

COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Government of Maharashtra)

END Semester Examination

IE202 Analog Techniques

Programme: S. Y. B. Tech (Instrumentation and Control)

Year: 2011-12
Duration: 3 hrs

Semester: I
Max. Marks: 50

1. All questions are compulsory.
2. Assume suitable data if necessary.
3. Figures to right indicate full marks.
4. Draw neat figures wherever required.
5. Use of non programmable calculator is allowed.

Q1

- A) Where do we require power amplifiers? Justify. Compare different classes of power amplifiers. [5]
- B) i. Describe how a differential amplifier differs from an amplifier.
- ii. The output voltage of a particular op-amp increases 8 V in 12 μ s in response to a step input. Determine the slew rate.
- iii. In case of op-amp explain the difference between common mode input impedance and differential mode input impedance. [5]

Q2

- A) i. Compare the triac and SCR in terms of basic operation.
- ii. How does a triac differ from diac?
- iii. In a basic UJT relaxation oscillator, what are the factors determines the period of oscillations? [5]
- B) Draw a circuit of boost converter along with waveform and derive the equation for output voltage? Compare non isolated converter topologies? [5]

Q3

- A) i. An RC low pass filter has $R = 1.8 \text{ K}\Omega$ and $C = 0.0056\mu\text{F}$. What is its critical frequency? [5]
- ii. Draw circuit diagram of second order high pass filter and derive the expression for cut of frequency

- B)** i. Design voltage regulator using three terminal voltage regulator IC to generate 13 volts and 1 A output from 230 volts ac input.
- ii. Define input offset voltage, input offset current and CMRR for op-amp. [5]
- Q4**
- A)** i. Accurately analyze the voltage divider circuit with $R_1=33\text{ K}\Omega$, $R_2=12\text{K}\Omega$, $R_C=1.2\text{K}\Omega$, $R_E=1\text{ K}\Omega$, $h_{FE} = 50$, $V_{BE} = 0.7\text{V}$, $V_{CC}= 18\text{V}$.
- ii. Compare various biasing circuits. [5]
- B)** i. Define h_{ie} , h_{re} , h_{oe} and h_{fe} . Also state typical h parameter values for low current transistor.
- ii. Draw h parameter approximate model of CE transistor? [5]
- Q5)**
- A)** i. Draw a circuit, input and output waveforms for Integrator and Differentiator.
- ii. Write important specifications of IC 7812 and explain. [5]
- B)** i. What is Q point of a transistor? How it affects the performance of a Transistor?
- ii. Explain the operation of a MOSFET? Compare SCR and MOSFET with respect to gate control? [5]