

COMPUTER TOOLS

2. PARTIAL EXAM – 16. 12. 2013

In file izpit.asc you already have a circuit of linear voltage stabilizer.

1. Find the output voltage of the stabilizer at 20 V of input voltage and 100 Ω of load resistance:

$$U_{izh} = \text{_____} \text{ V}$$

2. Find resistance R_C , to set the output short circuit current to 1A.

$$R_C = \text{_____} \Omega$$

3. Find resistance R_1 to set the output open circuit voltage to 5V.

$$R_1 = \text{_____} \Omega$$

4. Find temperature coefficient of the output voltage in temperature range between 0 in +70 °C.

$$TK_{U_{izh}} = \text{_____} \text{ V/}^\circ\text{C}$$

5. Find the stabilization factor $S = \frac{dU_{vh}}{dU_{izh}}$.

$$S = \text{_____}$$

6. Find the stabilization factor dependence in the resistance range $R_C = 500 - 2500 \Omega$. At which resistance you get the maximum?

$$R_C(S_{maks}) = \text{_____} \Omega$$

7. Find the high corner frequency of the stabilization factor at the given value of R_C from step 2.

$$f_m = \text{_____} \text{ Hz}$$

8. Determine output voltage noise in the frequency range up to 100 kHz. Find the noisiest element of the circuit?

$$U_{noise} = \text{_____} \mu\text{V}, \text{ the noisiest component: } \text{_____}$$

9. Find minimal input voltage at which the stabilizer still operates.

$$V_{inmin} = \text{_____} \text{ V}$$

10. Find output voltage AC amplitude, if input voltage has an AC component with amplitude of 2V and DC component of 20V. Calculate the stabilization factor.

$$\Delta U_{izh} = \text{_____} \text{ mV } S = \text{_____}$$

11. Determine the maximum output voltage spike if the input voltage has a step change of 1V.

$$\Delta U_{izh} = \text{_____} \text{ mV}$$

12. Build a thermal model and find the temperature difference to air of transistor Q1 at maximal current, if the temperature resistance between junction and case, insulation between case and heatsink to air are respectively 1.5 K/W, 0.2 K/W and 1 K/W.

$$\Delta T_{Q_1} = \text{_____} \text{ }^\circ\text{C}$$

Solving: Check through all the tasks and decide for appropriate approach. You can solve any of the tasks in a random order, but note that some of the tasks require other tasks to be already solved.

Points: Each task has one point. Exam result is a sum of points of all fully completed tasks. The maximum score is not limited and any excess points over 10 are carried forward. You are eligible to approach the next partial exam if you get at least 5 points.

Time to solve is limited to 60 min. Every solved task has to be demonstrated promptly to supervisor for checking.