QUESTION BANK

(B.E. SEM V EC ATKT EXAM)

GUJARAT UNIVERSITY

Integrated Circuits And Application

Each Question Of 10 Marks

Q-1: Derive the equations of close loop voltage gain, input resistance with feedback, output resistance with feedback, bandwidth with feedback, and total output offset voltage with feedback for voltage-series feedback amplifier

Q-2: The 741C op-amp having the following parameters is connected as a noninverting amplifier (figure-1) with $R_1 = 1k\Omega$ and $R_F = 10k\Omega$: A=200000,$R_i = 2\,M\Omega$,$R_o = 75\Omega$,$f_o = 5\,Hz$, supply voltages = ± 15V and output voltage swing = ±13V. Compute the values of$A_F, R_{iF}, R_{oF}, f_F, and\ V_{ooT}$. Repeat example for the voltage follower of figure-2.

Q-3: Define the following terms:

1) Input bias current 2) Input offset current 3) Input offset voltage 4) Differential input resistance 5) Input capacitance 6) Common-mode rejection ratio 7) Supply voltage rejection ratio 7) Large-signal voltage gain 8) Slew rate 9) Power supply rejection ratio 10) Input voltage range

Q-4: Explain differential amplifier with one op-amp and two op-amps in detail.

Q-5: Explain summing, scaling, and averaging amplifiers in detail

Q-6: Explain instrumentation amplifier in detail

Q-7: Explain diode match finder, zener diode tester and light-emitting diode tester in detail

Q-8: Explain peaking and differential input and differential output amplifier in detail

Q-9: Give the causes of slew rate and explain difference between bandwidth, transient response, and slew rate

Q-10: Explain integrator in detail
Q-11: Explain differentiator in detail
Q-12: Explain voltage to current with floating and grounded load
Q-13: Explain current to voltage converter and voltage follower in detail
Q-14: Explain zero crossing detector and Schmitt trigger in detail
Q-15: Explain positive and negative clippers and clampers in detail
Q-16: Explain sample-and-hold circuit and peak detector in detail
Q-17: Explain positive and negative small-signal half-wave rectifier circuit using one diode and using two diode
Q-18: Explain square and triangular wave generator in detail
Q-19: Explain saw tooth, log and antilog amplifier in detail
Q-20: Give the classification of filters and explain magnitude and frequency scaling in detail
Q-21: Draw the block diagram of 555 timer and explain function of each pin of 555 timer
Q-22: Explain monostable multivibrator in detail
Q-23: Explain astable multivibrator in detail
Q-24: Explain monstable multivibrator as frequency divider and astable multivibrator as square wave generator
Q-25: Draw the block diagram of PLL and explain operating principles of it
Q-26: Explain PLL applications in detail
Q-27: Explain adjustable three terminal voltage regulator in detail
Q-28: Give the introduction of voltage regulators and explain fixed voltage regulator in detail
Q-29: Explain switching regulators and its characteristics in detail
Q-30: Explain monolithic power amplifier LM380 in detail
Q-31: Explain function generator IC XR 2206 in detail
Q-32: Explain biquad filter design in detail
Q-33: Explain sallen & key circuit in detail
Q-34: Explain deyiannis-friend circuit in detail
Q-35: Explain absolute-value output circuit in detail
Q-36: Design a bandpass filter with a center frequency at ω_o =1000 rad/s, a bandwidth of 200 rad/s, and a maximum gain of 1, using the biquad circuit

Q-37: The circuit of figure-3 is to provide a gain of 10 at a peak frequency of 16 kHz. Determine the values of all components. Given C = 0.01μF, internal resistance of inductor = 30Ω, and $R_1 = 100\Omega$.

Q-38: a) Design a differentor to differentiate an input signal that varies in frequency from 10 Hz to about 1 kHz.

b) If a sine wave of 1V peak at 1000Hz is applied to the differentiator of part (a), draw its output waveform. Given $C_1 = 0.1\mu F$.

Q-39: a) In the circuit of figure-4, $R_A = 10\ k\Omega$, the output pulse width $t_p = 10ms$. Determine the value of C

b) The circuit of figure-4 is to be used as a divide-by-2 network. The frequency of the input trigger signal is 2 kHz. If the value of C = 0.01 μF, what should be the value of R_A?

Q-40: a) In the astable multivibrator of figure-5, $R_A = 2.2k\Omega$, $R_B = 3.9\ k\Omega$, and C = 0.1μF. Determine the positive pulse width t_c, negative pulse width t_d, and free-running frequency f_o.

b) Referring to the circuit of figure-6, determine the frequency of the free-running ramp generator if R is set at 10kΩ. Assume that $V_{BE} = V_{D1} = 0.7\ V$.

