.

- TRUE
- FALSE

Need a dummy load at B to find deflection at B

Q5
2 Points

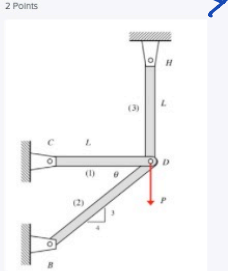


The number of *redundant* reactions for this problem is:

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- none of the above

$\Sigma F_y = 0$ } 2 eqns/
$\Sigma M_A = 0$ } 4 unknowns
$\Rightarrow$ 2 redundant loads

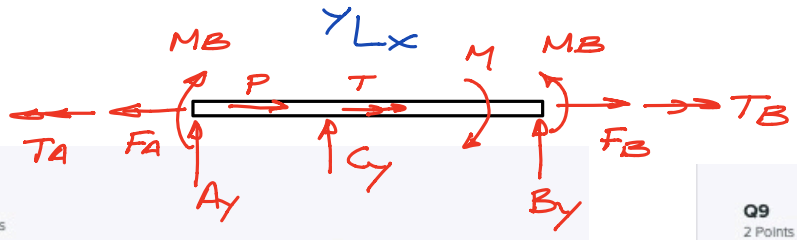
Q6
2 Points



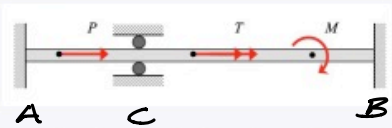
The number of *redundant* reactions for this problem is:

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- none of the above

$\Sigma F_x = 0$ } 2 eqns/
$\Sigma F_y = 0$ } 3 unknowns
$\Rightarrow$ 1 redundant load



Q7
2 Points



An axial force P, a torque T and a bending couple M are applied to the beam shown above. The number of *redundant* reactions for this problem is:

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- none of the above

$\Sigma F_x = 0$
$\Sigma F_y = 0$
$(\Sigma M_A)_z = 0$
$(\Sigma M)_x = 0$
} 4 eqns / 9 unknowns

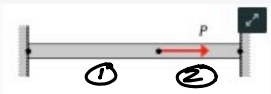
$\Rightarrow$ 5 redundant loads

Q8
2 Points

When using Castigliano's Theorem for indeterminate structures, the final form of the strain energy:

- should include all reaction loads.
- should include only redundant reaction loads.
- should include all but the redundant reaction loads.
- the number of reaction loads to include is totally up to you.
- none of the above

Q9
2 Points



A three-node finite element model is to be constructed for the rod shown here. The size of the stiffness matrix [K] that is to be used to solve for the nodal displacements is of the size:

- 1x1
- 2x2
- 3x3
- 4x4
- none of the above

$$[K] = \begin{bmatrix} k_1 & -k_1 & \\ -k_1 & k_1+k_2 & -k_2 \\ & -k_2 & k_2 \end{bmatrix}$$

Q10
2 Points

A three-node finite element model is to be constructed for the rod shown here. The size of the stiffness matrix [K] that is to be used to solve for the nodal displacements is of the size:

- 1x1
- 2x2
- 3x3
- 4x4
- none of the above

$$[K] = \begin{bmatrix} k_1 & -k_1 & \\ -k_1 & k_1+k_2 & -k_2 \\ & -k_2 & k_2 \end{bmatrix}$$