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B.E/B.Tech (Full Time) END SEMESTER EXAMINATIONS, APRIL / MAY 2019

(COMMON TO ECE AND BIOMEDICAL ENGINEERING)

IV SEMESTER

EC7452 – OPERATIONAL AMPLIFIERS AND ANALOG INTEGRATED CIRCUITS

(Regulation 2015)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART – A (10 x 2 = 20 Marks)

1. Define slew rate.
2. Write about gain of positive feedback amplifier.
3. List out the advantages of active load in a differential amplifier circuit.
4. Draw the circuit of voltage to current converter if the load is grounded.
5. What is meant by capture range?
6. What is the use of low pass filter in PLL?
7. Calculate the values of LSB, MSB and fulscale output for an 16 bit DAC for 0 to 10V range
8. State the limitations of weighted resistor DAC.
9. What are the applications of isolation amplifier?
10. What are the different modes of operation of timer?

Part – B (5 x 13 = 65 marks)

11. a (i) Derive the wilson current source with neat diagram. 6
(ii) Derive the input offset current with diagram and design an inverting amplifier with T-feedback network using 741 op-amp to get a gain of -10 and input impedance of 10M Ω . Calculate R_i, R_s and R₁ 7
(OR)
- b What are all the frequency compensation techniques used in op-amp? Explain it in detail. 13
12. a (i) Derive for frequency oscillation of monostable multivibrator using op-amp with neat illustration. 7
(ii) Derive for regenerative comparator circuit and design the circuit with hysteresis voltage of 4V 6
(OR)
- b (i) Design and explain the different types of voltage to current converter. 7
(ii) Write short note on adder and subtractor. 6



13. a Explain about four quadrant analog multiplier and derive its output. 13
(OR)
- b (i) With a neat diagram explain the working of VCO and how different waveforms are obtained from it. 7
(ii) Explain the application of PLL as AM detection. 6
14. a (i) Explain the function of R-2R ladder DAC 9
(ii) Consider the function of inverted R-2R ladder DAC. Given $R=R_f=10k\Omega$ and $V_R=10V$. Calculate the output voltage for the binary input of 1110. 4
(OR)
- b (i) Describe about the dual slope ADC with neat illustration. 9
(ii) Write short notes on voltage to frequency converter. 4
15. a (i) Design a wide band pass filter using opamp with $f_L=2kHz$, $f_h=6kHz$ and pass band gain 8. Assume $C_1=C_2=0.1\mu F$ 8
(ii) Design a second order butterworth LPF with cutoff frequency of 3kHz and $R=2.5k\Omega$ 5
(OR)
- b (i) Explain the working principle of boost controller 8
(ii) Write short notes on fiber optic IC and optocouplers. 5

Part – C (1 x 15 = 15 marks)

16. a (i) Design a square wave generator with duty cycle of 60% and frequency of oscillation of 3kHz. Assume $C=0.1\mu F$ 8
(ii) Draw the circuit of a Schmitt trigger using 555 timer and describe its operation. 7

