KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

Electrical Engineering Department

EE-416 Analog Filter Design

Instructor: Dr. Hussain Alzaher

Exam-I (071)

Name: I.D.# Serial #:

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1) Use an ideal op-amp for designing a circuit to realize the bilinear transfer function wit a pole at 1 kHz and a zero at 10 kHz, and high-frequency gain of 20 dB. **Show your final design.**

2) Design a Sallen-Key lowpass biquad using an ideal-opamp to realize Butterworth response with gain 0 dB, Q = 0.707, and f_o = 100kHz. **Show your final design.**

3) Design a Delyiannis-Friend bandpass circuit with Q = 10, and f_o = 100kHz and H_M = 10dB. **Show your final design.**

(4) Determine the non-ideal effects in the parameters and responses of the filters designed in problems (1), (2) and (3), when they are realized using real op-amps with $\omega_t = 2\pi 100$ Mrad/sec.