**20EI502**

**Hall Ticket Number:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **December, 2023** | **Electronics and Instrumentation Engineering** | | |
| **Fifth Semester** | **Linear Integrated Circuits & Applications** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
|  | | |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | CO | BL | M |
| 1 | a) | Define Virtual ground. | CO1 | L1 | 1M |
|  | b) | Draw the high frequency equivalent of an Op-Amp. | CO1 | L2 | 1M |
|  | c) | Why open loop op-amp configurations are not suitable for linear applications? | CO1 | L1 | 1M |
|  | d) | Write down the condition for Bark-hausen criterion. | CO2 | L2 | 1M |
|  | e) | What are the disadvantages of ZCD (Zero Crossing Detector)? | CO2 | L2 | 1M |
|  | f) | What are the applications of comparator? | CO2 | L2 | 1M |
|  | g) | Write down the expression for time period of a square wave generator | CO2 | L2 | 1M |
|  | h) | What is a sample and hold circuit? Where it is used? | CO3 | L1 | 1M |
|  | i) | Write the advantages of R-2R Ladder DAC | CO3 | L2 | 1M |
|  | j) | How many comparators are required for Flash type/Parallel type comparator? | CO3 | L2 | 1M |
|  | k) | Define resolution of a data converter. | CO3 | L2 | 1M |
|  | l) | List the applications of 555 timer in Monostable mode of operation. | CO4 | L1 | 1M |
|  | m) | What are the three stages through which PLL operates? | CO4 | L2 | 1M |
|  | n) | What are the advantages of active filters over passive filters? | CO4 | L1 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | Briefly explain the necessity and function of different stages of Op-Amp with respect to its block diagram. | CO1 | L1 | 7M |
|  | b) | Explain the following i) summing amplifier ii) instrumentation amplifier | CO1 | L3 | 7M |
| **(OR)** | | | | | |
| 3 | a) | Draw the circuit of a voltage to current converter if the load is (i) floating and (ii) grounded. Is there any limitation on the size of the load when grounded? | CO1 | L1 | 7M |
|  | b) | Find R1 and RF in the lossy integrator so that the peak gain is 20db and the gain is 3 db down from its peak when ω=10,000 rad/s .Use a capacitance of 0.01µF. | CO1 | L2 | 7M |
| **Unit-II** | | | | | |
| 4 | a) | Draw the circuit diagram of RC phase shift Oscillator and also derive the frequency of oscillations. | CO2 | L2 | 7M |
|  | b) | Draw and explain the operation of a triangular wave generator. | CO2 | L1 | 7M |
| **(OR)** | | | | | |
| 5 | a) | Explain the operation of Inverting comparator with neat circuit and draw the input, output waveforms for positive reference voltage, (+Vref ). | CO2 | L1 | 7M |
|  | b) | A Schmitt trigger with the upper threshold level VUT=0V and hysteresis width VH=0.2V converts a 1 kHz sine wave of amplitude 4Vpp into a square wave. Calculate the time duration of the negative and positive portion of the output waveform. | CO2 | L3 | 7M |
| **Unit-III** | | | | | |
| 6 | a) | Draw the circuit diagram of peak detector and explain its operation. | CO3 | L1 | 7M |
|  | b) | Define Precision diode. Explain how the precision diode can be used as positive peak clamper? | CO3 | L2 | 7M |
| **(OR)** | | | | | |
| 7 | a) | The logic levels used in an 8-bit R-2R ladder type DAC are logic ‘1’ = +5 Volts and logic ‘0’ = 0 Volts. Find the output voltage for an input of 10110110. | CO3 | L2 | 7M |
| **P.T.O**  **20EI502** | | | | | |
|  | b) | A dual slope ADC uses a 16-bit counter and a 4 MHz clock rate. The maximum input voltage is +10V. The maximum integrator output voltage should be -8V when the counter has cycled through 2n counts. The capacitor used in the integrator is 0.1μF.Find the value of the resistor R of the integrator. | CO3 | L3 | 7M |
| **Unit-IV** | | | | | |
| 8 | a) | Draw the functional diagram and explain the operation of 555 timer as Astable multivibrator. | CO4 | L2 | 7M |
|  | b) | Draw the functional diagram of PLL and explain the application of PLL as a frequency translator. | CO4 | L3 | 7M |
| **(OR)** | | | | | |
| 9 | a) | Draw the circuit diagram of first order high pass filter and its frequency response. Derive the expression for output voltage. | CO4 | L2 | 7M |
|  | b) | Design the Narrow band pass filter with two feedback paths having fc=1.5kHz, Q=7 and AF=15.Calculate the new value of resistance in the circuit which will change fc to 2 kHz. Choose C1=C2=C=0.02μF. | CO4 | L3 | 7M |