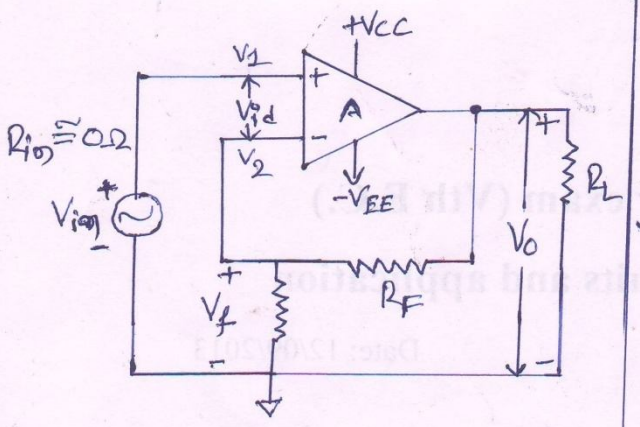

Figure-1

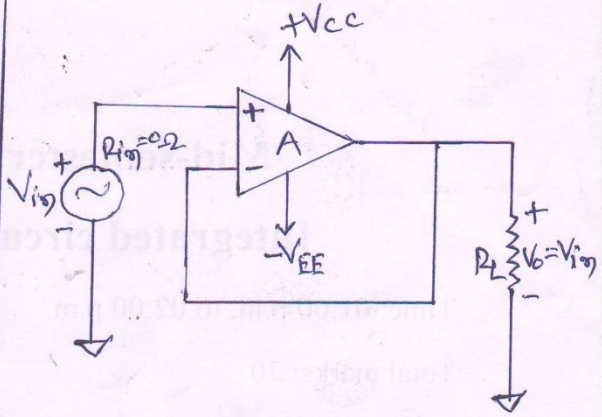

Figure-2

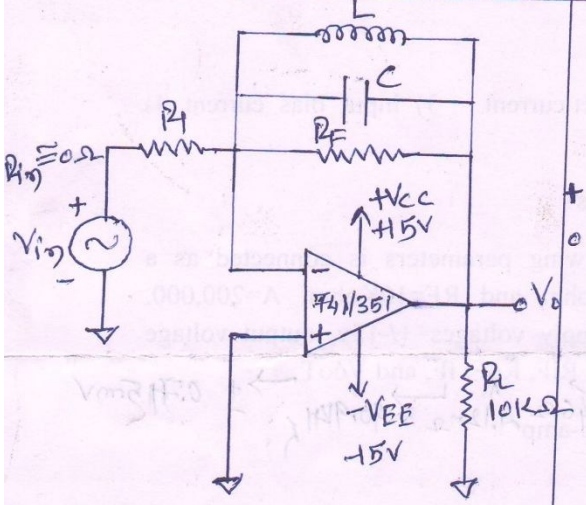

Figure-3

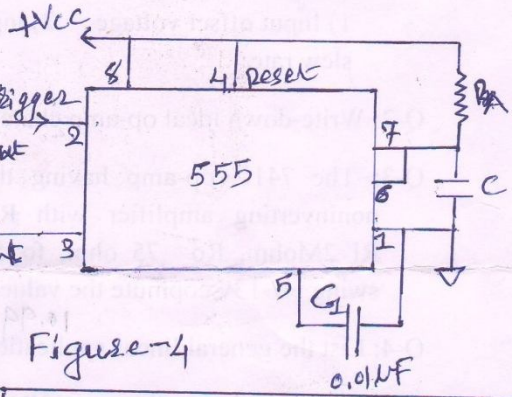

Figure-4

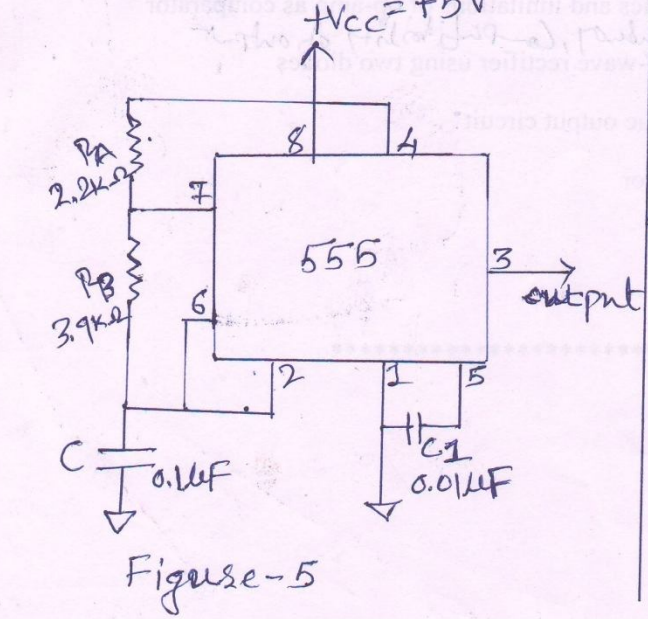

Figure-5

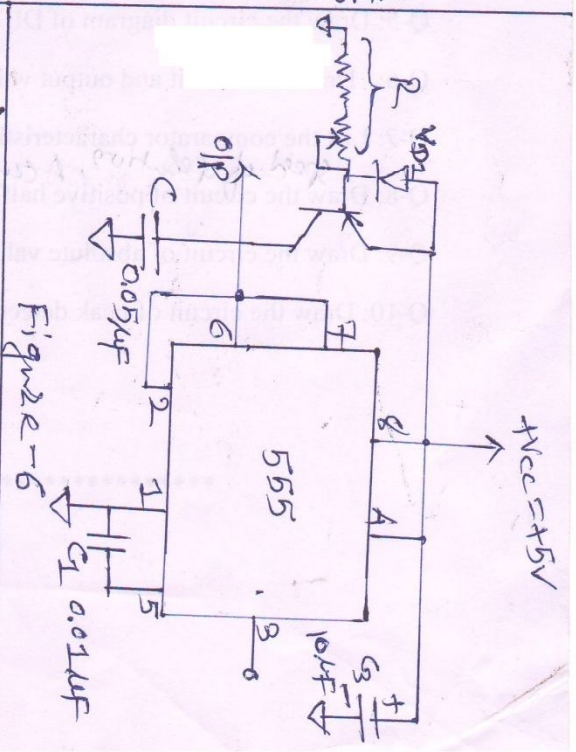

Figure-6