X

(https://swayam.gov.in) (https://swayam.gov.in/nc_details/NPTEL)

reviewer6@nptel.iitm.ac.in

NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Basic Electrical Circuits (course)

Announcements (announcements) **About the Course (preview)** Ask a Question (forum) Progress (student/home) Mentor (student/mentor)

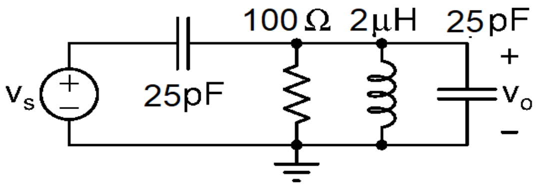
Unit 13 - Week 11: Second order system response

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-12-02, 23:59 IST.

1)



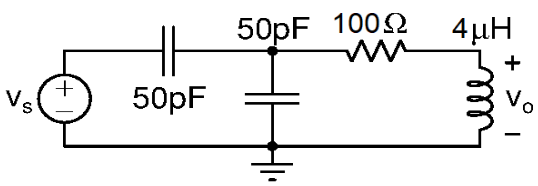
Determine the damping factor ζ of the circuit above.

(The answer must be the value of ζ. Round off fractional answers to 2 decimal places.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.9,1.1

1 point

2)



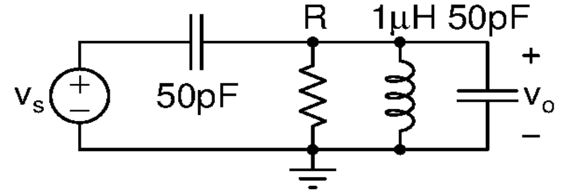
Determine the damping factor ζ of the circuit above.

(The answer must be the value of ζ. Round off fractional answers to 2 decimal places.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.2,0.31

1 point

3)



In the circuit above, R is such that the damping factor $\zeta = 0.6$. $v_s(t) = 4\mathrm{u}(t)$ V. $v_o(0^-) = 0$. The total response of the circuit is given by

$$v_o(t) = \underbrace{V_f}_{\text{Forced}} + \underbrace{V_p \exp(\sigma t)\cos(\omega t + \phi)}_{\text{Natural}}$$

Determine V_f, V_p, σ, ω, ϕ. (Think carefully and compute the forced and natural responses separately. For the natural response, you need to use v_o and dv_o/dt at $t = 0^+$. Again, these can be calculated by looking at the circuit and judging the voltages and currents, similar to how first order responses were calculated.)

Value of V_f:

(The answer must be in **volts (V)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0

1 point

4) Value of V_p:

(The answer must be in **volts (V)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 4.8,5

1 point

5) Value of σ:

(The answer must be in **megaradians per second (Mrad/s)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) -61,-59

1 point

6) Value of ω:

(The answer must be in **megaradians per second (Mrad/s)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 78.9,81.1

1 point

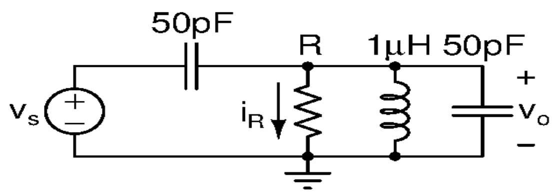
7) Value of ϕ:

(The answer must be in **degrees** (°). Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 65,67

1 point

8)



In the circuit above, R is such that the damping factor $\zeta = 0.8$. $v_s(t) = 4\cos(10^8 t)$ V. What is the amplitude of $i_R(t)$ *in steady state*? (Hint: Use the methods outlined in Unit 10 for directly calculating the sinusoidal steady state response).

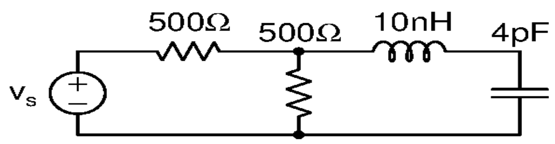
Amplitude of $i_R(t)$:

(The answer must be **milliamperes (mA)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 19,21

1 point

9)



Determine the damping factor ζ and the natural frequency ω_n of the circuit above.

Value of ζ:

(The answer must be the value of ζ. Round off fractional answers to 2 decimal places.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.4,2.6

1 point

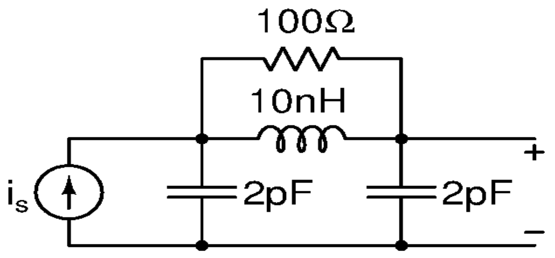
10) Value of ω_n:

(The answer must be in **gigaradians per second (Grad/s)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 4.9,5.1

1 point

11)



Determine the damping factor ζ and the natural frequency ω_n of the circuit above.

Value of ζ:

(The answer must be the value of ζ. Round off fractional answers to 2 decimal places.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.45,0.55

1 point

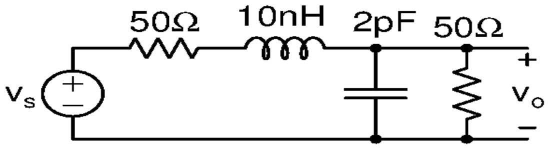
12) Value of ω_n:

(The answer must be in **gigaradians per second (Grad/s)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 9.9,10.1

1 point

13)



The above circuit is governed by the second order differential equation

$$\frac{d^2 v_o}{dt^2} + 2\zeta\omega_n \frac{dv_o}{dt} + \omega_n^2 v_o = b_2 \frac{d^2 v_s}{dt^2} + b_1 \frac{dv_s}{dt} + b_0 v_s$$

Derive the governing differential equation, put it in the standard form, and determine the damping factor ζ and the natural frequency ω_n.

Value of ζ:

(The answer must be the value of ζ. Round off fractional answers to 2 decimal places.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.7,0.81

1 point

14) Value of ω_n:

(The answer must be in **gigaradians per second (Grad/s)**. Round off fractional answers to 1 decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 9.9,10.1

1 point