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(2125)

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B. Tech 5th Semester Examination
Linear Integrated Circuit and Design (NS)

EC-315

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from section A, B, C & D. Section-E is compulsory.

SECTION - A

1. (a) What is constant current bias? Describe how it can be used for increasing CMRR of differential amplifier. (8)
- (b) Discuss the transient response and stability problem in op-amp. (5)
- (c) Design an op-amp circuit to give an output voltage $V_0 = 3V_1 - 2V_2 + 5V_3$ where V_1 , V_2 and V_3 are inputs. (7)
2. (a) Why frequency compensation is required for op-amps? Discuss frequency compensation techniques used in operational amplifier. (6)
- (b) Define slew rate and describe a method to improve slew rate. (6)
- (c) For the non-inverting Op-Amp with input resistance R_1 and feed-back resistance R_2 find the effect on output voltage because of the common mode voltage when the input voltage changes by 1 V. Given CMRR =70dB. (8)

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SECTION - B

3. (a) Describe Op-Amp based voltage to current converter (floating load) and voltage to current converter (grounded load) with appropriate circuit diagram and output current and voltage relation. (10)
- (b) An amplifier has mid-band voltage gain ($A_{(v \text{ mid})}$) of 1000 with $f_{-L} = 50$ Hz and $f_{-H} = 50$ KHz, if 5% feedback is applied then calculate gain f_{-L} and F_{-H} with feedback. (5)
- (c) Describe the working of ample and hold amplifiers. Why S/H is used? (5)
4. (a) Design the difference amplifier with two Op-Amp. Find out the relationship between input and output voltage. (10)
- (b) Design and describe the working of Op-Amp based differential amplifier. How high frequency noise and stability problem is compensated in Op-Amp based differentiator? (10)

SECTION - C

5. (a) Describe Op-Amp based astable multi-vibrator. How it can be used to generate saw-tooth waveform? (10)
- (b) Describe following Op-Amp based circuit with appropriate diagram and input/output voltage relationship
(i) Schmitt triggers (ii) Precision Rectifier
(iii) Peak Detector (10)
6. (a) Draw the circuit of a second order Butterworth low pass filter and derive its transfer function. (10)
- (b) Describe the second order band reject filter and derive its transfer function. (10)

SECTION - D

7. (a) Explain the internal structure of voltage regulator IC 723. Also draw a low voltage Regulator circuit using IC 723 and explain its operation. (10)
- (b) Describe the followings:
- (i) Phase Locked Loop (PLL)
 - (ii) Monolithic PLLs (10)
8. (a) Explain how 555 IC can be used in astable mode. (10)
- (b) With neat diagram, explain the working principle of:
- (a) R-2R ladder type DAC
 - (b) LM317 (10)

SECTION - E

9. (a) What are the two requirements to be met for a good current source?
- (b) List the various methods of realizing high input resistance in a differential amplifier.
- (c) Why active guard drive is necessary for an instrumentation amplifier?
- (d) What is comparator?
- (e) VCO is also called as V-f converter, Why?
- (f) Define settling time of D/A converter.
- (g) What is a switched capacitor filter?
- (h) What is a zero crossing detector?
- (i) Find the resolution of a 12 bit DIA converter.
- (j) Why integrators are preferred over differentiators in analog computers? (2×10=20)