Limba engleza

Nr.1

Select the correct equation for computing the period of vibration:

1. $T = 2 \cdot \sqrt{\delta \cdot G}$ 2. $T = 2 \cdot \sqrt{k \cdot G}$ 3. $T = 0.2 \cdot \sqrt{k \cdot G}$

1 ☐
2 ☐
3 ☐

Nr. 2

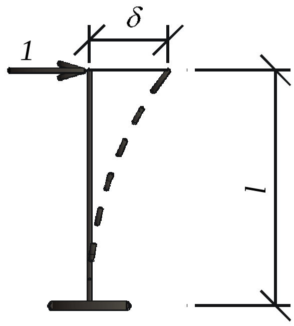
Select the correct equation for computing the circular frequency of vibration:

1. $\omega = \frac{2 \cdot \pi}{f}$ 2. $\omega = \sqrt{\frac{g}{\delta \cdot G}}$ 3. $\omega = \sqrt{k \cdot m}$

1 ☐
2 ☐
3 ☐

Nr. 3

The flexibility (δ) of the system shown by the next figure:



1. $\delta = \frac{l^3}{3 \cdot E \cdot I}$ 2. $\delta = \frac{3 \cdot E \cdot I}{l^2}$ 3. $\delta = \frac{4 \cdot E \cdot I}{l}$

1 ☐
2 ☐
3 ☐

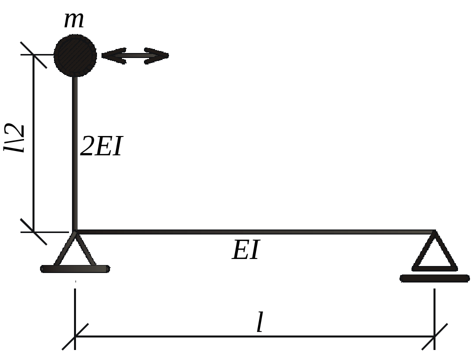
Nr. 4

The period of vibration *(T)* for the system shown by the next figure is:

l = 3 m

G = 20 KN

EI = $6 \cdot 10^9$ *daN cm*^{2}



1. T = 3.244 s 2. T = 0.194 s 3. T = 0.011 s

1 ☐
2 ☐
3 ☐

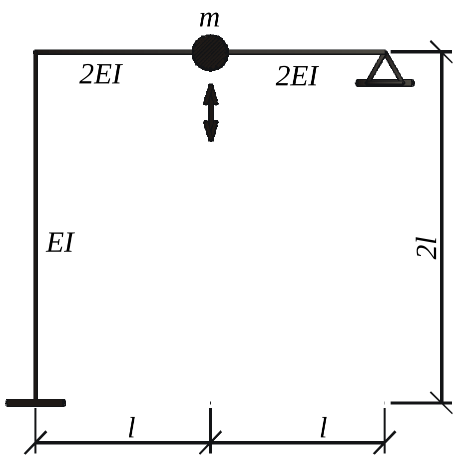
Nr. 5

The period of vibration *(T)* for the system shown by the next figure is:

l = 3 m

G = 50 KN

$EI = 8 \cdot 10^9 \; daN \; cm^2$



1. T = 0.114 s
2. T = 1.944 s
3. T = 0.035 s

1 ☐
2 ☐
3 ☐

Nr. 6

Which of the next versions represents the system of equation for determining the modes of vibrations for the *n DOF* system in undamped free vibrations using stiffness matrix method?

1. $([k]_L - \omega_r^2 \cdot [m]) \cdot \{U_{ir}\} = \{0\}$
2. $([k]_L - \theta^2 \cdot [m]) \cdot \{U_{ir}\} = \{0\}$
3. $([\Delta]_L - \omega_r^2 \cdot [m]) \cdot \{U_{0i}\} = \{0\}$

1 ☐
2 ☐
3 ☐

Nr. 7

Which of the next versions represents the system of equation for determining the modes of vibrations for the *n DOF* system in undamped free vibrations using flexibility matrix method?

1. $(\omega_r \cdot [\Delta]_L \cdot [m] - [1]) \cdot \{U_{ir}\} = \{0\}$
2. $(\omega_r^2 \cdot [\Delta]_L \cdot [m] - [1]) \cdot \{U_{ir}\} = \{0\}$
3. $([\Delta]_L \cdot [m] - \omega_r^2 \cdot [1]) \cdot \{U_{ir}\} = \{0\}$

1 ☐
2 ☐
3 ☐

Nr. 8

Which of the next versions represents the system of equation for determining the maximum and minimum conventional forces using the stiffness matrix method?

