

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**.
02. .
03. .

Module -1

Q.01	a	Draw and explain the block diagram of an op- amp.	5 Marks
	b	For a non-inverting amplifier with $R_i=5k\Omega$, $R_f=20k\Omega$, $V_i= 1V$ and a load resistor $R_L=.5k\Omega$ is connected at the output. Calculate (i) Output voltage V_o ii) Load current i_L iii) Output current i_o	5 Marks
	c	Explain the non-ideal characteristics of an op-amp.	10 Marks
OR			
Q.02	a	Derive an expression for output voltage of Non inverting summing amplifier	6 Marks
	b	Explain the working of an op-amp as Voltage Follower and Scale Changer	6 Marks
	c	Mention the Salient features of Instrumentation Amplifier. With a neat schematic and circuit diagram, explain how implementation amplifier can be used as signal conditioning circuit for Transducer bridge.	8 Marks
Module-2			
Q. 03	a	Explain the following applications of op-amp (i) V-I converter with grounded load (ii) Precision full wave rectifier	10 Marks
	b	Explain the operation of a sample and hold circuit using op amp and mention it applications	6 Marks
	c	Design an op-amp differentiator-that will differentiate an input signal with $f_{max} = 100Hz$. Assume $C=0.1\mu F$	4 Marks
OR			
Q.04	a	Explain the working of a regenerative comparator circuit with the help of waveform and transfer characteristics.	8 Marks
	b	Draw the circuit schematic of opamp based astable multi vibrator and explain its working.	8 Marks
	c	Design a phase shift oscillator circuit for a frequency of 100Hz. Assume $C=0.1\mu F$.	4 Marks
Module-3			
Q. 05	a	Define the terms line Regulation and load regulation with respect to voltage regulator.	4 Marks
	b	Explain the characteristics of three terminal IC voltage regulator.	8 Marks
	c	With neat functional block diagram explain about the low voltage regulator.	8 Marks
OR			
Q. 06	a	With neat circuit diagram and waveform, explain the frequency response of low pass filter and high pass filter.	10 Marks
	b	Design a second order low pass filter with high cutoff frequency of 1kHz if capacitances of $0.0047\mu F$ are to be used.	5 Marks
	c	Design low pass filter for a cutoff frequency of 1kHz with a pass band gain of 2	5 Marks

Module-4			
Q. 07	a	With a neat functional diagram, explain the operation of 555 timer IC.	6 Marks
	b	With the help of circuit and waveforms, explain the operation of astable multivibrator using IC 555 timer.	8 Marks
	c	Explain the application of Monostable multivibrator in Pulse width modulation.	6 Marks
OR			
Q. 08	a	Define the terms lock in range and capture range with respect to phase locked loops.	4 Marks
	b	With a neat block diagram explain the construction and operation of a phase locked loop.	8 Marks
	c	Explain the following applications of phase locked loop (i) Frequency multiplication or division (ii) Frequency translation	8 Marks
Module-5			
Q. 09	a	Explain the function of each component of an Analog Data Acquisition System.	8 Marks
	b	Draw the functional diagram of DAC and write the mathematical expression for voltage output DAC.	4 Marks
	c	With a neat circuit diagram, explain the construction and working of 3-bit R-2R ladder DAC. What are its advantages over weighted resistor DAC?	8 Marks
OR			
Q. 10	a	Draw the functional diagram of ADC and write the mathematical expression for output of ADC.	4 Marks
	b	with a neat schematic block diagram, Explain the working of successive approximation ADC	8 Marks
	c	With a neat schematic diagram, explain the working of digital recording system and discuss about the two ways in which recorders can be coupled to digital system	8 Marks