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

B.TECH.
(SEM V) THEORY EXAMINATION 2022-23
INTEGRATED CIRCUITS

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   2x10 = 20

  (a)   Explain the role of capacitor used in IC 741.
  (b)   Define Slew rate and write the value of slew rate for IC 741.
  (c)   List the advantages of instrumentation amplifier.
  (d)   Calculate the quality factor if the center frequency and bandwidth are $1\ KHz, 50\ Hz$ respectively.
  (e)   Explain astable and monostable multivibrators.
  (f)   Discuss the uses of voltage follower or voltage buffer.
  (g)   Define noise margin and propagation delay.
  (h)   Explain the PUN and PDN in CMOS realization.
  (i)   Define Lock range and capture range.
  (j)   EXOR gate can be used as phase detector. Justify the statement.

SECTION B

2.   **Attempt any *three* of the following:**   10x3 = 30

  (a)   Calculate the voltages and currents of various transistors for input stage of IC 741 after completing the DC analysis.
  (b)   Derive all the transfer functions obtained in KHN or universal active filter.
  (c)   Discuss the temperature compensation of logarithmic amplifier along with the circuit and mathematical expressions.
  (d)   Realize the single-bit comparator using CMOS.
  (e)   Explain the working of PLL with its block diagram. Also discuss the various applications of it.

SECTION C

3.   **Attempt any *one* part of the following:**   10x1 = 10

  (a)   Calculate the various parameters like input impedance, output impedance, voltage gain, transconductance for output stage of IC 741.
  (b)   Calculate the overall voltage gain provided by IC 741 after drawing the small signal models of each stage.
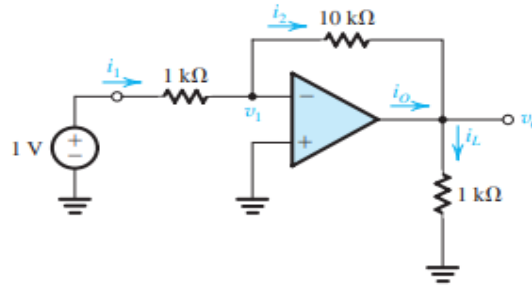
4.   **Attempt any *one* part of the following:**   10x1 = 10

  (a)   Discuss and design a second order band pass filter of bandwidth $100\ Hz$ and quality factor of **20** with pass band gain of **10**.
  (b)   Derive of impedance offered by generalized impedance converter. Also calculate the values of resistances and capacitors to simulate an inductor of $1\ mH$ using it.

5.   **Attempt any *one* part of the following:**   10x1 = 10

   (a)   Discuss analog multiplier along with its quadrant operation. Also explain the various applications of it.
   (b)   For the following circuit calculate the $i_1, i_2, i_o, i_L, v_o, v_1$. Also calculate the voltage gain, input resistance, current gain and power gain.

6.   **Attempt any *one* part of the following:**   10x1 = 10

   (a)   Realize R S flip flop using CMOS inverter. Also discuss its simplified and clocked implementation.
   (b)   Discuss the D flip flop implementation using CMOS. Also explain its master slave configuration.

7.   **Attempt any *one* part of the following:**   10x1 = 10

   (a)   Using 555 timer discuss the operation of monostable multivibrator. Also design a pulse generator of pulse width of $1\ ms$ using it.
   (b)   Explain the working of VCO with its block diagram and necessary waveforms and mathematical expressions.

QP23DP1_290

| 10-01-2023 13:20:53 | 117.55.242.132