

Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

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Fourth Semester B.E. Degree Examination Signal Conditioning and Data Acquisition Circuits

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1

Q.01	a	Explain block schematic of op-amp with neat diagram.	8 marks
	b	In the circuit below $R_1=10K\Omega$, $V_i=5V$. A load resistor of $10 K\Omega$ is connected at the output. Calculate i) V_o ii) A_{CL} iii) Load current i_L iv) The output current i_o indicating proper direction of flow.	6 marks
	c	Explain the operation of differential amplifier. Derive the output voltage equation.	6 marks
OR			
Q.02	a	Explain input offset current in op-amp and a method to minimize its effects.	10 marks
	b	Explain frequency response curves of an op-amp.	6 marks
	c	Design an adder circuit using an op-amp to get the output expression as $V_o = -(10V_1 + 5V_2 + 0.5V_3)$. Where V_1, V_2, V_3 are the inputs. Take $R_f = 10K \Omega$.	4 marks
Module-2			
Q. 03	a	Explain the working of precision full wave rectifier with neat circuit diagram.	8 marks
	b	Find the values of R_f and R_1 in the lossy integrator so that the peak gain is 40dB and gain is 3dB down from its peak when $\omega=12000\text{rad/sec}$. Use capacitance of $0.01 \mu\text{f}$.	6 marks
	c	Explain sample and hold circuit with neat circuit diagram.	6 marks
OR			
Q.04	a	Explain zero crossing detector and window detector with neat diagram.	6 marks
	b	In Schmitt trigger circuit hysteresis of $0.1V$ is desired. Calculate V_{ref} , V_{sat} and R_1 , if $V_{UT} = V_{ref}$, $A_{OL}=100,000$ and loop gain is $100, R_2=1K\Omega$.	6 marks
	c	Explain monostable multivibrator using op-amp and derive equation of output frequency.	8 marks
Module-3			
Q. 05	a	Explain series op-amp regulator with neat circuit diagram. Give the characteristics of three terminal IC regulators.	10 marks

	b	Explain 723 general purpose regulator. Hence explain functional diagram of low voltage regulator.	10 marks
		OR	
Q. 06	a	Explain first order low-pass filter with circuit diagram and frequency response, obtaining the gain equation. Design first order low-pass filter for cut-off frequency of 5KHz and passband gain of 4.	10 marks
	b	Explain wide band and narrow band pass filter with necessary diagrams and equations.	10 marks
		Module-4	
Q. 07	a	With neat functional diagram explain the operation of 555 timer monostable multivibrator. Derive the time duration of output pulse.	10 marks
	b	Design a Astable multivibrator using 555 timer for duty cycle $D=75\%$ and frequency $f = 1\text{KHz}$	6 marks
	c	Discuss FSK generator using Astable multivibrator.	4 marks
		OR	
Q. 08	a	Explain the principle of PLL with neat block schematic. Hence define the terms –i) Lock-in range, ii) Capture range and iii) Pull-in time.	10 marks
	b	Explain the block diagram of VCO. Derive the expression of output frequency f_o .	10 marks
		Module-5	
Q. 09	a	Describe the block diagram of Analog Data Acquisition System.	10 marks
	b	Describe components of Digital Data Acquisition System.	10 marks
		OR	
Q. 10	a	Describe weighted resistor DAC with necessary diagram. What are the disadvantages of this type of DAC.	8 marks
	b	Explain the counter type A to D converter.	6 marks
	c	Define the following terms- i)Resolution ii) Linearity iii) Monotonocity	6 marks