1. $([k]_L - \theta^2 \cdot [m]) \cdot \{U_{0i}\} + \{D_{0i}\} = \{0\}$
2. $([k]_L - \theta^2 \cdot [m]) \cdot \{U_{0i}\} = \{F_{0i}\}$
3. $([k]_L - \omega^2 \cdot [m]) \cdot \{U_{0i}\} = \{F_{0i}\}$

1 ☐
2 ☐
3 ☐

Nr. 9

Which of the next versions represents the system of equation for determining the maximum and minimum conventional forces using the flexibility matrix method:

1. $(\theta^2 \cdot [\Delta]_L \cdot [m] - [1]) \cdot \{U_{0i}\} + \{D_{0i}\} = \{0\}$ 1 ☐
2. $(\theta^2 \cdot [\Delta]_L \cdot [m] - [1]) \cdot \{U_{0i}\} = \{F_{0i}\}$ 2 ☐
3. $(\theta^2 \cdot [\Delta]_L \cdot [m] - [1]) \cdot \{U_{ir}\} = \{D_{0i}\}$ 3 ☐

Nr. 10

Which of the next orthogonality equations is correct:

1. $\sum_{i=1}^{n} m_i \cdot U_{ir} \cdot U_{is} = 0,\ r \neq s$ 2. $\sum_{r=1}^{n} m_i \cdot U_{ir} \cdot U_{is} = 0,\ r \neq s$ 3. $\sum_{i=1}^{n} m_r \cdot U_{ir} \cdot U_{is} = 0,\ r \neq s$

1 ☐
2 ☐
3 ☐

Nr. 11

Conforming P100 – 92, for a *S DOF* system, the seismic force is defined by:

1. $S = \alpha \cdot k_s \cdot \beta \cdot \psi \cdot G$ 2. $S_r = \alpha \cdot k_s \cdot \beta_r \cdot \psi \cdot G_r$ 3. $S_i = \alpha_i \cdot k_s \cdot \beta_i \cdot \psi \cdot G_i$

1 ☐
2 ☐
3 ☐

Nr. 12

Conforming P100 – 92, for a *n DOF* system, the seismic force computed through the direct method is defined by:

1. $S_{ir} = \alpha \cdot k_s \cdot \beta_r \cdot \psi \cdot \varepsilon_r \cdot G_i$ 2. $S_{ir} = \alpha \cdot k_s \cdot \beta_r \cdot \psi \cdot \eta_{ir} \cdot G_i$ 3. $S_{ir} = \alpha \cdot k_s \cdot \beta_r \cdot \psi_i \cdot \eta_{ir} \cdot G_i$

1 ☐
2 ☐
3 ☐

Nr. 13

Conforming P100 – 92, for a *n DOF* system, the seismic force computed through the indirect method is defined by:

1. $S_r = \alpha \cdot k_s \cdot \beta_r \cdot \psi \cdot \varepsilon_r \cdot G$ 2. $S_r = \alpha \cdot k_s \cdot \beta_r \cdot \psi \cdot \eta_r \cdot G_r$ 3. $S_r = \alpha_r \cdot k_s \cdot \beta_r \cdot \psi \cdot \varepsilon_r \cdot G_r$

1 ☐
2 ☐
3 ☐

Nr. 14

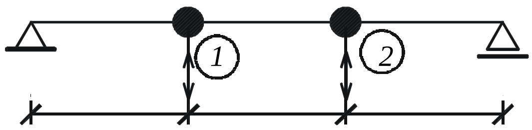
Conforming P100 – 92, the dynamic coefficient β has the next maximum and minimum values:

1. $\beta_{max} = 2.5$, $\beta_{min} = 1$ 2. $\beta_{max} = 3$, $\beta_{min} = 0.7$ 3. $\beta_{max} = 2.5$, $\beta_{min} = 0.7$

1 ☐
2 ☐
3 ☐

Nr. 15

For the system shown by the next figure, the flexibility matrix is:

