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Total Number of Pages: 02

B.Tech
PEEI5302

6th Semester Regular / Back Examination 2016-17

ANALOG SIGNAL PROCESSING

BRANCH(S): ECE, ETC

Time: 3 Hours

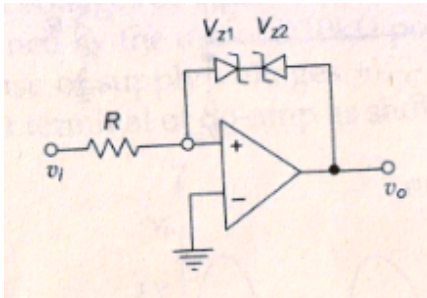
Max Marks: 70

Q.CODE: Z238

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)**
- a) What is the difference between compensated and non – compensated Op-amp?
 - b) Mention the advantages of active filter over passive filter.
 - c) An inverting amplifier using Op-amp has a flat response up to 25 KHz. The gain of the amplifier is 20 and the slew rate of the Op-amp is $0.5V/\mu s$. What is the maximum peak to peak input signal can be applied without distorting the output?
 - d) What is a precision diode?
 - e) A $50 \mu A$ input offset current flows in an Op-amp inverting input circuit in which the feedback resistor is $150 K\Omega$ and the input resistor is $10 K\Omega$. Calculate the output offset voltage.
 - f) What is squaring mode accuracy of multiplier?
 - g) What is Thermal drift w.r.t. Op-amp?
 - h) A differential input Op-amp has a measured CMRR of 80 dB and the differential gain of 100 dB. Calculate the output voltage that would occur if a common mode voltage of 1 volt is applied to both inputs simultaneously.
 - i) Consider a non-inverting amplifier with feedback resistor $R_f = 10 K\Omega$ and input resistor $R_1 = 100 \Omega$ with broadband noise characteristic of Op-amp indicating a input rms noise level of $V_{ni} = 0.5\mu V$. Calculate the noise level possible in the bandwidth 10 Hz to 1 KHz.
 - j) Define the term Hysteresis. Which are the parameters that determine Hysteresis in Op-amp circuit?
- Q2 a) Draw the circuit of a basic differentiator circuit using Op-amp. What are its drawbacks and how they can be overcome? (5)**

b) (5)



Draw the transfer characteristics of the comparator circuit shown in figure. Assume the break down voltage of the diodes are $V_{z1} = V_{z2} = 5.5$ V. Assume the Op-amp to be ideal.

Q3 a) Design a circuit to convert a 0 mA to 20 mA input current to a 0V to 10 V output voltage using Op-amp. The circuit is powered from ± 15 V regulated power supply. (5)

b) Mention the different sources of noise in Op-amp. How they can be minimized? (5)

Q4 a) Explain the operation of binary weighted type ADC. Discuss its advantages and disadvantages. (5)

b) What are switched capacitor filters? Explain with diagram. What are its advantages and disadvantages? (5)

Q5 a) Draw and explain the operation of a full wave precision rectifier circuit using Op-amp. (5)

b) Design a first order high pass filter at a cut-off frequency of 2.5 KHz with a pass band gain of 1.5. Assume suitable parameters. (5)

Q6 a) Draw and explain the working of Isolation amplifier. Mention its applications. (5)

b) Explain Logarithmic amplifier with its circuit diagram (5)

Q7 What is an Instrumentation amplifier? What are the desirable characteristics of Instrumentation amplifier? What are its applications? (10)

Draw an Instrumentation amplifier system whose gain can be controlled by a variable resistor.

Q8 Write short answer on any TWO: (5 x 2)

- a) Analog Multiplier
- b) Integrator using Op-amp
- c) All pass filter
- d) Peak detector using Op-amp