COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

(IE-203)   Analog Techniques

ourse: B.Tech   Branch: Instrumentation and Control Engineering

emester: Sem III

ear: 2014-2015   Max.Marks:60

uration: 3 Hours   Time:- 10 to 1 p·m   Date: NOV 2014

Instructions: MIS No. ☐☐☐☐☐☐☐☐☐

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

Q.1

A) A silicon transistor with V_{BEsat} = 0.8V, h_{FE} = 100, V_{CEsat}= 0.2 V is   [6]
    used in the circuit shown. Find the minimum value of Re for which
    the transistor remains in saturation.
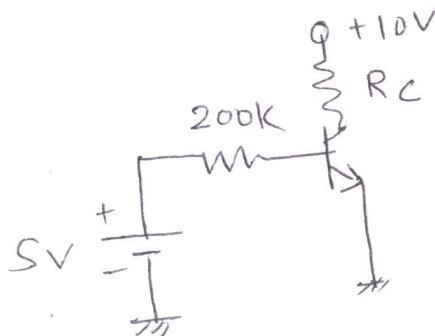
B) What is the specialty of differential amplifier? Where do you need   [6]
    differential amplifier? Justify its operation and derive the output
   voltage expression.

Q.2
A) Compare SCR and MOSFET. How willyou reduce component size   [6]
    of the converter? Why switching losses are important in dc-dc
    converter?
B) Where do you need buck-boost converter? How is it different from   [6]
    other converters? Also derive the expression for output voltage
    and draw its typical circuit diagram.

Q.3

A) Derive expression for A_I, A_V, A_{IS}, A_{VS} and Z_I for CE transistor using h parameter model. [6]

B) How will you generate square waveform using Op-AMP, suggest a suitable circuit scheme and justify its operation. Also draw the waveform associated with it. [6]

Q.4

A) Design the regulated power supply for the following specifications: [6]
Input Voltage: 230 V, 1 Phase AC Supply
Output Voltage: 12 Voltage
Output Current: 1 A

B) Calculate the overall gain for the instrumentation amplifier. Also determine the current and voltage levels throughout the circuit when a + 1 V common mode input is present along the +/- 10 mV signals. [6]
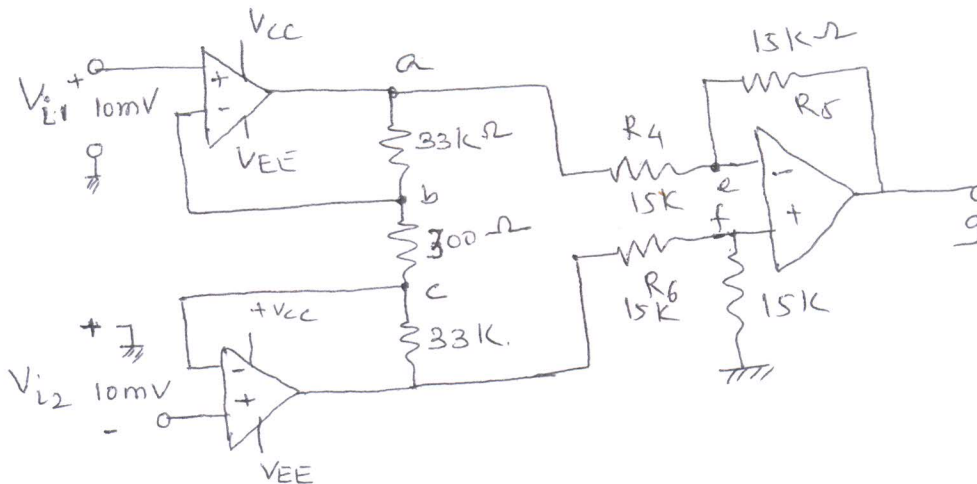
Q.5

A DC to DC converter has to design to provide output voltage of 60 volts and output current 20 A. The input to the converter is 110 V. The switching frequency is 25 KHz. The peak to peak 2.5 % ripple for output voltage. Inductor ripple is 10% of load current. Determine value of L and C. Also determine input current and duty cycle. [6]

B Design relaxation oscillator using UJT if V_{BB} = 12 volts, R = 20 KΩ, C = 1uF, R_{B1} = 10KΩ, R_{B2} = 5KΩ, I_P = 100uA, V_V= 1 Volts and I_V = 5.5 mA. Determine V_P, Rmax, Rmin and frequency. [6]