



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR
OF SCIENCE COMPUTER ENGINEERING

SCE 517: ELECTRONIC CIRCUITS AND SYSTEMS

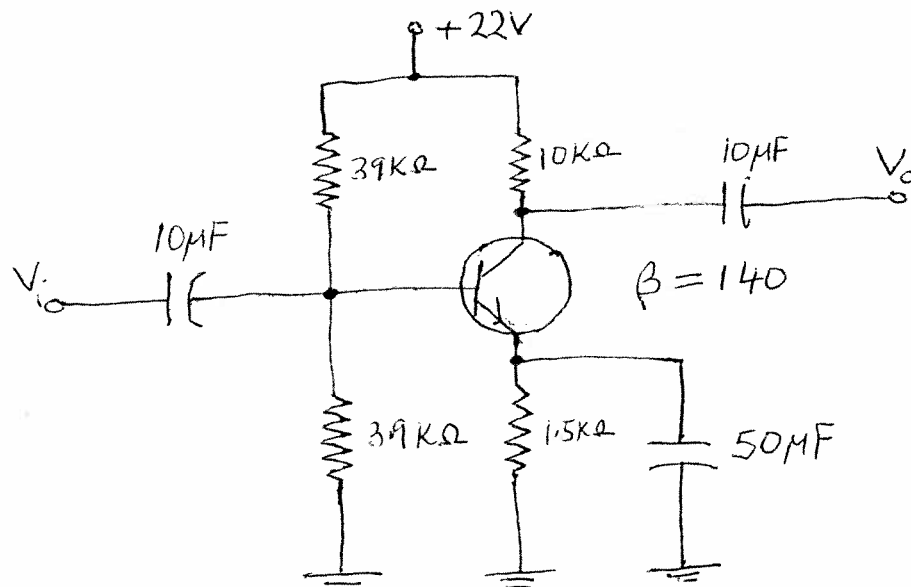
DATE: Thursday, 12th April, 2012

TIME: 11.00 a.m. – 1.00 p.m.

INSTRUCTIONS:

Question 1 (30 marks)

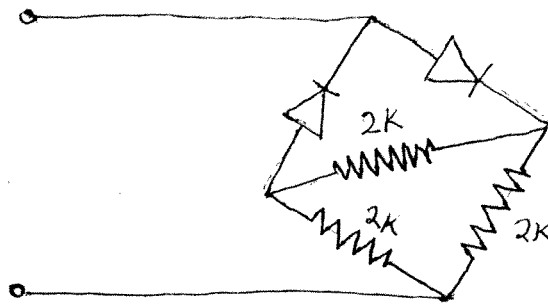
- a) Explain the effect of temperature to the following:
- i) Common-emitter forward current amplification factors (β)
 - ii) Reverse saturation current (I_{co})
- (4 marks)
- b) Using appropriate circuit configuration for a series diode, obtain the load line equation and draw the characteristics
- (5 marks)
- c) Explain the operation of half-wave voltage doubler
- (5 marks)
- d) Determine the dc bias voltage V_{CE} and current I_c for the voltage divider configuration in figure below
- (6 marks)



- e) Using appropriate diagram explain the operation of a current mirror circuit. (5 marks)
- f) Design a digital – to – Analog converter for five digital inputs using ladder network of $15\text{ k}\Omega$ and $30\text{ k}\Omega$ resistors. If reference voltage is 16V , calculate the output voltage for an input of 11010 to the circuit. (5 marks)

Question 2 (20 marks)

- a) Using a diagram explain the operation of a relay driver linear circuit. (6 marks)
- b) Determine the output waveform for the network below and calculate the output dc level and PIV (peak reverse voltage) of each diode (6 marks)