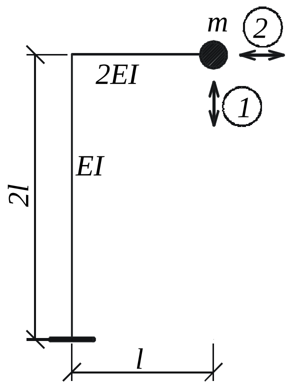


1. $[\Delta]_L = \frac{l^3}{E \cdot I} \cdot \begin{bmatrix} \frac{3}{4} & \frac{11}{12} \\ \frac{11}{12} & \frac{4}{3} \end{bmatrix}$ 2. $[\Delta]_L = \frac{l^2}{3 \cdot E \cdot I} \cdot \begin{bmatrix} \frac{3}{4} & \frac{11}{12} \\ \frac{11}{12} & \frac{4}{3} \end{bmatrix}$ 3. $[\Delta]_L = \frac{l}{E \cdot I} \cdot \begin{bmatrix} \frac{3}{4} & -\frac{11}{12} \\ -\frac{11}{12} & \frac{4}{3} \end{bmatrix}$

1 ☐
2 ☐
3 ☐

Nr. 16

For the system shown by the next figure, the flexibility matrix is:

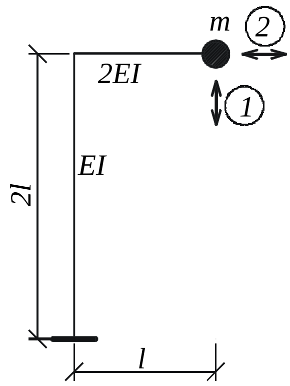


1. $[\Delta]_L = \frac{l^2}{3 \cdot E \cdot I} \cdot \begin{bmatrix} 13 & 12 \\ 12 & 16 \end{bmatrix}$ 2. $[\Delta]_L = \frac{l^3}{6 \cdot E \cdot I} \cdot \begin{bmatrix} 13 & 12 \\ 12 & 16 \end{bmatrix}$ 3. $[\Delta]_L = \frac{l}{E \cdot I} \cdot \begin{bmatrix} 13 & -12 \\ -12 & 16 \end{bmatrix}$

1 ☐
2 ☐
3 ☐

Nr. 17

For the system shown by the next figure, the mode shapes are:



1. $\{U_{i1}\} = \begin{Bmatrix} 1 \\ 1.133 \end{Bmatrix}$ $\{U_{i2}\} = \begin{Bmatrix} 1 \\ -0.883 \end{Bmatrix}$

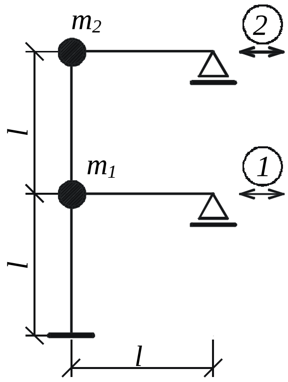
2. $\{U_{i1}\} = \begin{Bmatrix} -1 \\ -1.133 \end{Bmatrix}$ $\{U_{i2}\} = \begin{Bmatrix} -1 \\ -0.883 \end{Bmatrix}$

3. $\{U_{i1}\} = \begin{Bmatrix} 1 \\ 1.133 \end{Bmatrix}$ $\{U_{i2}\} = \begin{Bmatrix} 1 \\ 0.883 \end{Bmatrix}$

1 ☐
2 ☐
3 ☐

Nr.18

For the system shown by the next figure, the flexibility matrix is:

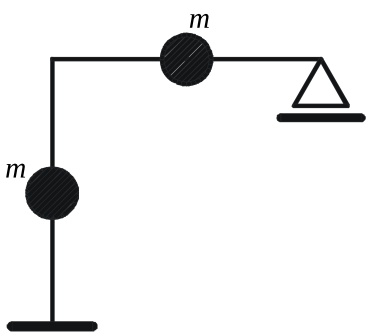


1. $[\Delta]_L = \frac{l^3}{228 \cdot E \cdot I} \cdot \begin{bmatrix} 31 & 46 \\ 46 & 113 \end{bmatrix}$ 2. $[\Delta]_L = \frac{l^2}{3 \cdot E \cdot I} \cdot \begin{bmatrix} 31 & 46 \\ 46 & 113 \end{bmatrix}$ 3. $[\Delta]_L = \frac{l^2}{3 \cdot E \cdot I} \cdot \begin{bmatrix} 31 & -46 \\ -46 & 113 \end{bmatrix}$

1 ☐
2 ☐
3 ☐

Nr.19

How many dynamic degrees of freedom has the system shown by the next figure?

