DOS : Equivalent SDOF system

Number of participants: 0

1. In order to compute an equivalent stiffness, one needs to

0 correct answer
out of 0 respondent

✓	Apply a static force at the location where the mass is attached and in the direction of the motion of the mass	0%	0 votes
	Apply an harmonic force at the location where the mass is attached and in the direction of the motion of the mass	0%	0 votes
	Compute the first 5 modes shapes of the flexible element	0%	0 votes

2. The equivalent stiffness is then given by

0 correct answer
out of 0 respondent

✓	k=F/x where x is the displacement in the direction of motion at the location of the applied force	0%	0 votes
	k=F/x where x is the average displacement computed on the flexible element	0%	0 votes
	k= F*x where x is the displacement in the direction of motion at the location of the applied force	0%	0 votes

3. For a bar in traction with section A, young's modulus E and length L, the equivalent stiffness is given by

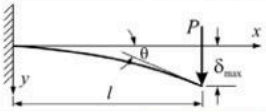
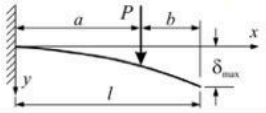
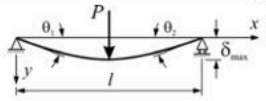
0 correct answer
out of 0 respondent

	k = E A L	0%	0 votes
✓	k=EA/L	0%	0 votes
	k=E/(A*L)	0%	0 votes
	k=1/(EAL)	0%	0 votes

4. Consider a cantilever beam with a mass attached at the tip. If the length of the beam is doubled, the first natural frequency is

0 correct answer
out of 0 respondent

BEAM DEFLECTION FORMULAE

BEAM TYPE	SLOPE AT FREE END	DEFLECTION AT ANY SECTION IN TERMS OF x	MAXIMUM DEFLECTION
1. Cantilever Beam – Concentrated load P at the free end			
	$\theta = \frac{Pl^2}{2EI}$	$y = \frac{Px^2}{6EI}(3l - x)$	$\delta_{max} = \frac{Pl^3}{3EI}$
2. Cantilever Beam – Concentrated load P at any point			
	$\theta = \frac{Pa^2}{2EI}$	$y = \frac{Px^2}{6EI}(3a - x)$ for $0 < x < a$ $y = \frac{Pa^2}{6EI}(3x - a)$ for $a < x < l$	$\delta_{max} = \frac{Pa^2}{6EI}(3l - a)$
6. Beam Simply Supported at Ends – Concentrated load P at the center			
	$\theta_1 = \theta_2 = \frac{Pl^2}{16EI}$	$y = \frac{Px}{12EI}\left(\frac{3l^2}{4} - x^2\right)$ for $0 < x < \frac{l}{2}$	$\delta_{max} = \frac{Pl^3}{48EI}$

multiplied by 2	0%	0 votes
divided by 2	0%	0 votes
✓ divided by 2 sqrt(2)	0%	0 votes
divided by 4	0%	0 votes

5. To compute the equivalent mass of a flexible element simplified by a spring element, one needs to

0 correct answer
out of 0 respondent

	use the principle of d'Alembert	0%	0 votes
	compute the total mass of the flexible element and divided it by 3	0%	0 votes
✓	equate the kinetic energy of the flexible element with the one of the additional mass located at the tip of the spring	0%	0 votes

6. When replacing a flexible element by a spring, the approximation is

0 correct answer
out of 0 respondent

	always valid	0%	0 votes
	valid only above the first natural frequency of the flexible element	0%	0 votes
✓	valid in a limited frequency band where the element's natural frequencies are not excited	0%	0 votes

7. A complex structure can be represented by an equivalent mass-spring model using

0 correct answer
out of 0 respondent

✓	the principles of equivalent mass and spring if the structure is made of a large mass attached to a flexible element	0%	0 votes
✓	a single mode approximation if the eigenfrequencies are well separated	0%	0 votes
	A division of the structure using single finite elements	0%	0 votes

8. When using single mode approximation, the equivalent mass and stiffness of the SDOF system depend on

0 correct answer
out of 0 respondent

✓	The value of the eigen frequency of the mode	0%	0 votes
	The average value of the modeshape considered	0%	0 votes
✓	The value of the modeshape considered at the position and in the direction of the applied force	0%	0 votes