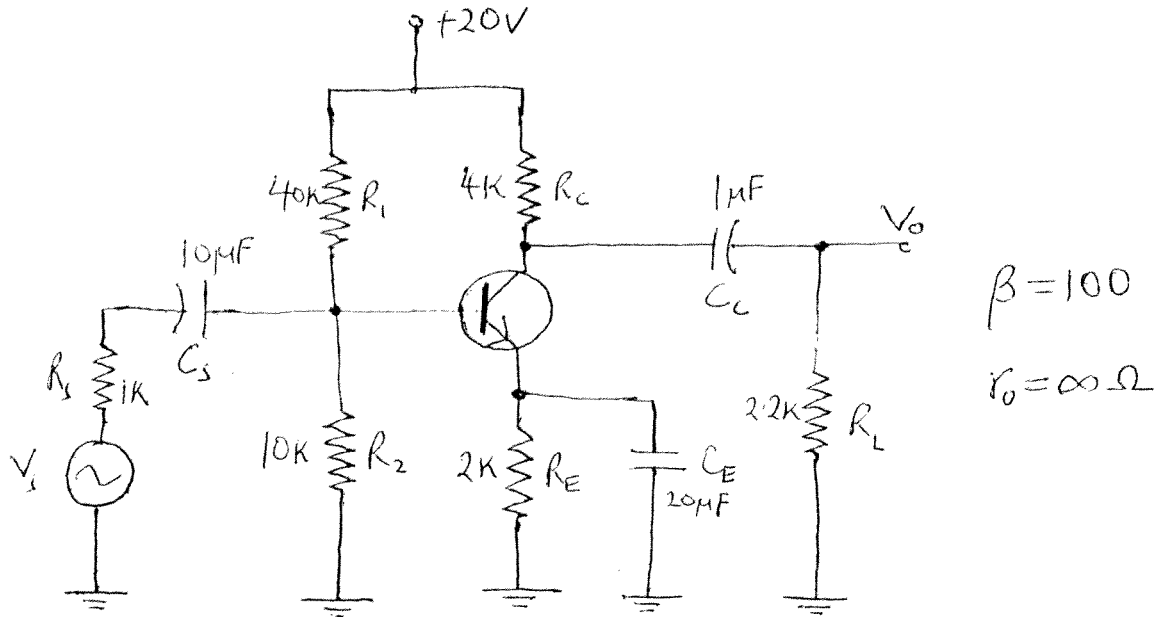
- c) Explain the operation of a Voltage Controlled Oscillator (VCO) (8 marks)

Question 3 (20 marks)

- a) Design a current – controlled current source circuit (6 marks)
- b) Explain the operation of dual-slope Analog – to – Digital conversion method (6 marks)
- c) Using appropriate circuit design, explain the operation of a battery charging circuit (8 marks)

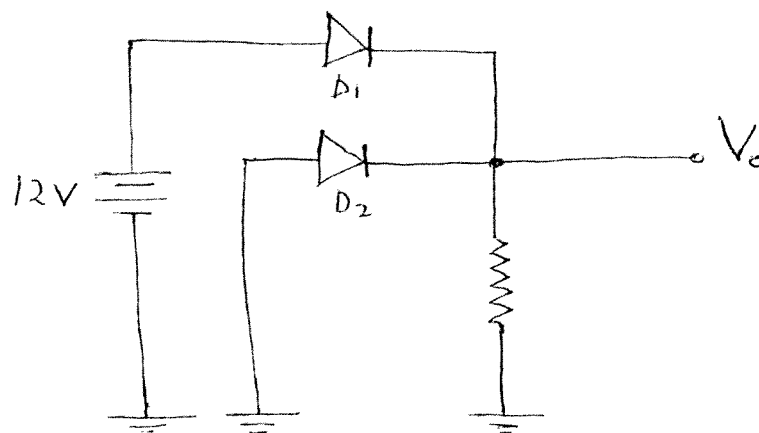
Question 4 (20 marks)

- Design a voltage supply using a full-wave rectifier bridge, appropriate discrete circuit elements and lc regulator to provide output of +5V (6 marks)
- Explain the operation of a logic 2-input OR gate circuit designed from Bipolar junction transition (BJT) (6 marks)
- Determine the lower cutt-off frequency for the circuit below (8 marks)



Question 5 (20 marks)

- Show that $\beta = \frac{\alpha}{1 - \alpha}$ (6 marks)
- Determine the output voltage of circuit below (6 marks)



- c) Explain the application of 565 IC Phase Locked Loop (PLL) circuit as a frequency demodulator (8 marks)