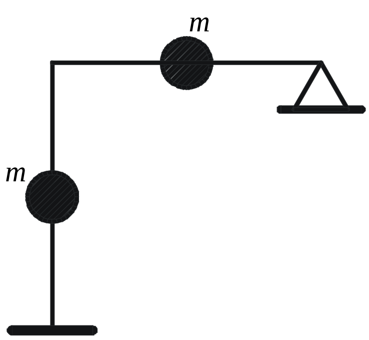


1. *1 DOF* 2. *2 DOF* 3. *3 DOF*

1 ☐
2 ☐
3 ☐

Nr. 20

How many dynamic degrees of freedom has the system shown by the next figure?

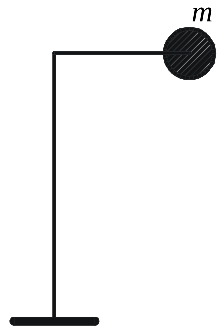


1. *1 DOF* 2. *2 DOF* 3. *3 DOF*

1 ☐
2 ☐
3 ☐

Nr. 21

How many dynamic degrees of freedom has the system shown by the next figure:



1. *1 DOF* 2. *2 DOF* 3. *0 DOF*

1 ☐
2 ☐
3 ☐

Nr. 22

The seismic force defined as the maximum inertia force is:

1. $S = m \cdot S_a$ 2. $S = m \cdot \omega^2 \cdot S_a$ 3. $S = m \cdot \omega \cdot S_a$

1 ☐
2 ☐
3 ☐

Nr. 23

The relation between the seismic response spectra is:

1. $S_a = \omega^2 \cdot S_d = \omega \cdot S_v$ 2. $S_a = \omega^2 \cdot S_v = \omega \cdot S_d$ 3. $S_a = -\omega^2 \cdot S_d = -\omega \cdot S_v$

1 ☐
2 ☐
3 ☐

Nr. 24

Conforming P100 – 92, the k_s coefficient for the “A” seismic area is:

1. $k_s = 0.32$ 2. $k_s = 0.26$ 3. $k_s = 0.20$

1 ☐
2 ☐
3 ☐

Nr. 25

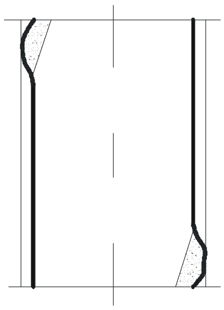
Conforming P100 – 92, the minimum degree of seismic assurance R_{min} for the buildings belonging to the second importance class is:

1. $R_{min} = 0.60$ 2. $R_{min} = 0.70$ 3. $R_{min} = 0.50$

1 ☐
2 ☐
3 ☐

Nr.26

Which of the next forces or bending moments produce the damages shown by the next figure (M – is the bending moment; Q - is the shear force; N - is the axial force):

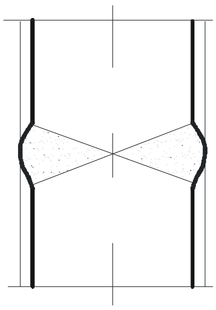


1. M 2. Q 3. N

1 ☐
2 ☐
3 ☐

Nr. 27

Which of the next forces or bending moments produce the damages shown by the next figure (M – is the bending moment; Q - is the shear force; N - is the axial force):

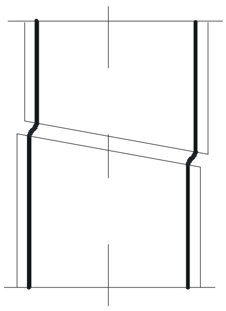


1. M 2. Q 3. N

1 ☐
2 ☐
3 ☐

Nr. 28

Which of the next forces or bending moments produce the damages shown by the next figure (M – is the bending moment; Q - is the shear force; N - is the axial force):

