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06EC46

Fourth Semester B.E. Degree Examination, June/July 2015
Linear IC's and Applications

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Draw the basic circuit diagram of an op-Amp ; Identify all the terminals and briefly explain how the circuit operates. **(06 Marks)**

b. Explain the following parameters of an op-Amp with a suitable diagram : -
i) Input off set current ii) OFF SET NULLING iii) Input inpendace **(06 Marks)**

c. The difference of two input signals is to be amplified by a factor of 37. Each input has an amplitude of approximately 50 milli volts. Using an LF 353 op Amp, design and draw a sutable circuit. Also calculate the differential and common mode input resistances. **(08 Marks)**

2 a. Draw the circuit of high input impedance capacitor coupled non inverting amplifier. Briefly explain the circuit operation. **(10 Marks)**

b. Design and draw a capacitor coupled non-inverting amplifier using a single polarity supply voltage circuit.
Given : Supply voltage = + 24 V
Voltage gain = 100
Output Amplitude = 5V
Lower cut off frequency = 75Hz
Minimum load resistance = 5.6 kΩ
Op Amp = 741
[From 741 data sheet I_{Bmax} = 500 n Amp] **(10 Marks)**

3 a. Explain the working of the following with a neat diagram.
i) Phase lead compensation Network.
ii) Miller – effect compensation using
1) Transistor 2) op-Amp **(12 Marks)**

b. i) Calculate the cut off frequency limited rise time for a voltage follower circuit using a 741 op Amp. Also determine the slew-rate limited rise time if the ouput amplitude is to be 5 volts.
ii) Detetmine the miximum undistorted pulse output amplitude for the 741 voltage follower if the output rise time is not to exceed 1 μs.
iii) Calculate minimum output rise time and the maximum pulse amplitude at that rise time for a 741 amplifier with an upper cut-off frequency of 100 KHz. [The typical slew-rate for 741 op-Amp] S = 0.5 volts per μs **(08 Marks)**

4 a. Draw the circuit of a current source using op-Amp for a floating load and explain its operation. **(05 Marks)**

b. Draw & compare the performance of a difference amplifier with that of a differential input and output amplifier. **(05 Marks)**

c. Design and draw precision fullwave rectifier circuit to produce 2 volts peak output from a sine wave input with a peak value of 0.5v and a frequency of 1MHz. Use bi-polar op-Amps with a supply voltage of ± 15 v. **(10 Marks)**

PART – B

5 a. Explain the operation of a precision clampling circuit using op-amp. Draw the input and output wave forms. Show how the out voltage can be biased to any desired level. **(08 Marks)**

b. Draw a basic multiplier schematic symbol and identify the terminals. Show how two analog voltages are multiplied by using log-antilog signal? List out the applications of multiplier. **(06 Marks)**

c. Draw a practical wien bridge oscillator circuit with a negative feed back, explain its operation. **(06 Marks)**

6 a. Draw the circuit of an op-amp astable multivibrator. Show the voltage waveforms at various points in the circuit.Explain its operation and design procedure. **(10 Marks)**

b. With a neat sketch explain the operation of
i) I^{st} order Low pass Active filter
ii) II^{nd} order High pass Active filter **(10 Marks)**

7 a. Draw the series op-amp regulator power supply using discrete components, and explain its operation. **(05 Marks)**

b. Explain the following terms :-
i) Line regulation ii) load regulation and iii) ripple rejection for a D.C voltage regulator **(06 Marks)**

c. What are the limitations of three terminal regulator? Draw & explain the functional block diagram of 723 regulator. **(09 Marks)**

8 a. Explain the following for PLL
i) Lock-in-range
ii) Capture range
iii) Pull-in-time **(06 Marks)**

b. A 555 A stable multi vibrator has $R_A = 6.8\ k\Omega$, $R_B = 3.3\ k\Omega$ and $c = 0.1\ \mu F$ calculate
i) t_{high} ii) t_{low} iii) Free running frequency iv) Duty cycle
Draw the connection diagram. **(10 Marks)**

c. Calculate the value of LSB, MSB and full scale output for an 8 bit DAC for 0 to 10 Volts range i) 0110 (For a 4 bit DAC) ii) 10111100 (For a 8 bit DAC) **(04 Marks)**

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