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Section:

Version A

Exam 3 — EE 233 Fall 2011

The test is closed book, with one sheet of notes and standard calculators (no communications) allowed. Show all work. Be sure to state all assumptions made and check them when possible. The number of points per problem are indicated in parentheses. Total of 50 points in 3 problems on 3 pages.

1. In the circuit at right, v_1 is the input and v_2 is the output. C = 20 mF.

(a) Calculate the impulse response. (7)



(b) Determine $v_2(t)$ for $v_1(t) = 6e^{-4t}u(t)$. (10)

2. What is the s-domain transfer function $V_{Out}(s)/V_{In}(s)$ for the circuit to the right? What type of filter is it? (16)



3. A filter has the transfer function

H(s) =
$$\frac{-\left(\frac{R_2}{R_1}\right)s^2}{s^2 + \frac{s}{R_1C_1} + \frac{1}{R_1R_2C_1C_2}}$$
.

(a) Choose values for the R_1 , R_2 , C_1 and C_2 to satisfy the following conditions: (12)

- Corner frequency of 20,000 rad/s.
- Gain in passband far away from corner frequency of 38 dB.
- Gain at the corner frequency of 26 dB.
- Use 5nF capacitors whenever possible.

(b) What is the cutoff frequency? (5)