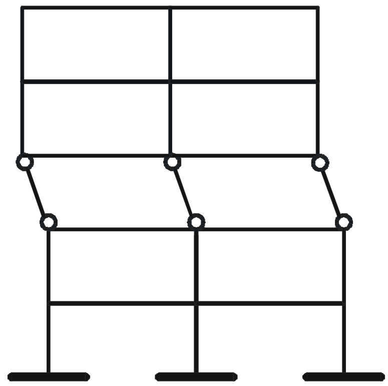


1. M 2. Q 3. N

1 ☐
2 ☐
3 ☐

Nr. 29

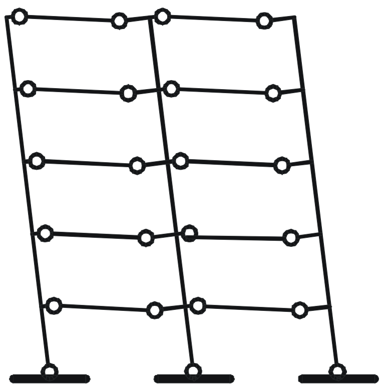
For the system shown by the next figure the collapse mechanism is:



1. collapse due to columns
2. collapse due to girders
3. collapse due to columns and girders

Nr. 30

For the system shown by the next figure the collapse mechanism is:



1. collapse due to columns
2. collapse due to girders
3. collapse due to columns and girders

Nr.31

The earthquakes from Vrancea area are:

1. shallow earthquakes
2. intermediate earthquakes
3. deep earthquakes

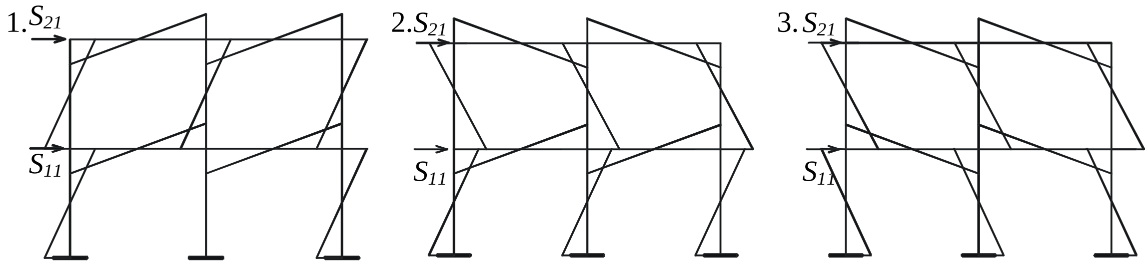
Nr.32

Which of the next seismic waves are the most dangerous for buildings:

1. the primary (longitudinal) waves 2. the secondary (transversal) waves 3. the surface waves

Nr.33

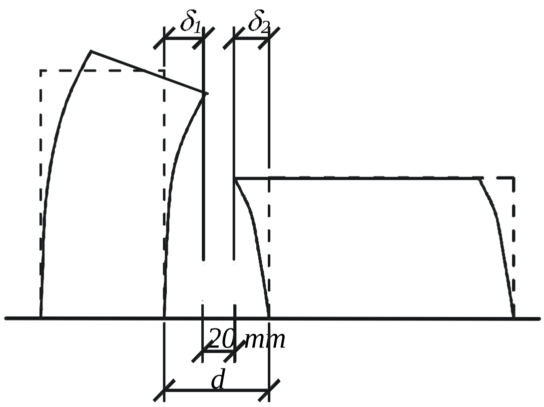
Which of the next bending moment diagrams is correct:



1 ☐
2 ☐
3 ☐

Nr.34

Conforming P100 – 92 the anti-seismic joint is:



1. $d \geq \delta_1 + \delta_2 + 20mm$
2. $d \geq \delta_1 + \delta_2 + 20cm$
3. $d \geq \delta_1 + \delta_2 + 10cm$

1 ☐
2 ☐
3 ☐

Nr.35

The equation defining the seismic assurance „R” is:

1. $\mathrm{R} = \mathrm{S}_{\mathrm{capable}} / \mathrm{S}_{\mathrm{max\ imum}}$
2. $R = S_{capable} / S_{necessary}$
3. $R = S_{necessary} / S_{capable}$

1 ☐
2 ☐
3 ☐

Nr.36

As a part of Geology, the seismology is the science conserned with the study of:

1. Earth structure
2. earthquakes
3. vibrations of civil engineering structures

1 ☐
2 ☐
3 ☐

Nr.37

The tectonic plates are floating on the mantle of the Earth determining:

1. the continental drift
2. the Earth internal structure
3. the behavior if civil engineering structures

1 ☐
2 ☐
3 ☐

Nr.38

The process in which a tectonic plate is moving against and under another plate is named:

