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Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APRIL/MAY 2024

ELECTRONICS AND COMMUNICATION ENGINEERING

IV- SEMESTER

EC7452- OPERATIONAL AMPLIFIERS AND ANALOG INTEGRATED CIRCUITS

(REGULATION 2015)

ADDITIONAL CONTROLLER OF EXAMINATIONS AU CHENNAI 600 025

Time: 3hrs **Max. Marks: 100**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

Q. No	Questions	Marks
1	What is virtual ground? Why this is an important concept in Op-Amp?	2
2	Define CMRR? How to improve CMRR.	2
3	In the circuit of Schmitt trigger R_2 = 220Ω, R_1 = 120KΩ, V_{ref} = 0V, vi = $1V_{pp}$ (Peak to peak) sine wave and saturation voltage= ± 14V. Determine threshold voltage V_{UT} and V_{LT}.	2
4	Draw the Precision half wave rectifier circuit	2
5	Define frequency synthesizers, and write the applications.	2
6	Difference between AM and PM.	2
7	List the applications of Sample and Hold circuit.	2
8	Draw the functional diagram for dual slope ADC	2
9	List the advantages and disadvantages of low noise amplifier and tuned amplifier.	2
10	Draw the Pin configuration for frequency to voltage converter.	2

PART- B (5 x 13 = 65 Marks)

Q. No	Questions	Marks
11 (a) (i)	Derive the Wilder Current Source with neat diagram and Design the Circuit with following parameters V_{CC}=5V, β=200, R_E=15KΩ, I_0=20μA, V_T=25mV.	8
(ii)	In input offset voltage, for the non-inverting amplifier R_1 = 30KΩ, R_f = 120KΩ, Calculate the maximum output offset voltage due to V_{os} and I_B. The op-amp is LM307 with V_{ios} = 20mV and I_B = 300ηA, I_{OS} =100ηA and Calculate the value of R_{Comp} needed to reduce the effect of I_B.	5
	(OR)	
11 (b)	Explain in detail AC Characteristics of operational amplifier with neat Sketch.	13
12 (a)	Derive the 3-stage Op-amp Instrumentation Amplifier with neat diagram and design the circuit with the gain of 40dB.	13
	(OR)	

12 (b)(i)	Derive the RC Phase Shift Oscillator with neat Sketch and design the circuit, with frequency of 10KHz Assume C=0.1μF	10
(ii)	Derive the expression for voltage to current converter.	3
13 (a)	With neat Block diagram, explain the operation of Four Quadrant multiplier in detail.	13
	(OR)	
13 (b)	Explain in detail (i) Phase lock loop (ii) FSK Modulator and demodulator (iii) Voltage Control oscillator	13
14 (a) (i)	Draw the Block diagram of Successive Approximation converter and explain its operation with an example	8
(ii)	Obtain the output of 4-bit R-2R ladder with the digital data of 0100.	5
	(OR)	
14 (b)(i)	Explain the Construction of Flash type ADC and verify its truth table, Discuss its merits and demerits.	10
(ii)	Describe voltage to frequency converters.	3
15 (a)	Explain in detail switched capacitor filter with neat block diagram	13
	(OR)	
15 (b)(i)	What are the classification of power amplifier and where we use the power amplifier describe with example	9
(ii)	Describe the principle of SMPS	4

PART- C (1 x 15 = 15 Marks)

Q. No	Questions	Marks
16 (i)	In the basic differential Amplifier Given $R_C = 5K\Omega$, $R_E = 12.3K\Omega$, $V_{CC} = \|V_{EE}\| = 10V$; $\beta_O = 200$, $V_{BE} = 0.7V$. determine, (a) For $V_1=V_2=0$, that is for both the inputs grounded, the values of quiescent currents and voltages, I_{BQ}, I_{CQ}, V_{01}, V_{02}, V_{CEQ}.	7
(ii)	Design and derive the wide band pass filer having $F_L = 800Hz$, $F_H = 4KHz$ and pass and gain of 2. Also find the value for Q of the filer.	8