

Model Question Paper-2 with effect from 2019-20 (CBCS Scheme)

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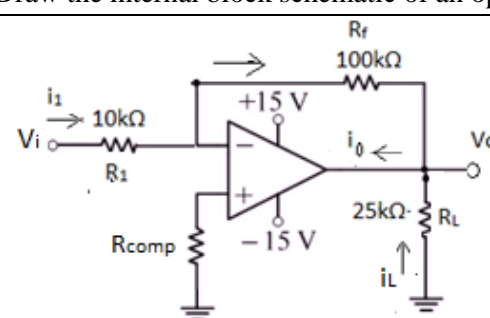
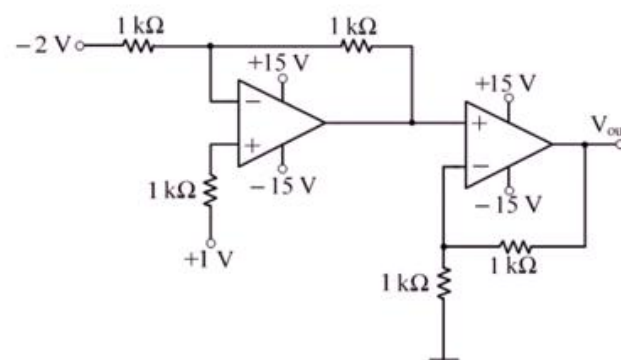
Fourth Semester B.E. Degree Examination Signal Conditioning and Data Acquisition Circuits

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	Draw the internal block schematic of an op-amp. Mention the function of each block.	4
	b	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>In Fig.1(b), $V_i = 1V$, Calculate</p> <ol style="list-style-type: none"> i. the current i_1 through R_1 ii. the voltage drop across R_f iii. the load current i_L iv. the total output current i_o of the op-amp v. the output voltage V_o vi. the closed loop voltage gain A_v vii. the circuit input resistance R_i viii. the bias current compensating resistor R_{comp} </div> </div> <p style="text-align: center;">Fig 1(b)</p>	8
	c	Define input bias current. Show that the use of resistor R_{comp} in the closed loop amplifier circuits can compensate for bias currents.	8
OR			
Q.02	a	Give the high frequency model of an op-amp. Derive an expression for the magnitude of the open loop gain.	4
	b	With a neat circuit diagram of a Non-Inverting Summing amplifier circuit., derive an equation for its output voltage V_o .	8
	c	For the circuit in Fig.2(c), find V_{out}	8
		 <p style="text-align: center;">Fig.2(c)</p>	
Module-2			
Q. 03	a	With a neat circuit diagram, describe the use of Trans-resistance amplifier in light detection	4
	b	What is the use of Precision rectifier ? Explain the operation of Full wave precision rectifier along with the circuit diagram and I/O waveforms.	8
	c	Draw the circuit diagram of a basic op-amp integrator and obtain an expression for its output voltage. Also, discuss about its frequency response.	8
OR			

Q.04	a	Briefly discuss the types of multivibrators	4
	b	What is a Comparator? Describe the operation of the following circuits that make use of comparators i) Zero crossing detector and ii) Time marker generator. Also, sketch I/O waveforms.	8
	c	With a neat circuit diagram and I/O waveforms, explain the operation of inverting Schmitt trigger	8
		Module-3	
Q. 05	a	Define the terms i) Voltage regulation, ii) Line regulation, iii) Load regulation, and iv) Ripple rejection	4
	b	Draw a neat circuit diagram of Series voltage regulator and explain its operation. List any four characteristics of IC 7805 series voltage regulator.	8
	c	Design a voltage regulator using 723 to get a voltage output of 28 V.	8
		OR	
Q. 06	a	Define i) Passband, ii) Stopband, iii) Roll off rate and iv) Q factor for a Active filter.	4
	b	With a neat circuit diagram and frequency response curve, deduce an expression for the magnitude of the first order high pass filter gain $ H(j\omega) $. Verify the filter operation using $ H(j\omega) $.	8
	c	Sketch the frequency response curve and circuit diagram of a wide band pass filter. Also, design the same filter for cut off frequencies of 400 Hz and 2 kHz and a pass band gain of 4.	8
		Module-4	
Q. 07	a	With suitable voltage waveforms, Explain the theory behind the working of Frequency divider	4
	b	With a neat circuit diagram, timing waveforms and functional diagram, explain the working of an astable multivibrator using 555 timer.	8
	c	Design an astable multivibrator of output signal frequency 1 kHz and Duty cycle of 70%.	8
		OR	
Q. 08	a	Give the definition of the terms in relation to PLL: i) Lock in range, ii) Capture range, and iii) Pull in time	4
	b	Give the block diagram of IC 566 VCO, sketch the output waveforms and deduce an expression for the output frequency of the VCO.	8
	c	Describe the construction and working of the following circuits that use PLL: i) FM Demodulator ii) Frequency translator	8
		Module-5	
Q. 09	a	Differentiate between Analog Data Acquisition system and Digital Data Acquisition system	4
	b	With a neat block diagram, explain the function of each of the components in the Digital Data Acquisition system	8
	c	Describe the various ways of digital recording .	8
		OR	
Q. 10	a	Calculate the value of the LSB, MSB and Full scale output for a 5-bit DAC for the 0 to 10V range.	4
	b	Draw a 4-bit Binary weighted DAC circuit and obtain an expression for the output voltage V_o . Also, draw the Transfer characteristics.	8
	c	With a neat circuit diagram, explain the operation of a 3 bit Flash ADC.	8