1. subduction   2. substitution   3. substructure

1 ☐
2 ☐
3 ☐

Nr.39

The place where an earthquake is generated is named (1)………………and the corresponding projection of the crust is named (2)…………….:

1. (1) hypocenter; (2) epidermis
2. (1) epicenter; (2) hypocenter or focus
3. (1) hypocenter or fours; (2) epicenter

1 ☐
2 ☐
3 ☐

Nr.40

The seismic primary waves (or P - waves) are (1)…………..waves and the secondary waves (or S – waves) are (2)……………………….:

1. (1) transversal (shear); (2) longitudinal (tension/compression)
2. (1) parallel (bending); (2) rotational (torsional)
3. (1) longitudinal (tension/ compression); (2) transversal (shear)

1 ☐
2 ☐
3 ☐

Nr.41

The earthquakes can be registered and measured with:

1. the seismograph   2. the micrometre   3. the pantograph

1 ☐
2 ☐
3 ☐

Nr.42

An seismic intensity scale, such as Mercalli Modified scale (MM), is:

1. an objective scale, based on instrumentation measurements
2. a subjective scale, based on human feeling and on effects on structures and living beings
3. an objective scale, based on 12 degrees of structural damages

1 ☐
2 ☐
3 ☐

Nr.43

The Richter scale is an (1)…………………., scale, also named (2)………………………scale:

1. (1) objective; (2) seismic intensity
2. (1) objective; (2) magnitude
3. (1) subjective; (2) MSK

1 ☐
2 ☐
3 ☐

Nr.44

The modified Mercalli scale (MM) is a………..degrees scale:

1. IX　　2. XI　　3. XII

1 ☐
2 ☐
3 ☐

Nr.45

The seismic magnitude is define as:

1. the base 10 logarithm of the maximum amplitude, measured in micrometres (10^{-6}m), of the earthquake record obtained by Wood – Anderson seismograph with magnification 2800, the natural period T=0.8s, damping coefficient 0.8, and corrected to a distance of 100 km from epicenter.
2. the natural logarithm of the minimum amplitude, measured in nanometers (10^{-9}m), of the earthquake result obtained by Woody – Alen, seismograph with magnification 8200, the natural period T=8.0s, damping coefficient 8.0, and corrected to a distance of 90 km from epicenter.
3. the natural logarithm of the average amplitude, measured in centimeters (10^{-2}m), of the earthquake result obtained by Wood – Angel seismograph with magnification 28, the natural period T=8.08s, damping coefficient 0.8, and corrected to a distance of 10 m from epicenter.

1 ☐
2 ☐
3 ☐

Nr.46

It was observed that the magnitude, M, is directly linked by the seismic energy, E (in ergs) in the focus by the next equation:

1. $\ln E = 16.5 \cdot M^2 + 0.8 \cdot M$　　2. $\log_{10} E = 11.8 + 1.5 \cdot M$　　3. $\log_{10} M = 11.8 \cdot E^2 + 1.5 \cdot E$

1 ☐
2 ☐
3 ☐

Nr.47

The main earthquake from March 4th 1977, from Vrancea had the next main characteristics:

1. magnitude (Richter) = 7.2; intensity (Mercalli) = 9
2. magnitude (Mercalli) = 6; intensity (Richter) = 6
3. magnitude (Richter) = 2.7; intensity (Mercalli) = 8

1 ☐
2 ☐
3 ☐

Nr.48

Romanian Earthquake engineering code is named:

1. P001 - 29 2. P100 - 92 3. P92 - 100

1 ☐
2 ☐
3 ☐

Nr.49

Conforming to the seismic zonation of Romania, an earthquake with the intensity 9 on MSK scale is probable to occur every ………………. years in Vrancea area:

1. 3 2. 1977 3. 100

1 ☐
2 ☐
3 ☐

Nr.50

A system with *1 DOF*, „u(t)”, has the mass „m”, the stiffness „k” and the damping „c”. If the external, unidirectional acceleration earthquake action is „$\ddot{u}_g(t)$”, then the equation of motion for this system under the earthquake action is:

1. $m \cdot \ddot{u}(t) + c \cdot \dot{u}(t) + k \cdot u(t) = -m \cdot \ddot{u}_g(t)$
2. $m \cdot \ddot{u}_g(t) + c \cdot \dot{u}_g(t) + k \cdot u_g(t) = -m \cdot u\ \ (t)$
3. $m \cdot \ddot{u}_g(t) + c \cdot \dot{u}(t) + k \cdot u(t) = -m \cdot u\ \ (t)$

1 ☐
2 ☐
3 ☐

Nr.51

A particular solution of the equation of motion $\ddot{u}(t) + 2 \cdot \xi \cdot \omega \cdot \dot{u}(t) + \omega^2 \cdot u(t) = -\ddot{u}_g(t)$:

1. $u(t) = 2 \cdot \xi \cdot \omega + \frac{1}{\omega^2} \cdot \int_0^t \ddot{u}_g(\tau) \cdot e^{-\xi \cdot \tau} \cdot \sin \frac{1}{\sqrt{1-\xi^2}} \cdot d\tau$
2. $u(t) = -\frac{1}{m} \cdot \int_0^t \ddot{u}_g(\tau) \cdot \sin \frac{\omega^2}{1-\xi^2} \cdot d\tau$
3. $u(t) = -\frac{1}{\omega \cdot \sqrt{1-\xi^2}} \cdot \int_0^t \ddot{u}_g(\tau) \cdot e^{-\xi \cdot \omega \cdot (t-\tau)} \cdot \sin\left[\omega \cdot \sqrt{1-\xi^2} \cdot (t-\tau)\right] \cdot d\tau$

1 ☐
2 ☐
3 ☐

Nr.52

For an *1 DOF* system described by the equation $\ddot{u}(t) + 2 \cdot \xi \cdot \omega \cdot \dot{u}(t) + \omega^2 \cdot u(t) = -\ddot{u}_g(t)$, the spectral value of the displacement is defined by:

1 $S_d(\xi, \omega) = |u(t)|_{\max}$ 2. $S_\omega(\xi, \omega) = \left|\ddot{u}(t)\right|_{\min}$ 3. $S_a(\xi, \omega) = \left|u(t)\right|^2$

1 ☐
2 ☐
3 ☐

Nr.53

A design spectra refers to the maximum probabilistic response of 1 DOF system loaded by:

1. the Vrancea earthquake, March 4th, 1977
2. many earthquake records
3. one specific earthquake, chosen by designer

1 ☐
2 ☐
3 ☐

Nr.54

A multi degree of freedom system loaded by an earthquake „$\ddot{u}_g(t)$" is given by next equations where $[M]$- mass matrix, $[K]$- stiffness matrix, $[C]$- damping matrix, $\{u\}$ displacement vector:

1 $[M] \cdot \left\{\ddot{u}(t)\right\} + [C] \cdot \left\{\dot{u}(t)\right\} + [K] \cdot \left\{u(t)\right\} = -[M] \cdot \left\{\ddot{u}_g(t)\right\}$

2. $[M] \cdot \left\{\ddot{u}_g(t)\right\} + [C] \cdot \left\{\dot{u}_g(t)\right\} + [K] \cdot \left\{u_g(t)\right\} = -[M] \cdot u(t)$

3. $[M] \cdot \left\{u(t)\right\} + [C] \cdot \left\{\dot{u}(t)\right\} + [K] \cdot \left\{\ddot{u}(t)\right\} = -[M] \cdot \ddot{u}_g(t)$

1 ☐
2 ☐
3 ☐

Nr.55

For a "n" DOF system with the stiffness $[K]$ and the mass matrix $[M]$, the unknown eigenvalue „ω" , can be determined from the next characteristic equations::

1 $\det([K] - \omega^2 \cdot [M]) = 0$

2. $[K] \cdot \omega^2 + [M] \cdot \omega + [1] = \{0\}$

3. $\sqrt{[K]^2 + \omega \cdot [M] \cdot \omega} + [1] = \{0\}$

1 ☐
2 ☐
3 ☐

Nr.56

The maximum response of a structure to seismic load, obtained by modal superposition is given by (note that „R_r" is the response for the „r" mode of vibration):

1. $R_{\max} = \dfrac{\sum_{r=1}^{m} R_r}{\sqrt{\sum_{r=1}^{m} R_r^2}}$ 2. $R_{\max} = \sqrt{\sum_{r=1}^{m} R_r^2}$ 3. $R_{\max} = \dfrac{1}{\sqrt{\sum_{r=1}^{m} R_r^2}}$

1 ☐
2 ☐
3 ☐